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Income and food purchases-related GHG emissions: the French case

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12th European Nutrition Conference (FENS)

Berlin, Germany, October 20–23, 2015

Abstracts

Guest Editors
Heiner Boeing, Nuthetal
Helmut Oberritter, Bonn
Hannelore Daniel, Freising-Weihenstephan
on behalf of the German Nutrition Society

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EDITORS ABSTRACT

Every four years, the Federation of the European Nutrition societies (FENS) organizes a scientific conference that brings together European and Paneuropean experts to discuss most recent scientific developments in the food, diet and health arena. The 12th FENS conference took place in Berlin, October 20 to 23, 2015, under the hospice of the German Nutrition Society with the motto "Nutrition and Health during life cycle – science for the European consumer". Sessions were dedicated to latest research and outcomes of studies on the impact of diet into body functions, on dietary intake and dietary status of the population and of specific groups as well on the role of diets in disease occurrence and prevention. Translational research addressed strategies and approaches to change dietary behavior and policy measures. Four plenary sessions framed the program with distinquished speakers covering health aspects in the life cycle but also the global dimension of food security.

The present supplement comprises the 950 submitted abstracts and additional 320 abstracts of invited and selected speakers. The abstracts are ordered according to the scientific sessions of the conference, and the industry sponsored satellite activities, and posters. Within the program up to eight scientific sessions were held in parallel with thematic areas of (1) Food and nutrient intake, dietary patterns, dietary guidelines, (2) Advances in dietary studies, methodology and design,(3) Metabolic diversity, (4) Nutrition, public health, chronic diseases, and (5) Food quality, food safety, sustainability, consumer, behavior and policy.

The supplement can be searched with pdf-tools by using keywords such as authors, topics, specific compounds, etc.

Keywords: Nutrition, Nutrition policy, FENS, German Nutrition Society

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Welcome by the Conference President Prof. Heiner Boeing

Dear colleagues,

On behalf of the German Nutrition Society and the Organizing Committee of the 12th FENS European Nutrition Conference I would like to cordially invite you to the Estrel Convention Center in the city of Berlin from the 20th to the 23rd of October 2015 and to participate in the scientific program and cultural activities we are currently designing.

The aim of this Conference is to communicate up to date information obtained with scientific rigor and encouragement that could help the European citizens and consumers to manage a successful life and maintain healthy in all age periods. The knowledge of the members of our European Nutrition Societies and their friends will be activated for this ambitious goal probably not without intense scientific debates. In line with this goal of the FENS we put our conference under the Slogan 'Nutrition and health throughout life-cycle - Science for the European consumer'.

We have planned four days of scientific presentations and debates organized as oral and poster communications which will center around 5 major topics: Food and nutrient intake, dietary patterns, dietary guidelines; Advances in dietary studies, methodology and design; Metabolic diversity; Nutrition, public health, and chronic diseases; and Food quality, food safety, sustainability, consumer behavior and policy.

We would also like to invite you to experience the city of Berlin, one of the largest scientific locations in Europe. The networking between science and research is supported by around 300 universities, universities of science, research institutions and technology parks. The German capital with its Estrel Convention Center, Europe's largest convention, entertainment & hotel complex, is a city of high excitement and contrasts- history and modernity, bustling urbanity and sheer relaxation, skyscrapers and spreading wathes of green. In Berlin, there are always natural surroundings where you can unwind, even in the downtown area.

We look forward to a very successful FENS Conference and to meeting you in Berlin.

Yours sincerely,

Prof. Dr. Heiner Boeing

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Welcome by the Federal Minister of Food and Agriculture, Christian Schmidt

Dear congress participants,

Nutrition and health are inherently linked. Nowadays we are living longer and want to do so, of course, in the best health possible. But unfortunately, with age, the risk of chronic diseases also increases. This presents considerable challenges to the healthcare system as well as to individuals.

We have to face up to these challenges together as a society. Chronic diseases are largely linked to lifestyle and diet. We require new research approaches to better understand how different factors affect the development of chronic diseases, which in turn will allow suitable preventive approaches to be developed for the population. Interdisciplinary research into nutrition is particularly suited for providing us with answers in this area.

It therefore gives me great pleasure to welcome to Germany for the first time the 12th European Nutrition Conference entitled: "Nutrition and Health throughout Life Cycle – Science for the European Consumer". Interdisciplinary cooperation is vital in research. This is reflected in the wide range of presentations and symposia at this conference.

Increasingly we are turning our attention to the food production process in its entirety, as can be seen in such buzzphrases as "from farm to fork". Food safety and transparent production processes are keys here. Research and politics have to work together to achieve this.

In this regard the research institutions of the Federal Ministry of Food and Agriculture are also making important contributions. In Germany, the Third National Consumption Study is currently being prepared.

Research thrives on interaction, and on shared ideas and projects that must not stop at national boundaries. This is why the Federal Ministry of Food and Agriculture has from the very beginning participated with the Federal Ministry of Research in the Joint Programming Initiative on "A Healthy Diet for a Healthy Life", which now comprises 25 states. This initiative has set itself the task of enhancing nutrition research, and Europe as a centre of research, by establishing a common research agenda. Seven joint projects have already been launched with the aim of intensifying cooperation in the long term.

New research findings are one thing, implementing them in everyday life is quite another. Expectations and reality can often be worlds apart. Here we need to bridge the gap between research findings and concrete dietary recommendations. This is what characterises this conference led by the European Nutrition Societies Ladies and Gentlemen, do use this opportunity for stimulating conversation, fruitful discussions and a whole host of new findings for your important work.

Yours sincerely,
Christian Schmidt

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PLENARY LECTURES

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Nutrition and Health throughout life cycle: Global picture

Walter Willett, Harvard University. USA.

Much has been learned about the relation of diet to health during the last three decades from large cohort studies and a limited number of randomized trials. This knowledge has been translated into dietary guidelines, has affected diets in important ways, and has had major beneficial impacts on health. However, almost all of this information has come from studies that assessed diet in midlife with limited follow-up. This was a logical approach because midlife and later is when the major burden of disease and mortality is experienced. However, much evidence indicates that exposures during childhood are etiologically important for breast and possibly other cancers. Also, the influences of diet throughout life in relation to cognitive function and other conditions at older ages have been minimally investigated. Our knowledge of diet and health will remain incomplete until the full range of exposures from in utero to the end of life, and health outcomes throughout life, have been fully examined.

Only recently have prospective data on diet during adolescence and cancer become available. Using a retrospective/prospective approach within the Nurses' Health Study II, high consumption of red meat and low intake of dietary fiber from multiple sources predict higher risk of breast cancer, which was not seen when diet was assessed during midlife. Also, among men in the Health Professional's Follow-up Study, multiple aspects of diet during midlife strongly predict memory loss many decades later. These finding reinforce the need for research to examine fully the entire life cycle if we are to have a complete understanding of the relation of diet to health. This will require creative research approaches and commitment to long term funding of well-designed studies.

Nutrition and Health throughout life cycle: Children and adolescents

Luis Alberto Moreno Aznar, University of Zaragoa. Spain.

Not received.

Nutrition and Health throughout life cycle: Targeting fat metabolism by diet to improve metabolic health in adults

Ellen E Blaak, Department of Human Biology, NUTRIM, school of Nutrition and Translational Research in Metabolism, Maastricht University, The Netherlands.

The prevalence of overweight and obesity and related chronic metabolic diseases is increasing worldwide. Disturbances in fatty acid metabolism in adipose tissue, liver, skeletal muscle, gut and pancreas play an important role in the development of insulin resistance, impaired glucose metabolism and type 2 diabetes mellitus.

Besides an increased fat mass, adipose tissue dysfunction, characterized by an altered capacity to store dietary lipids may result in systemic lipid overflow This lipid overflow and the impaired capacity of skeletal muscle to adjust substrate oxidation to substrate supply may contribute to the accumulation, and altered localization and composition of bioactive lipid metabolites in ectopic tissues, which may be one of the drivers of peripheral insulin resistance through interference with insulin signaling.

Focuss in this lecture will be on dietary intervention strategies that may target impairments in adipose tissue and skeletal muscle fat metabolism thereby improving glucose homeostasis and insulin sensitivity. Data will be presented on the impact of polyphenols and gut-derived microbial products like short chain fatty acids (SCFA, from microbial fermentation of dietary fibres) on fat metabolism and metabolic health in overweight or obese subjects with a high risk for developing type 2 diabetes mellitus and cardiovascular disease.

There is human evidence that dietary polyphenols may affect energy and substrate metabolism and cardiometabolic risk profile. Nevertheless, effects may depend on the polyphenol content and the composition of the supplement. Combining polyphenols with distinct mechanisms of action might result in additional and/or synergistic metabolic effects. In this lecture, data on the short and long term effects of epigallocathechin-3-gallate (EGCG) and resveratrol on adipose tissue and skeletal muscle function and metabolism and tissue-specific insulin sensitivity will be presented. Interestingly, there are indications that polyphenols may also affect gut microbial composition, affecting thereby metabolism. The second part of this lecture will focuss on the role of our gut microbiota and in particular gut microbial products like SCFA, on human metabolic health. Implications for nutritional intervention strategies will be discussed.

Nutrition and Health throughout life cycle: Nutrition and Ageing

Thomas B. L. Kirkwood, Newcastle University Institute for Ageing. Campus for Ageing and Vitality, Newcastle upon Tyne NE4 5PL. United Kingdom

There are multiple important connections between nutrition, ageing, health in later life, and longevity. As human life expectancy continues to increase, the evidence grows ever stronger that the ageing process is not fixed but malleable. Ageing and its associated diseases arise from the accumulation through life of various kinds of molecular and cellular damage. Diet has adverse effects on ageing when it includes components, such as excess sugars and saturated fats, that add to the damage; it has beneficial effects when it provides ingredients that enhance the body's intrinsic capacity for maintenance and repair. At a deeper level, the links between ageing and healthy longevity arise from the fundamental physiological requirement to make best use of the energy and other resources that derive from nutrition. Indeed, the tension between how much of the nutritional resources should be directed towards maintenance and repair, versus other essential functions such as growth and reproduction, is at the core of the disposable soma theory which integrates evolutionary and physiological aspects of ageing within a single framework. The allocation of resources is mediated through actions of nutrient-sensing molecular pathways, such as insulin/IGF-1 and mTOR. In short-lived animals (mice, flies, worms), these pathways appear to offer an adaptive adjustment to food scarcity that boosts maintenance at the expense of reproduction, resul-

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ting in the well-known phenomenon of life extension through dietary restriction. Whether or not dietary restriction might have similar effects in human beyond, at a moderate level, protecting against the various metabolic disorders associated with excess consumption, is controversial. It will be shown that there are strong grounds to suggest that while consumption of a light diet is generally beneficial for health span, it is unlikely actually to slow the ageing process.

Producing more food for the growing global population

Tim Benton, Champion of the UK's Global Food Security Programme and Professor, University of Leeds, UK.

That the growing global population is creating increasing demand for food over the next decades is well appreciated. However, what is less well appreciated are the constraints on meeting this demand and providing sufficient, safe and healthy food. In this plenary, I will review the projected way demand is growing and the constraints upon meeting it. These arise from finite natural resources (land and water), a need for agriculture to avoid impacts on the environment that are to the detriment and also from climate change. There are therefore likely to be supply-side limits on what can be provided, sustainably –in terms of absolute amounts, but also the dietary breadth and quality of what might be available in future. On the demand side, interventions to reduce the loss and waste will relieve some supply-side pressure, but changing our diets (in terms of reducing excessive caloric intake in the developed, and increasingly developing, world) and changing the spectrum of what we eat has the potential to contribute significantly towards achieving a sustainable and equitable food system. "Sustainable nutrition" clearly also has the potential to contribute significantly to public health outcomes. "Eating better" is therefore not just a public health imperative but has important implications for the food system and global food security.

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ABSTRACTS LECTURES SCIENTIFIC PROGRAM

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Session 1.1. Critical micronutrients in Europe: e.g. iodine, folate, vitamin D... including DRIs

Making a Meaningful Difference-Iodine Supplementation based on Survey data

Assoc. Prof. Dr. Ilze Konrade, Riga East Clinical Hospital, Riga, Latvia

Iodine is an essential constituent of the thyroid hormones that cannot be synthetized by the body. Since 1922, when Switzerland was the first country to establish a national iodine fortification program, considerable progress worldwide has been achieved; the number of iodine-sufficient countries has increased to 111, and only 30 countries remain mildly or moderately iodine-deficient. Despite this overall progress, recent data suggest that a minor iodine deficiency still prevails approximately in 50% of Continental Europe, and the problem has reappeared in industrialized countries like the United Kingdom, and the United States, therefore iodine deficiency disorders (IDDs) still represent a global threat to individuals and societies.

In most foods iodine content depends on the amount of iodine in the soil and is highly variable. Traditionally iodized salt, milk and seafood are considered the best dietary iodine sources. However, in most European countries access to iodised salt is incomplete (from 80% in Switzerland to 5% in the UK), the recommended fortification levels differ. Also universal restrictions regarding salt intake have been associated with iodine deficiency. Furthermore, the iodine content in milk products decreases as a result of a lower use of iodophors in the farming. Important aspect is also the growing consumption of soy products that may contain isoflavones, as well as products containing perchlorate and thiocyanates, which may reduce active intrathyroid iodine transport.

The most vulnerable groups are pregnant women and children, even in areas with adequate iodine intake in population. A recent meta-analysis has shown that at age 5, children lost 7.4 IQ points due to iodine deficiency during pregnancy. Econometric models have established that this result greatly impacts not only individuals but also society as a whole because a one-point decrease in IQ has been associated with a persistent 0.11% annual decrease in per capita gross domestic product (GDP), which is connected with a recession in the economy and tends to translate into decreased productivity. These substantial consequences result from the fact that even mild iodine deficiency during pregnancy disrupts the metabolism of thyroid hormones, which are a critical endocrine regulator of early brain development. Thyroid hormones act specifically by regulating the genes that underlie major neurodevelopmental events, including neurogenesis, axon and dendrite formation, neuronal migration, synaptogenesis and myelination. Thyroid hormones are also involved in the regulation of the basal metabolic rate and macronutrient metabolism. Due to the trend of insufficient iodine intake in pregnancy, the World Health Organization (WHO) has increased the daily iodine intake recommendation for pregnancy to 250 μg iodine (WHO/UNICEF/ICCIDD 2007), where 150 μg is provided by supplements from the earliest time possible. However, there are no placebo-controlled randomized trials of iodine supplementation in pregnancy in mild or moderately deficient populations that show benefit, or at least lack of harm.

Iodine deficiency is most commonly assessed by measuring urinary iodine concentration (UIC) because approximately 90% of dietary iodine is excreted in the urine. Due to large intra-and interindividual variation, UIC cannot be used to assess iodine status in individuals and is only appropriate for population. A median UIC <100 μg /L in children and nonpregnant adults or <150 μg /L in pregnancy indicates iodine deficiency. In addition to UIC, other measures of iodine status include thyroid volume, thyrotropin (TSH), thyroglobulin (Tg), triiodothyronine (T3), and thyroxine (T4). These indicators should be used for careful monitoring for both iodine deficiency and excess to ensure that iodization programs are safe and effective.

Acknowledgments: Survey study on Iodine status in Latvia was supported by the Latvian National Research Programme BIOMEDICINE

Vitamin D – where do we stand in relation to recommendations and meeting same ?

Kevin D. Cashman, Vitamin D Research Group, School of Food and Nutritional Sciences, University College Cork, Cork, Ireland

Introduction: Vitamin D deficiency and inadequacy are evident in Europe and beyond, and contributes to risk of metabolic bone disease as well as potentially other non-skeletal chronic diseases in both early-life and later-life. Thus strategies for their prevention are of major public health importance. Dietary Reference Values (DRV) for vitamin D have a key role in protecting against vitamin D deficiency in the population, and these have been re-evaluated in recent years in several countries/regions.

Objectives: This review will briefly overview the various DRV from agencies in Europe. It will compare current population intake estimates for children and adults in Europe against the Estimated Average Requirement for vitamin D, as a benchmark of nutritional adequacy. It will also overview the current situation in relation to circulating 25-hydroxyvitamin D levels in European populations and how these compare to internationally proposed cut-offs. While vitamin D supplementation has been suggested as a method of bridging the gap between current vitamin D intakes and new recommendations, the level of usage of vitamin D supplements in many countries as well as the vitamin D content of some supplements, appears to be low. The fortification of food with vitamin D has been suggested as a strategy for increasing intake with potentially the widest reach and impact in the population. The present review will highlight the need to re-evaluate current food fortification practices as well as consider new additional food-based approaches, such as biofortification of food with vitamin D, as a means of collectively tackling the low intakes of vitamin D within populations and the consequent high prevalence of low vitamin D status that are observed.

Conclusion: Strategic approaches to fortification of a wide range of foods, has the potential to increase vitamin D intakes in the population and minimize the prevalence of low vitamin D status.

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Achieving optimal folate status for health in European populations

Helene McNulty, Mary Ward, Leane Hoey, Catherine Hughes, JJ Strain and Kristina Pentieva, Northern Ireland Centre for Food & Health (NICHE), School of Biomedical Sciences, University of Ulster

Folate has important roles throughout the lifecycle. Notably, conclusive evidence has existed for over 20 years that folic acid supplementation in early pregnancy protects against neural tube defects (NTD). Apart from preventing NTD, emerging evidence supports other roles for folate in maintaining health, from pregnancy, through childhood, to preventing chronic disease in later life. Of particular interest is the link between folate and brain health in ageing and the longer term effect of folate exposure in pregnancy on childhood cognitive development. Biologically, folate is required for one-carbon metabolism and the health effects of folate involve important gene-nutrient interactions and metabolic interrelationships with other B vitamins.

Despite the known and emerging health benefits, achieving optimal folate at a population level can be challenging. This is because the bioavailability of natural food folates is poor compared to folic acid (the synthetic vitamin). Folic-acid fortified foods provide a highly bioavailable vitamin form. Thus biomarker status of folate tends to be lowest in those countries without access to folic acid-fortified foods and highest in countries with mandatory fortification. In countries such as Ireland and the UK with voluntary fortification policies, folate status will vary depending on individual consumer practices. For many Europeans, dietary folate intakes are insufficient in achieving optimal biomarker status.

The variability in folate status is reflected in differences in health outcomes. In European countries, policy to prevent NTD has been largely ineffective. This is because women are generally not compliant with folic acid supplementation as recommended before and in early pregnancy. In contrast, those countries worldwide (n=75) where mandatory folic acid-fortification has been introduced have experienced marked reductions in NTD risk. Of concern, the incidence of NTD in Ireland appears to be increasing in recent years. There are important public health implications (and challenges) of achieving optimal folate status.

Session 1.10. Meal design and assessment

Introduction

Agneta Yngve, Professor, School of Hospitality, Culinary Arts and Meal Science, Örebro University, Sweden.

Today, dietary assessment is mostly dealing with nutritional quality of the meal and to a lesser extent assesses the environment, the commensality and the design of the meal as such. This seminar is an effort to combine anthropology, meal design and nutrition in a common seminar to increase mutual understanding of a widened approach to meal assessment. Previously, the five aspects meal model has been proposed as a theoretical framework for commercial meal planning and quality assurance. This model includes the product, the room and the service, combined with the ambience and the management system. In this introductory talk, the five aspects meal model will be compared with methods of marketing, including, product, place, price and promotion and with consumer orientation aspects of social marketing. In the broader aspect of public meal planning, consumer orientation aspects are suggested to be an integral part of meal assessment. Issues related to sustainability, food waste and nutritional status and well-being in a broader sense also need to be taken into consideration in the planning of public meals as well as in the provision of meal guidelines and – support to the public. The other presentations during this symposium deal with meal design in three different contexts, a new way of assessment of individual food choice and a historical overview of commensality and meal design.

ICT assisted dietary data acquisition – an overview of novel technologies

Mikkelsen, BE, Dobroczynski, M & Ofei, KA. University of Aalborg, Copenhagen, Denmark

Data collection in dietary intake studies using traditional methods is costly and time consuming and as a result the interest in ICT assisted automated or semi-automated systems is high. Therefor there is considerable interest in methods that can assist this process. Tablet, smartphones in combination with imaging and vision technologies are some of solutions that have shown promising results. This presentation takes the Dietary Intake Monitoring System (DIMS) as a point of departure. It is a device for capturing accurate data on dietary intake. It has been developed for capturing information about patient's meal both before and after consumption in a foodservice setting and is used for assessment of food intake and plate waste. The DIMS is able to estimate the type and amount of food on a plate using an integrated technology based on imaging, weighing scale, IR thermometer and ID technology. The DIMS is used in a sequential mode: first the plated meal is recorded and second the returned plate is recorded. The 2 recordings then return the intake and the plate waste. The results so far indicates a substantial potential for decreasing the workload for registering food intake data. The paper discusses the DIMS technology, present other recent innovations such as the eButton technology developed in the US and other recent ICT assisted approaches to measuring behaviour and suggest directions for future research directions as well as for research infrastructures in this field.

The Icelandic example of meal design and food specialities

Bryndís Eva Birgisdóttir, Inga Þórsdóttir, Unit for Nutrition Research, Faculty of Food Science and Nutrition, School of Health Sciences, University of Iceland

Official guidelines for meal design for both children and adults in Iceland are based on the Nordic plate model, divided in thirds of low processed; fish, meat, egg, milk or beans and potatoes, pasta or rice (or

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other carbohydrate rich food items) as well as a third for vegetables and fruits. The model is based on sound research into the optimal nutrient composition of the diet and the Nordic food based dietary recommendations for wellness and health, with a dash of Icelandic habitual cultural heritage. These are for example the weight on seafood, cod liver oil, local vegetables and berries, rye bread and milk products, such as skyr. The last made out of milk from the old cattle herds imported at the settlement of Iceland over 1000 years ago. In recent years there has been an increase in local production of different food items, some not grown for a very long time, such as barley, rye and rapeseed. The public itself has gained more interest in growing berries and fruits, such as apples for example, but these are not produced on a consumer scale in Iceland. The Icelandic food production circle does not include all the basic elements found to be of importance in a healthy diet (ex. beans, nuts, oils, cereals, fruits and some vegetables) and therefore, a lot of food would have to be imported and balanced against sustainability concerns. Commensality, eating together as social practice, is common in Iceland, both for breakfast, lunch and dinner among families, friends and colleagues. According to dietary surveys, the public seems to follow the plate model in many ways, both children and adults. But not everyone or everyday and the vegetables and fruits have been fighting for their rightful place on the plate in the habitual diet. However, they are now slowly gaining footage and acceptance as noble protectors of health and great culinary experiences.

"What about lunch? For lunch we only had soup" - An approach to the study of meal design in Portugal

Maria Daniel Vaz de Almeida, Bela Franchini, Claudia Afonso, Rui Poínhos. Faculty of Nutrition and Food Sciences, Porto University, Portugal*

A meal is an eating occasion in which foods and drinks are consumed following a specific order, at a certain time of the day where place and commensality rules also apply. Our previous research showed that Cape Verdean immigrants adapted in Portugal by modifying the structure and composition of meals, namely breakfast (from a cooked, structured meal to a simpler eating occasion of coffee and bread), but also lunch and dinner with inclusion of soup and wine.

We present a combined approach of qualitative and quantitative methods to illustrate how meals are organized in Portugal. Firstly, semi-structured interviews were carried out as part of the "Food in later life project" to illustrate how Portuguese elderly describe their meals across the life cycle, from childhood to old age (de Morais et.al., 2012). 80 elderly (40 men and 40 women), living in their homes and aged between 65 and 91 years old were interviewed to assess their perceptions of meals during specific periods of their lives, providing a life cycle perspective of foods and meals in a time span of nearly 100 years. Participants' childhood was marked by economic constraints, which in turn influenced their meal structure and food consumption, specially in the case of those born in the first two decades of the 20th century. Old age, lack of resources, disease and loneliness play important roles in meal structure and food consumption today.

A quantitative study with 24h recalls was used to describe todays' meals in a representative sample of Portuguese adults. 3529 subjects (52% women) aged between 18 and 93 years were interviewed within the study "Portuguese population food habits and lifestyle" (Poínhos et.al., 2009). Food intake, time, meal designation, place and commensality of each meal were registered. On average, respondents had 5 daily eating occasions, lunch and dinner being the most frequent meals eaten, followed by breakfast.

Food and drink combinations in Swedish meals

Henrik Scander, PhD student, School of Hospitality, Culinary Arts and Meal Science, Örebro University, Sweden

The Swedish national survey on dietary intake, Riksmaten, which took place in 2010-11, included details on day of the week, time point of consumption as well as where meals were consumed. The dietary data were collected through an online registration covering four days, combined with questionnaire data on educational level, lifestyle habits and self-perceived health. The data have previously been presented in regards to nutrient intake and food choice related to educational level. An interesting analysis on which drink that is consumed (or reported to be consumed) at different types of meals and with different food combinations and energy intakes has been undertaken.

The results show large differences in choice of drink depending on food choice, gender, day of the week and time of day. We have also shown that a large proportion of the energy intake comes from consumption of sweet or alcoholic drinks in between meals and in combination with meals.

It is important to inform the public about the choice of drink in relation to energy intake, especially for those aiming to restrict their intake. Our results will present a background for such guidelines. Some surprising results in regards to taste combinations will also be briefly discussed, from the sommelier's horizon.

Historical aspects of commensality during meals in Europe

Richard Tellström, School of Hospitality, Culinary Arts & Meal Science, Örebro University, Sweden

Who are we eating with? There are always companions to relate to in a meal, both to those who are present and they who are on another place or even in a past history. The choice of food and beverages at the market, the selection of flavour and texture combinations, cooking processes and serving the food with different utensils are all originating from a cultural, religious or social context. Commensality therefore seems to not only to be eating together at the same table but also eating with non-present table guests and relations.

During the 20th century in Sweden the eating context and commensality has changed due to urbanization, changing of how families are created, education levels and gender equality. An increased distance between living place and work has made commuting necessary, which effects the commensality at home but also how meals are shared within the work team you belong to. In Sweden's major cities it is today often more common to live as single but is a single person eating done

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alone or do you take part of an immaterial commensality when you live by yourself? The societal changes give an indication that commensality is changing over time and this is probably an expression of values related to the present time and trends (Zeitgeist). The current use of "communal tables" at restaurants might illustrate a need for socializing when eating and also make it easier to go to restaurants when single.

In my presentation I will discuss the question of foods', beverages' and the meals' inner cultural values which can be observed in Sweden the last hundred years and how they interact with the purpose of eating. I will also discuss eating events and raise the question if it is actually the commensality we are consuming, and not the food.

Session 1.2. Recommendations on non-nutrient-components

The chemoprotective role of the isothiocyanate sulforaphane: From animal models to humans

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Cruciferous vegetables are rich sources of glucosinolates and their hydrolytic products, such as the isothiocyantes, which have crucial functions in plant defense. In mammalian cells, the isothiocyantes are potent activators of transcription factor NF-E2 p45-related factor 2 (NRF2), the master regulator of cellular responses which protect against oxidative, electrophilic, and inflammatory stress, the underlying causes for all chronic diseases. Indeed, the isothiocyanate sulforaphane has shown protective effects in numerous animal models of chronic disease, including cancer, neurodegenerative, and cardiovascular diseases. Mechanistically, sulforaphane activates NRF2 by chemically modifying cysteine sensors of its main negative regulator KEAP1, disrupting the cycle of KEAP1-mediated NRF2 degradation. Consequently, NRF2 accumulates and orchestrates the enhanced expression of cytoprotective genes encoding drug metabolizing, antioxidant and anti-inflammatory proteins. In humans, intervention studies, which involve biomarker quantification, suggest that sulforaphane-rich broccoli preparations protect against damage caused by exposures to environmental carcinogens, such as solar ultraviolet radiation, aflatoxin, and air pollutants. With the emerging role of NRF2 in mitochondrial function and intermediary metabolism, it is also becoming apparent that sulforaphane has chemoprotective effects in conditions of compromised mitochondrial function, such as Parkinson's disease in cellular and animal models, and autistic spectrum disorder in humans.

Phytochemicals: Non-Essential But Indispensable For Human Health

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The consumption of plant foods such as vegetables and fruits is inversely associated with the risk of cardiovascular diseases and some types of cancer. The active compounds in plant foods mediating these preventive effects are still not well characterized. Besides essential nutrients and dietary fibre, which clearly contribute to these effects, plant foods contain a wide range of low-molecular weight molecules with diverse biological activities which are termed phytochemicals. More than 150 years ago, plant physiologists described their synthesis and biological functions within plants. In the past, primarily antinutritive or toxic effects of phytochemicals were investigated in humans. Just for the last 30 years has there been an increasing recognition of the potential health-benefits of phytochemicals in human nutrition.

Phytochemicals mostly occur in minute amounts in plant foods. They are classified according to their chemical structure (carotenoids, phytosterols, glucosinolates, polyphenols, saponins, monoterpenes, and sulfides) and their functional characteristics (antioxidants, anticarcinogens, etc.). The intestinal microbiota contributes to the metabolism of phytochemicals, generating mammalian-specific plant-derived compounds.

Data from epidemiological studies and randomized clinical trials (intervention studies) provide evidence that dietary phytochemicals modulate physiological processes in humans, supporting the concept of health promotion through a high intake of minimally processed plant foods. Further, certain phytochemicals such as lutein and zeaxanthin accumulate in the macula of the human eye, indicating a specific function in this tissue. Experimental data revealed defined mechanisms of isolated and chemically characterized phytochemicals. Recently, EFSA approved health claims for selected phytochemicals, e.g. the flavanols and their effect on vasodilatation, demonstrating their physiologically-relevant bioactivity. Overall, an impressive number of publications suggests a health-promoting effect of these compounds and raised the question, whether specific phytochemicals are essential to human health.

Clearly, phytochemicals do not strictly fulfill the criteria which define essential nutrients. As an example, an inadequate intake of phytochemicals does not generally induce biochemical or clinical symptoms of deficiency. Although not essential to life, phytochemicals may confer a range of effects that may support health. Therefore, already in the 1970s, the German scientist J. Kühnau introduced the term "semi-essential" to emphasize the unique contribution of flavonoids to human health. This term has never been further developed or defined neither for flavonoids nor other classes of phytochemicals. In light of the huge chemical diversity between and within the different classes of phytochemicals, measuring their dietary intakes and investigating their functional effects is an ongoing tremendous challenge to nutritional sciences. We are far from understanding individual exposure, requirements, metabolism, and bioactivity for most of the single phytochemicals.

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Bioavailability of Phytochemicals

Gary Williamson, University of Leeds, Leeds, UK

Phytochemicals are a broad class of dietary compounds found in many plant-containing foods and beverages. They have been proposed to have long term benefits for health based on human, animal and in vitro evidence. The main class considered here is that of (poly)phenols. Bioavailability is a complex issue, since some (poly)phenols are absorbed in the small intestine, and some are absorbed after metabolic transformation by bacteria in the colon. Many of the circulating species are conjugated, and as for drugs, are normally excreted within 48 hours. The key metabolic pathways of metabolism will be presented, together with evidence on how this affects biological activities, based on both human and cellular studies. The evidence for dietary recommendations on (poly)phenols will be considered based on bioavailability and bioactivity information.

Session 1.22. Breastfeeding in Europe - current status and perspectives

Breastfeeding in Europe - Current Status and Perspectives

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Breastfeeding is the natural way of feeding infants and has well documented benefits for infants and their mothers. It is recommended to exclusively breastfed infants for their first half year and to partially breastfed them after the introduction of complementary foods, for as long as mother and child wish to do. In Europe, between 70 and over 90 % of mothers start breastfeeding after birth. However, breastfeeding rates decline rapidly within the first few months in many countries, and thus only between 30 and 60 % of infants are exclusively breastfed at 3 months of age. Therefore, promoting, protecting and supporting breastfeeding are important public health measures to eliminate obstacles and facilitate breastfeeding. Strategies and actions to improve breastfeeding in Europe have been developed by the 'Blueprint for Action for the protection, promotion and support of breastfeeding in Europe' in 2004, revised in 2008. The extent to which breastfeeding practices and rates have improved since then has, however, not been systematically analyzed. Thus, the aim of this workshop is to bring together European professionals, identified as having a coordinating role and expertise in breastfeeding promotion, in order to discuss past experience, problems and obstacles as well as strategies and possible actions to improve the breastfeeding situation in Europe. The workshop will start off with two introductory presentations on "Breastfeeding in Europe: yesterday" and "Breastfeeding in Europe: today", followed by a panel discussion, in which the representatives from eight European countries present and discuss past, current and future breastfeeding promotion and support activities and breastfeeding data available.

Session 1.23. Controversies about sugar consumption

Insulin resistance and diabetes

Ian A Macdonald, School of Life Sciences, University of Nottingham, Nottingham, UK

There is major concern about the increased incidence of type 2 diabetes worldwide, which is linked in part to increased overweight and obesity and particularly to increases in ectopic fat content in the liver and skeletal muscle. Whilst obesity can only develop when energy intake exceeds energy expenditure over a prolonged period of time, there is some concern that certain diets and food components may increase the risk of overconsumption of energy and subsequent weight gain. The free sugars (particularly sucrose and fructose) have been highlighted as potential contributors to such increased risk of weight gain. There is epidemiological evidence that increased sugars sweetened beverages intake is associated with increased risk of developing type 2 diabetes, which may be independent of obesity itself. There was no association with total sugars intake, and any no clear mechanism by which sugars sweetened beverages may contribute to the development of diabetes.

There has also been some concern expressed that fructose may be particularly troublesome as far as insulin resistance is concerned. Recent randomized controlled trials and associated systematic reviews and meta-analyses have not provided supporting evidence for such effects at fructose intakes below 100g/day, provided people are in energy balance. High levels of fructose ingestion (25% of energy) are associated with an increase in liver fat content when consumed as part of an overeating intervention (125% of energy requirements). However, this effect is no different to that seen when equivalent amounts of glucose are consumed during overeating, and neither diet was associated with a significant change in insulin sensitivity when fed to overweight but otherwise healthy men for 2 weeks. Recent intervention studies of the effects of dietary glycaemic index and glycaemic load have shown

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potential effects on liver fat which may have an impact on insulin resistance, but further longer term studies are needed.

Sugars in obesity and diabetes: Results of systematic reviews and meta-analyses

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Sugars have become an intense focus of public health concern. Low quality ecological studies which have linked increasing intake of sugars with increasing obesity and diabetes rates along with animal models and select human trials of overfeeding of sugars at levels of exposure far beyond actual population levels of intake have driven the debate. Despite the limitations in extrapolating from these data, international diabetes and heart association guidelines have taken a harm reduction approach to sugars, setting strict upper thresholds for intake. To address the uncertainties in the evidence, we and others have conducted a series of systematic reviews and meta-analyses of the highest level of evidence from prospective cohort studies and controlled feeding trials. Although large prospective cohort studies have shown a significant positive association of sugar sweetened beverages with incident obesity, diabetes, heart disease, and stroke when comparing the highest with the lowest levels of exposure, these associations do not hold true for total sugars or other important food sources of sugars. Similarly, the highest level of evidence from controlled feeding trials shows that sugars behave no worse than other carbohydrates that replace them (mainly starch) as long as the calories remain matched. Sugars appear to contribute to weight gain and its downstream metabolic disturbances (raised blood lipids, uric acid level, blood sugar, insulin, and markers of fatty liver) insofar as they contribute to excess calories. Taken together, the evidence suggests that sugary foods and beverages are one of many pathways to overconsumption and its downstream cardiometabolic complications. Attention needs to remain focused on reducing overconsumption of all caloric foods associated with obesity, including sugary foods and beverages, and promoting greater physical activity.

Results of recent randomized controlled trials including sugars and cardiovascular disease and various neurologic parameters

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Added sugars are amongst the most controversial and misunderstood components of nutrition. Much of the controversy is based on misinformation, animal studies or exaggerated conclusions from epidemiologic studies which do not establish cause and effect. Fructose containing sugars including HFCS (also called isoglucose in Europe), sucrose and fructose itself have been alleged to be linked to a variety of chronic diseases. However, the highest quality science in this area often does not support these assertions. This lecture will present data from recent randomized controlled trials related to both fructose containing sugars and non-nutritive sweeteners (NNSs) at dosages up to the 90th percentile population consumption levels exploring metabolism and health related parameters in the following areas: energy regulating hormones, appetite, weight, body composition, risk factors for cardiovascular disease (CVD), risk factors for diabetes, risk factors for metabolic syndrome, lipids, blood pressure, liver fat accumulation, muscle fat accumulation and brain responses to consumption.

Sugar Addiction: the Science as it Stands

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Sugar addiction (and other food addictions) is a rather hot topic at the moment and part of a widening concern and debate about how sugar affects us, and the harms it poses both at the individual and the public health level. There are two distinct ideas that are often conflated in this regard: 1) Does sugar addiction exist? 2) Does sugar addiction lead to obesity? This conflation is not a reasonable one (as obesity is not required to define a sugar addiction syndrome) but is an important one to acknowledge as it is fairly widespread. The intuitive appeal of sugar addiction is easy to understand and the ubiquity of sugar in high concentrations in foods and beverages does play a key part in this. However the intuitive appeal is not backed by the existing evidence on sugar addiction. There is good data from rodent models showing that it is possible to engender addiction like behaviours in the laboratory in animals. These included escalation of sugar consumption, increased motivation for high sugar solutions and withdrawal symptoms during forced abstinence or opioid antagonist challenge. These data make the case that a sugar addiction exists (in rodents). But this behavioural syndrome does not lead to obesity. The rodents preferentially consume sugar over normal chow but balance increased sugar consumption with a decrease in chow intake, and therefore do not develop obesity. The animal data provide important proof of concept for the sugar addiction concept. In the human field though, there is not evidence thus far to reasonably strongly support the idea of a human sugar addiction. In fact the examination of a human sugar(or other food) addiction in humans raises several important conceptual issues around the definition of the term itself and the challenges inherent in considering an addiction to sugar and other foods.

Session 1.24. Dietary Patterns of the Spanish Population

Analysis and scores concerning dietary patterns: an introduction

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Obesity is a chronic disease characterized by a sustained imbalance between energy intake and expenditure. Nutritional intake assessment has traditionally been focused on macronutrient contents and more recently on food dietary patterns. Nowadays there are some epidemiological strategies that allow analysing the dietary quality and variety of a population, with robust statistical tools, in order to identify healthy guidelines. Indeed, association studies concerning dietary patterns and the incidence of different diseases are enabling to elucidate metabolic features accompanying long-term nutritional intake. The instruments used for the identification of dietary patterns are varied, but scientists must discern those that fit better in each case. Score or index analyses allow finding out the importance of adherence to a specific dietary pattern on health related issues, whereas statistical analyses based on cluster, principal component, factor analysis or reduced rank reduction tests are able to approach dietary pattern variety within a specific population, and nutritional exposures that may help to prevent obesity and associated diseases. In this context, a factor analysis of food intake to identify the current food patterns in a Spanish population interested in Personalised Nutrition was carried out. Food items were categorized according to their nutritional values to perform the pattern analysis. Once identified the food patterns, studies based on the differences in macronutrient distribution between these dietary patterns were assessed. Subsequently, association studies between these dietary patterns and anthropometric measurements were carried out in order to determine potential relationships. The factor analysis strategy generated two quite different regimes; the first one characterised by high energy density foods, and the second one, featuring an increased consumption of vegetable and fish products. When the patterns were independently analysed, opposed trends between both and the body weight status were found. However, the association studies performed with both patterns showed interactions with specific nutritional components. The qualitative analysis of food intake may help to prevent the development of obesity and to detect specific nutrients that may be protective to gain excessive weight for a specific population. The evaluation of dietary adherence status could be helpful to the development of nutritional screening tools in Personalised Nutrition assessment, in order to identify nutritional targets to be individually approached in each person.

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Fallaize R, Forster H, Macready AL, Walsh MC, Mathers JC, Brennan L, Gibney ER, Gibney MJ, Lovegrove JA. Online dietary intake estimation: reproducibility and validity of the Food4Me food frequency questionnaire against a 4-day weighed food record. J Med Internet Res. 2014 Aug 11;16(8):e190.

Lifestyle associated risk biomarkers

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The evolution of humankind has suffered from a distortion during the last decades, acquiring the adipose tissue an exaggerated relevance. Indeed, according to WHO, obesity has been defined as an epidemic across the world from early ages to elderly. In fact, the increase in childhood obesity can lead to adulthood-associated comorbidities that give rise to elevated healthcare costs. Thus, prevention is essential since early ages. Therefore, nowadays many researchers are investigating the underlying pathophysiologic mechanisms involved in metabolic disorders that usually promote severe inflammatory alterations. Inflammation is a key function in the process by which the body responds to an injury or an infection, and the acute phase of inflammation normally leads to recovery from infection to healing, and returns to normal values within a few days. However, if the response is not properly phased, the process can develop into a chronic low-grade inflammatory state that may trigger different diseases under pathological conditions (obesity, type 2 diabetes, cardiovascular and neurological diseases and cancers).

The causes for obesity include not only an energy imbalance but also the impact of genes, as well as the interactions between them, contributing thus to the susceptibility to develop diverse metabolic disorders.

Adipose tissue is a key endocrine organ in the development of the low-grade inflammation observed in obesity. Among the most important inflammatory biomarkers, adipokines (the bioactive molecules secreted by the adipose tissue) can exert either pro- or anti-inflammatory actions, having the capacity to alter the production of cytokines from immune cells and furthermore, modifying the expression of adhesion molecules, which are associated with CVD. The gut microbiota composition has also appeared as a potential partaker in the development of obesity and its association with the subsequent metabolic disorders.

Scientific evidence has confirmed several health determinants related to lifestyle (eating behaviour, physical activity, sedentary habits, sleep quality and quantity as well as stress conditions). These factors are essential to evaluate the immune-inflammatory and nutritional status in order to detect metabolic disorders and to identify preventive and/or therapeutic strategies, as well as to implement successful treatments and achieve the best results.

Trends in dietary patterns of the adult population: strengths and weaknesses

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Spain has undergone dramatic social changes since the 1960s. A generalised incorporation of females into the active workforce added to rapid urbanisation processes in the 1980s, an accelerating factor for dietary change due to factors such as the organisation of family life and home meals. A rapidly increasing number of people use catering services, restaurants and vending machines , both during weekdays and leisure time, which is also a key factor in understanding changes in diet. In addition, there has been a rapid increase in the immigrant population, which now represents 10% of the total population. These changes in dietary pattern and lifestyle appear to have had negative consequences for both the present and future populations, as overweight and/or obesity affect >50% of the adult population.

Several recent dietary and nutrition surveys (Food Consumption Survey; ENIDE Study; ANIBES Study among others) are used to show main trends in dietary patterns of the adult population in Spain. The Spanish diet may be still considered varied and healthy, although some trends need to be considered negative. Therefore, a more detailed analysis of food consumption patterns at present and evolutionary trends reveals some significant findings: meat and meat product consumption is higher than the recommendations, whereas for cereals and their derivatives, vegetables and greens, fruit, and legumes and pulses, consumption is below recommendations for the Spanish population. Some staple and traditional Mediterranean foods (bread, potatoes and olive oil) showed a dramatic decline when compared to 1960´s data. Energy intake showed a marked decline when compared to the 1960's mean consumption, and show marked differences for food groups contributors. Energy profile shows too much coming from lipids vs carbohydrates and slightly higher from proteins. In conclusión, dietary patterns in Spain and energy and nutrient intakes have changed markedly in the last firty years.

Session 1.28. Eastern Europe Nutrition Science

The occurrence of food-borne illness before and after joining the EU in Poland and other Eastern European countries

Jerzy Bertrandt, Military Institute of Hygiene and Epidemiology, Warsaw, Poland

Infectious diseases transmitted by ingestion are an important public health problem in the European Union countries. More than 320 thousand cases of food-borne illness are recorded annually in the European Union, but the actual number of cases may be much higher. The accession in 2004 the Czech Republic, the Slovak Republic, Lithuania, Latvia and Poland to the European Union on the one hand led to an increase in movement of food between countries, on the other hand the introduction in these countries European Union legislation force on health monitoring over food. The presentation analyses data on the incidences of infectious diseases transmitted via food in the above countries of Central and Eastern Europe before accession and following their accession to the European Union. In 1999-2000 in the Slovak Republic the most common diseases were salmonellosis and shigellosis, in the Czech Republic salmonellosis and Campylobacter infection, in Poland and Latvia salmonellosis and hepatitis A and other viral diseases of the gastrointestinal tract, and in Lithuania shigellosis and salmonellosis. Analysis of data on infectious diseases foodborne covering the period 2009-2013 showed that in the above countries still the main problem are Salmonella and Campylobacter infections, as well as Listeria infection.

Community approach of preventing childhood obesity: the first community based large-scale intervention pilot programme in Hungary based on the EPODE methodology:

Prof. Katalin Tatrai-Nemeth, Semmetweis University Faculty of Health Sciences Department of Dietetics and Nutrition Sciences Hungary

Overweight and obesity are reaching epidemic proportions in Europe. As weight increases, so does the prevalence of health risks such as the risk for cardiovascular diseases, high blood pressure, 2nd- type diabetes, hyperlipidemia, certain cancers, chronic locomotor diseases, mental problems, and even total mortality, imposing substantial burden on the health care system.

In developing obesity, both lifestyle and environmental factors play their roles. According to WHO, obesity is one of the 10 most important public health problems. While in 1995 200 million adults were overweight or obese worldwide, this figure increased to 300 million in 2000. Obesity is also an important public health problem in the developing world, where 115 million people are obese. If the trends remain unchanged, it is predicted that 2,16 billion overweight and 1,12 billion adults will be worldwide. The joint prevalence of overweight and obesity is between 30-80% in European countries. In the EU27 states overweight and obesity together affects 200 million adults, more than half of which are men.

The 2009 National Diet and Nutritional Status Survey (OTÁP) by National Institute for Food and Nutrition Science showed that nearly two-thirds of the Hungarian adult population is overweight or obese based on their BMI (61.8%). (http://www.oeti.hu/download/national-diet.pdf)

To prevent obesity and overweight, many initiatives have been taken at international level, involving Hungary, too. WHO started its Dietary, Physical Activity and Health global strategy in 2004.

As part of comprehensive measures for the possibility of choice and healthy environment for all. The European Commission in 2007 published a strategy for Europe on Nutrition, Overweight and Obesity related health problems. The strategy sets out an integrated EU approach to reduce diet-related chronic diseases.

In line with this, the WHO Regional Office for Europe has developed related to food and nutrition policy in the Second European Action Plan. In 2006, the WHO Ministerial Conference has been accepted by the European Anti-Obesity Charter. The document points out that the obesity epidemic is reversible, requiring the individual, the society and the common responsibility of governments.a

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However, adult obesity prevention should start as early as childhood, with proper diet and lifestyle design. Children deserve our particular attention, as in Hungary, the number of obese children in the last twenty years has tripled in all age groups. In Europe, one in every three 11-year-old children is overweight or obese currently.

EPODE is the world's largest network for prevention of childhood obesity which started to work in 2004 in France. Hungary joined EPODE in 2014 with professional leadership of the Hungarian Dietetic Association (MDOSZ), and with cooperation of the following partners: Ministry of Human Resources, Mayor of Dunaharaszti, Semmelweis University Faculty of Health Sciences and National Institute of Children Helath. The name of the Hungarian programme is GYERE - Children's Health Programme, which started the operation in Dunaharaszti (http://www.mdosz.hu/mdgyere.html).

The main goal of this project is to reduce childhood obesity through the cooperation with the members of local communities, parents, teachers, kindergarten teachers, specialists and politicians. Further goals are promoting the importance of nutriton and active lifestyle; and to monitor the effectiveness of the project with comparing measured anthropometric datas of 6-12 years old children living in Dunaharaszti.

Dietary Guidelines in Romania

Lidia Iuliana Arhire, Mariana Graur, Grigore T. Popa University of Medicine and Pharmacy Iași, The Nutrition Society of Romania

The Nutrition Society of Romania published The Healthy Eating Guidelines in 2006. This was first discussed at Ministry of Health expert level, then adopted as official document of Romania and put on the Ministry of Health website. As the first national guideline, it has been placed in the context of Romanian morbidity and the ways of implementing it have been outlined: dialogue with food industry and collaborating with mass-media/advertising partners and all levels of education. The particularity of this Guideline is the separation into two parts: one for the specialists/educators, and one for the general public. The first part includes the following themes: energy balance, macro- and micronutrients, nutrition during lifespan, nutritional evaluation and several appendixes about daily recommended intake. The second part – Advice for the population – is more practical and includes sources of calories and nutrients and the food pyramid. There is chapter for each level of the food pyramid which ends with practical tips. There are also appendixes with the nutrient content of foods. The Guideline had a positive impact with the specialists. It has been republished three times. It has been the basis for several regulations, health programmes and other guidelines for particular age groups or population at risk. Food choice, with the quantities and proportions between foods, is a free decision and depends on the background and education regarding nutrition of each individual. We insisted on educating the younger generation, on promoting nutrition as a protective factor and on creating a favourable environment for consuming healthy foods. The Guideline was revised in 2014. The new edition has chapters on salt and on food balance. Food diversity and variety is recommended to obtain a good food balance and to maintain the pleasure of eating. In this new edition we outlined further the importance of food portions.

Session 1.3. Global view on food and nutrition situation

Global nutrition situation and trends

Anna Lartey: IUNS President and Director of nutrition, FAO, Rome, Italy

Over the last 25 years there has been gradual but significant reductions in undernourishment figures, from over 1 billion in 1990 to 805 million in 2014. This decrease is not uniform across all regions. In south Asia and sub-Saharan Africa the proportions and numbers of undernourished have increased. Micronutrient deficiency affects over 2 billion people worldwide. Globally over 160 million children under the age of 5 years live with the life-long consequences of stunting. About 90% of stunted children live in just 34 countries. Overweight and obesity with its attendant non-communicable diseases is on the rise. From 1998 to 2008 overweight and obesity prevalence increased in all regions, including developing countries. Underlying the current nutrition situation is the issue of unhealthy diets and the deteriorating food systems. The world has the knowledge to address all forms of malnutrition, what is needed is the political will to take action. The Sustainable Development Goals of 2015 will present a new set of opportunities. There is the need to take advantage this opportunity to reform the food system to deliver on healthy diets. With united purpose and commitment we can address malnutrition in our generation.

Climate smart nutrition: Co-benefits of nutrition-sensitive climate mitigation and adaptation

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b International Union of Nutritional Sciences task force on climate and nutrition, c Environmental Protection Agency, USA

Introduction Climate change has a negative impact on food security and nutrition of millions of people, The IPCC 5AR concluded that climate change will have a substantial negative impact on per capita calorie availability, childhood undernutrition, particularly stunting and on undernutrition–related child deaths in developing countries. It is expected that health losses due to climate change-induced undernutrition will occur mainly in areas that are already food-insecure. At the same time dietary and food consumption and production patterns strongly influence Green House Gas emissions that cause climate change.

Objectives The purpose of this paper to explore the interactions between climate change, food insecurity and malnutrition and to identify nutrition-sensitive climate adaptation and mitigation strategies and synergies between nutrition and environmental strategies through the promotion of sustainable and healthy diets

Methodology A literature search was conducted using public databases such as PubMed, Ovid, EBSCO (Agricola etc) for peer-reviewed articles and gray literature searches were conducted using public

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databases such as WHOLIS, AGRIS (the Food and Agriculture Organization of the United Nations (FAO), the International Food Policy Research Institute (IFPRI) and the World Bank project database.

Results Nutrition sensitive adaptation and mitigation approaches that include nutrition objectives have the most direct benefits in dietary diversity particular in developing countries. Encouraging a global transition to sustainable and healthy diets is potentially a major contribution to a reduction in emissions in the agriculture and food sectors and improved nutrition. reducing emissions

Conclusions. Climate smart agriculture needs to integrate nutritional outcomes. The co-benefits to environment and health of nutrition-sensitive climate change adaptation and mitigation measures need to be further explored within the context of the UNFCCC work the SDGs and the post-2015 development agenda.

The Impact of Food Losses and Waste on Sustainable Food and Nutrition Security

V Prakash, Vice President, International Union of Nutritional Sciences, Distinguished Scientist of CSIR, Mysore – 570 006, India

Introduction and Objectives : In the Social fabric of Quality diet the link between the Food and Nutrition Security and Food Losses and its intricate impact and network if one were to have minimal Food Loss and Waste on the Nutrition Security is enormous. Several matrices using the scale up of micro, meso, macro policies can link to economic, social, environmental and National goals as a result of such policy impact.

Design and Expected Results : The ambience of non-competitive markets, the production losses in the chain, the Nutrient bowl losses with every grain of Food that is lost or wasted has an impact on the entire resources of land, water and energy ultimately flagging the issue of malnutrition in the low income group of countries and problem of NCD's obesity in high income group of countries. Similarly missed access to Food by non-valorization of Food and its byproducts which can contribute to Nutrition bowl and its utilization can simply bring in a different stability of the lifecycle Nutrition programmes in. Hence adaptable, affordable and accessible Food Science in the matrices and how high Science and high Technology can be used to minimize the local Food Losses thus enhancing the Nutritional security of the region by networking several stakeholders.

Conclusions : These issues will be discussed with case studies especially with that of micronutrients and the bioavailability and bioaccessibility of the same when Nutritious combinations of Foods that can be made available to the needy by a system and strategic approach to minimize Food Losses and Wastes.

Session 1.5. Dietary patterns in Europe

The association of dietary patterns with health outcomes: Decomposition, Interpretation and Application in the EPIC-Study

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During the last decades, nutritional epidemiologists tend to assess diet as dietary patterns in addition to focusing on specific foods/food groups. The main rationale for using patterns is that components of diet (dietary exposures) act jointly in unspecified ways that are difficult to postulate in a statistical model.1

The usual practice has been to define a dietary pattern through a linear combination of individual dietary components. The definition of the pattern can be hypothesis-driven: it may express specific dietary habits (such as the Mediterranean Diet2), or, adherence to formal dietary guidelines (e.g. the World Cancer Research Fund/American Institute for Cancer Research guidelines for cancer prevention3). These are often referred to as a-priori as opposed to the a-posteriori dietary patterns.4 The latter are derived by letting the-data-on-hand for a set of dietary exposures to identify their "optimal" combination through mathematical/statistical methods (e.g. principal components, factor analysis, etc).5

To date, a variety of either-type patterns have been proposed.6,7 However, their association with health outcomes have not been linked to those of their components, at least in a systematic way. Recently, it has been shown that the association with a continuous health outcome (e.g. BMI, blood pressure) of a dietary pattern, which is a linear combination of dietary components, is a weighted average of the associations of the individual components with the same health outcome.8 Importantly, the weights depend on the correlations between the constituents of the dietary pattern.8

Using data from the large multi-centre European Prospective Investigation into Cancer and nutrition, several a-priori and a-posteriori dietary patterns have been identified and associated a number of health outcomes, including cancer incidence and mortality.

The most widely used of these dietary patterns are presented. Moreover, the decomposition of the association of dietary patterns with health outcomes is illustrated for the widely-used Mediterranean Diet Score.

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Systematic reviews of health benefits of mediterranean dietary patterns

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With respect to advices for healthy and health-maintaining diets, there is a tendency for food-based guidelines including dietary patterns. Taking the number of hits in electronic databases for scientific literature as an indicator, the so-called Mediterranean diet represents a dietary pattern with increasing popularity. The aim of this presentation will be to summarize some of the evidence regarding the health-promoting effects of a Mediterranean diet focusing on systematic reviews and meta-analysis of case-control and cohort studies as well as randomized controlled trials. In general, adherence to a Mediterranean diet is reported to be associated with significant improvements in health status. It is supposed to be effective both in the primary and the secondary prevention of non-communicable diseases such as type 2 diabetes mellitus, cancer, cardiovascular or neurodegenerative diseases with far-reaching implications, e.g. decreased mortality rates.

However, a critical examination of the potential benefits of a Mediterranean diet has to include the limitations one has to face when trying to synthesize the available data on this topic. Although the traditional Mediterranean diet first postulated by Ancel Keys in the 1960s seems to be well defined (high intake of virgin olive oil, vegetables, fruits, plant proteins, whole grains, fish, low-fat dairy, moderate alcohol intake, and low red meat consumption), this dietary pattern is far from being a homogeneous and straightforward construct when it comes to epidemiologial studies. In order to assess the adherence to a Mediterranean diet, different scores are in use. This does not only complicate a systematic evaluation of its effects, but in addition hampers approaches to explain the mechanisms underlying the health benefits of a Mediterranean diet (e.g. antioxidative effects of secondary plant phenols derived from extra virgin olive oil might explain cadioprotective effects, however, this presupposes that extra virgin olive oil is a mandatory component of the diet).

Given the potential favourable effects of adhering to a Mediterranean diet, further research should avoid these pitalls by adopting a universal definition of this dietary pattern as well as a an applicable adherence score facilitating recommendations at an individual level.

Developments in prevention of obesity and other noncommunicable diseases in Poland through nutrition and physical activity

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According to results of a number of studies conducted in recent years, every second man and woman in Poland is overweight or suffers from obesity; every fifth person is obese. The frequency of overweight and obesity in Poland shows an increasing tendency. Improper diet and insufficient physical activity are the main reasons for the development of noncommunicable diseases. According to studies of eating habits in the Polish population, the majority of Poles have unhealthy diet, energy rich meals (121-147% of Polish RDA), high in fat (35%), saturated fatty acids (12%), cholesterol >390 mg, sugars>13.5%, sodium 4,2 mg. There is, on the other hand, a low intake of carbohydrates, often below 50% of energy, calcium and B vitamins. According to data of the Central Statistical Office, low physical activity level among people over 15 was found with only 13.6% who spent their free time on active sports more than once a week, whilst the remaining 84% spent their free time in passive or not very active ways. All of these favours the positive energy balance,and leads to excess accumulation of fatty tissue in the body.

Quite many programmes have been developed in Poland to counteract overweight and obesity and other noncommunicable diseases. These include nationwide programs: POL-HEALTH (National Programme for the Prevention of overweight, obesity and noncomunicable diseases through diet and physical activity improvement 2007-2012), The Salt Reduction Programme 2009-2011, My sports field – ORLIK 2012, Keep fit programme 2006-, Preventing overweight and obesity as well as chronic diseases by education on nutrition and physical activity of the society 2011- 2016 (The Swiss – Polish Cooperation Programme). We see the positive changes in awareness of Poles on the role of nutrition and physical activity for health. We alsoobserve reduction of salt intake (about 1g/d).

Session 1.6. Evidence-based dietary guidelines

Fat intake and prevention of nutrition-related diseases

Prof. Dr. Jakob Linseisen, Helmholtz Zentrum München (HMGU), Institute of Epidemiology II, Neuherberg, Germany

Fat plays a major role in human nutrition and modification of the intake of fat and fatty acids may have a preventive potential on nutrition-related chronic diseases. Subsequently to the first evidence-based dietary guideline on fat and fatty acid intake and chronic disease prevention as published in 2006, the German Nutrition Society set up a working group to re-evaluate the scientific evidence in this area. The aim of the group was to systematically judge the potential of dietary fat and fatty acids in the primary prevention of the wide-spread chronic diseases including obesity, type-2 diabetes mellitus, dyslipoproteinaemia, hypertension, metabolic syndrome, coronary heart disease, stroke and cancer.

The major findings of this literature work are: a high intake of fat increases the risk of obesity when total energy intake is not controlled for (i.e., with ad libitum diet). When energy intake is controlled for, there is no association between the intake of fat and the risk of obesity. A reduced dietary intake of total and saturated fat reduces the concentration of total and LDL cholesterol in plasma. A greater intake of po-

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lyunsaturated fatty acids at the expense of saturated fatty acids reduces the risk of coronary heart disease and lowers the concentration of total and LDL cholesterol in plasma. Furthermore, a high intake of long-chain polyunsaturated n-3 fatty acids reduces the risk of hypertension, coronary heart disease and the triglyceride concentration in plasma. A high intake of trans-fatty acids increases the risk of dyslipoproteinaemia and coronary heart disease.

The updated evidence-based guideline on primary prevention of chronic diseases through modification of fat and fatty acid intake will be the basis for re-evaluation of dietary intake recommendations.

Prevention and treatment of obesity: German Clinical practice guideline 2014

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Background: The high prevalence of obesity (24% of the adult population) and its adverse effects on health call for effective prevention and treatment.

Method: Pertinent articles were retrieved by a systematic literature search for the period 2005 to 2012. A total of 4495 abstracts were examined. 119 publications were analyzed, and recommendations were issued in a structured consensus procedure by an interdisciplinary committee with the participation of ten medical specialty societies.

Results: Obesity (body-mass index [BMI] ≥30 kg/m2) is considered to be a chronic disease. Its prevention is especially important. For obese persons, it is recommended that a diet with an energy deficit of 500 kcal/day and a low energy density should be instituted for the purpose of weight loss and stabilization of a lower weight. The relative proportion of macronutrients is of secondary importance for weight loss. If the BMI exceeds 30 kg/m2, formula products can be used for a limited time. More physical exercise in everyday life and during leisure time promotes weight loss and improves risk factors and obesity-associated diseases. Behavior modification and behavioral therapy support changes in nutrition and exercise in everyday life. With respect to changes in lifestyle, there is no scientific evidence to support any particular order of the measures to be taken. Weight-loss programs whose efficacy has been scientifically evaluated are recommended. Surgical intervention is more effective than conservative treatment with respect to reduction of bodily fat, improvement of obesity-associated diseases, and lowering mortality. Controlled studies indicate that, within 1 to 2 years, a weight loss of ca. 4 to 6 kg can be achieved by dietary therapy, 2 to 3 kg by exercise therapy, and 20 to 40 kg by bariatric surgery.

Conclusion: There is good scientific evidence for effective measures for the prevention and treatment of obesity.

Source and Reference: Wirth A, Wabitsch M, Hauner H: Clinical practice guideline: The prevention and treatment of obesity. Dtsch Arztebl Int 2014; 111: 705–13. DOI: 10.3238/arztebl.2014.0705

Carbohydrate intake and prevention of diet-related diseases

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Nutrition-related chronic diseases increasingly contribute to the total disease burden of the society, and the respective health care costs has risen continuously over the past decades. For this reason, there is an urgent need to better exploit the potential of dietary prevention of these diseases. Carbohydrates play an important role in human nutrition and – in addition to fat – represent the largest group of energy-yielding nutrients. We, therefore, systematically investigated the potential function of carbohydrates to prevent wide-spread chronic diseases such as obesity, type 2 diabetes, dyslipoproteinaemia, hypertension, metabolic syndrome, coronary heart disease, and cancer. For this purpose, carbohydrate intake was subdivided into mono-/disaccharides, polysaccharides, whole-grain products, sugar-sweetened beverages, glycaemic index and glycaemic load. Only data from prospective cohort and randomised controlled intervention trials were included.

The major and statistically significant findings were: a high carbohydrate intake at the expense of total fat and saturated fatty acids reduces the concentrations of total, LDL and HDL cholesterol. A high carbohydrate consumption at the expense of polyunsaturated fatty acids increases total and LDL cholesterol, but reduces HDL cholesterol. Regardless of the type of fat being replaced, a high carbohydrate intake promotes an increase in triglyceride concentrations. Furthermore, a high consumption of sugar-sweetened beverages increases the risk of obesity and type 2 diabetes, whereas a high dietary fibre intake , mainly from whole-grain products, reduces the risk of obesity, type 2 diabetes, dyslipoproteinaemia, cardiovascular disease and colorectal cancer, at varying evidence levels. In the final part, the practical consequences for current dietary recommendations are presented.

Session 1.7. Setting Dietary Reference Values for the European Union

Introduction to Dietary Reference Values (DRVs)

Ambroise Martin, former chair of the EFSA NDA Panel, Lyon, France

In 2005, EFSA was requested by the European Commission to revise the report of the Scientific Committee on Food released in 1993, "to ensure that the Community action in the area of nutrition is underpinned by the latest scientific advice", with the objective of advising "on population reference intakes of micronutrients in the diet […] which, when part of an overall healthy lifestyle, contribute to good health through optimal nutrition". In addition, advice was asked how to translate nutrient reference values into diets that help to maintain good health (food-based dietary guidelines). The work is undertaken by the EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA), which is responsible for the formal adoption of the

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Opinions and is supported by working groups for DRVs. The work commenced by developing a guidance document on principles for deriving and applying DRVs. Considering the diversity of dietary habits, health concerns and nutrient recommendations in EU Member States, and the restriction of the role of EFSA to scientific assessment, a clear distinction between DRVs based on health considerations and recommendations that must take into account other (national) considerations was necessary. In the EFSA context, great care has been devoted to scientific excellence (e.g. by tendering out comprehensive reviews of the existing literature on specific topics, particularly focusing on human studies that can provide useful data), transparency (e.g. by detailing the basis for any choice and submitting draft Opinions to public consultation before final adoption) and consideration of uncertainty. In-house resources were used to undertake original calculations and/or statistical modeling where appropriate. DRVs were developed for different life-stage and sex groups. By providing transparent and detailed information, these DRVs may constitute a valuable support for European and national policy-makers to derive nutrient and food-based recommendations adapted to any given specific (national) situation.

DRVs for the European Union – what they can and what they cannot do

Hildegard Przyrembel, Berlin, Germany

Dietary Reference Values (DRVs) indicate the amount of an individual nutrient that people need for good health depending on age and gender. They are used for various purposes:

- assessment of diets, i.e. to determine the prevalence of inadequate/adequate intakes in population groups by comparing observed intakes with the appropriate DRVs; to assess the adequacy of an individual's usual intake combined with anthropometric, clinical, and biochemical (status) data
- diet planning for groups (or individuals), where the intake distribution should be between the Average Requirement (AR) and the Tolerable Upper Intake Level (UL) to avoid insufficient or excessive intakes
- as a basis for reference values in food labelling
- in establishing food-based dietary guidelines.

DRVs are based on the energy and nutrient requirements of "normal" healthy subjects. For adults, age-specific reference subjects are defined based on mean measured body heights and a body mass derived from a body mass index considered to be "healthy". The use of DRVs for some nutrients, needs modification or adaptation, e.g. according to environmental and individual conditions (climate, diet and renal function for water, sunlight exposure for vitamin D), whilst physical activity or the aim to maintain or change body mass should determine the individual energy intake. The Population Reference Intake (PRI) for zinc varies in a predictable way with the phytate content of the habitual diet. DRVs should be appropriately modified for subjects with a specifically reduced or increased requirement of (a) nutrient(s) due to chronic diseases, e.g. dyslipidaemia, overweight/obesity or vitamin-dependent inherited disorders of metabolism.

Comparison of the actual intake of a nutrient with its DRV is, if used in isolation, not a valid criterion to diagnose deficiency or excess of that nutrient, neither is it a sufficient criterion to judge the quality of a diet without taking into account all other nutrients.

Challenges in setting Dietary Reference Values. Where to go from here?

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The approach used to set Dietary Reference Values (DRVs) for nutrients depends on the quality and availability of data for deriving Average Requirements (ARs), i.e. the level of nutrient intake that is adequate for half of the people in a population group. One of the challenges is to select reliable biomarker(s) that can be linked to physiological requirements, e.g. the concentration/activity of an enzyme, and/or to nutrient intake. In cases where no such biomarkers are available, the level of nutrient intake required to achieve null balance in 50% of the population may be used for some nutrients. Estimates of physiological requirements for growth and maintenance and replacement of obligatory losses may be made using a factorial approach, followed by the use of a bioavailability factor to convert the AR into nutrient intake, another challenging area. A particular difficulty arises with nutrients where no reliable biomarkers are available. Here, an Adequate Intake (AI), sometimes based on habitual intakes of apparently healthy European Union populations, may be derived. Health endpoints may be taken into account when sufficient evidence is available. The challenges in deriving DRVs for different age groups, including older infants and children, where data are often limited, may be met by extrapolation from data for other population groups, i.e. up- or downscaling. For pregnant and lactating women, factorial methods may be applied. Examples from recent EFSA DRVs will be given to illustrate how the various challenges in setting DRVs have been addressed, including the approaches used, the way the scientific data have been interpreted, and the degree of expert judgement. Differences between DRVs by other authorities will be discussed, including whether the values comprise elements of risk management. Examples of gaps in knowledge identified during the EFSA DRV exercise will be discussed in the context of future research recommendations.

Session 1.8. Dietary Fatty Acids - is it time to change the recommendations?

Should saturated fat intakes be reduced?

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One key dietary recommendation in many guidelines for reducing the risk of coronary heart disease (CHD) is to consume not more than 10% of energy from saturated fatty acids (SFA). This advice is not only based on the overwhelming evidence from controlled dietary intervention studies that a mixture of SFA increases LDL-cholesterol,

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but also on results of randomized controlled trials suggesting that consumption of polyunsaturated fatty acids in place of SFA truly reduces cardiovascular events. Prospective epidemiological studies, however, have not consistently shown an association between SFA intakes with CHD. These latter findings should not be ignored, but should also not be used as a decisive argument that SFA intake is not related to CHD. Further, it should not be overlooked, that - when energy intake does not change - reducing the intake of SFA means increasing the intake of another macronutrient. SFA can be replaced by other types of fatty acids, by carbohydrates and by proteins. Each replacement may result in different metabolic effects. Also, it is well known that the different SFA in the diet behave metabolically different. It is not known, however, whether these different SFA have different health effects. An important aspect in this discussion is what the best (set of) biomarker(s) is to predict CHD. Further, the different SFA may affect pathways not related to lipoprotein metabolism differently. These outstanding questions must be answered in future studies. For now, the most convincing evidence is that – as long as SFA intakes is above recommended intakes - substitution of a mixture of SFA by cis-unsaturated fatty acids may be preferred over substitution by high-glycemic index carbohydrates.

Translating dietary recommendations to food-based guidelines

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Dietary recommendations have traditionally focused on setting recommendations for the intake of individual nutrients for planning purposes for various population groups. In recent recommendations, e.g. in the Nordic Nutrition Recommendations (NNR), more emphasis than earlier has been put on dietary pattern. This enables the translation of the recommended intake of single nutrients to food based guidelines. Recent research evidence also supports this approach. The health effects of the Mediterranean diet have been extensively studied, also on hard endpoints. In addition, there are data on the Dietary Approaches to Stop Hypertension (DASH) diet, as well as on the Healthy Nordic Diet. An important aspect in the food-based dietary guidelines is the consideration of the local food culture which helps the adoption of the recommended diet, the Mediterranean diet vs. the Healthy Nordic diet as an example.

The key features in the food-based dietary guidelines are 1) favoring whole grain products, 2) abundance of vegetables, fruit and berries, 3) favoring low fat and fat free dairy products, 4) favoring vegetable oils, including nuts and seeds, 5) inclusion of fish in the diet, and 6) red and processed meat, salt, alcohol, and beverages and foods with added sugar to be used sparingly. Formulation of dietary recommendations makes the nutrient recommendations easier to understand and adopt in everyday life.

Session 2.10. Energy Balance surveys across Europe

Mapping the dietary and physical activity surveys across Europe: strengths and weaknesses

Blanca Roman-Viñas, Nutrition Research Foundation & FPCEE, Blanquerna URL

Diet and physical activity, together with tobacco consumption are human behaviors that represent the main risk factors for developing chronic diseases, the leading cause of death in Europe. An in depth analysis of diet and physical activity patterns within the European Union is needed to improve the understanding of the wide variations in population health status across countries.

Most of the 27 European members have conducted diet surveys gathering information at national, regional or municipal level. Several efforts have been made to summarize such data to make international comparisons. From the European Nutrition Health Reports to projects such as the European Food Consumption Survey Method (EFCOSUM), the results have shown that comparability between diet surveys is not possible at the nutrient level, but at the food level. As such, experts from the EFCOSUM project and the European Food Safety Authority have given guidance to harmonize methodologies to obtain food consumption and physical activity data in European countries. Such effort provides an opportunity to obtain comparable data on diet and physical activity but there are still some issues open to debate and discussion. Even using the same assessment method, aspects such as bias in recording, individual perception of the portion sizes or physical activity intensity, the interviewer ability, the computation of nutrients, etc. affect the evaluation and are difficult to handle. Nevertheless, the harmonization of the methodology to collect and analyze food consumption and physical activity data will help to understand the variation in physical activity and food habits and the changing rates of diet related diseases across Europe.

The ANIBES Study on Energy Balance in Spain

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Different studies have previously assessed the global quality of the Spanish diet, identifying food patterns and nutritional status. However, no studies have evaluated energy balance and its determinants. The specific aims of the ANIBES Study ("Anthropometry, Intake, and Energy Balance in Spain") a cross-sectional study of a nationally representative sample of the Spanish population (from 9–75 years old) were: to provide quantitative data on the food and nutrient intakes, sources of nutrients, physical activity level and anthropometric measurements; to provide information on trends in food consumption, nutrient intake in different age groups and gender; to describe the

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individuals with intakes of energy and nutrients above or below the national average; to provide height, weight and other anthropometric measurements and examine their relationship to socio-demographic, dietary, and health data. The final sample comprised 2,009 individuals (1,013 men, 996 women). The sample quotas according to the following variables were: age groups (9–12, 13–17, 18–64, and 65–75 years); sex (men/women); geographical distribution (Northeast, Levant, Southwest, North-Central, Barcelona, Madrid, Balearic and Canary Islands); and locality size: 2,000 to 30,000 inhabitants (rural population); 30,000 to 200,000 inhabitants (semi-urban population) and over 200,000 inhabitants (urban population). Additionally, other factors were considered: unemployment rate, percentage of foreigners (immigrant population), physical activity level, and education or economic level. The ANIBES Stydy has employed for the first time in Spain new technology to collect information on intake and physical activity by using tablet devices in nearly real time and objective accelerometers. In summary, considering the carefully designed protocol based on best evidence available and previous experience, the ANIBES study may contribute to provide useful data to inform food policy planning, food-based dietary guidelines development and other health-oriented actions. The design, methodology and updated results of the ANIBES study are presented.

Physical Activity, Sedentariness and Appetite in Energy Balance

John Blundell, Anna Myers, Graham Finlayson and Catherine Gibbons, Institute of Psychological Sciences, Faculty of Medicine and Health, University of Leeds, Leeds, LS2 9JT, UK

It has been noted that in recent times man could be regarded as a sedentary, rather than an upright animal (Edholm et al, 1955). There are strong reasons to believe that this has contributed to the high prevalence of obesity. The engagement in sedentary behaviours leads to a low level of energy expenditure (EE) which itself contributes to a positive energy balance and fat accumulation. However, low physical activity (sedentariness and low energy expenditure) also influences the other side of the energy balance equation, and promotes an increase in energy intake (EI). It is not clear if there is a distinction between the effects of low energy expenditure and 'sitting' time per se.

It has been proposed that physical activity (or total EE) is related to EI by a U-shaped function with high EE associated with high EI (eg Mayer et al, 1956). At average to high levels of EE the appetite system is well controlled (Zone of Regulation), but below a normal activity level (sedentary zone or Zone of Dysregulation) a decrease in activity is accompanied by an increase in food intake, when individuals become susceptible to appetite promoting signals (biological and environmental). Using a 24 hour monitoring system we have demonstrated that sedentary behaviour is positively associated with percent body fat and with traits of appetite dysregulation. In contrast the amount of moderate to vigorous activity is negatively related to body adipose tissue. It appears that in a physically inactive state the homeostatic regulatory system is sluggish and responds weakly to appetite suppressing signals. Despite this and much other evidence, recent articles have referred to the 'myth of physical inactivity and obesity' BJSM 2015). Prescribed interventions that increase physical activity can increase satiety signalling , adjust post-prandial peptide profiles, improve appetite regulation and decrease adipose tissue mass.

Translating the research into action: the European Food Framework

Roy Ballam, British Nutrition Foundation

With life-long habits being established at an early age, numbers of overweight and obese children in the EU rising, variable nutrition education and ensuring young people become informed consumers based on factual information, this project sought to establish a unique food, nutrition and lifestyle resource to promote healthy active lifestyles to young people throughout Europe.

A Europe-wide diet (food and drink), active lifestyles and energy balance framework was developed in collaboration with European partners focusing on enhancing the food and nutrition knowledge development of young Europeans.

In order to engage children and young people with the Framework, as well as test the concept, a series of pilot projects were developed and implemented in Europe - Austria (peer-to-peer teaching), Malta (materials for young children), Spain (online resources to improve knowledge and skills in nutrition), the UK (link to existing initiatives) and throughout Europe via the SHE (Schools for Health Europe) Network (case studies of good practice). The five pilot projects all developed something unique for their country, or in the case of the SHE network, provided consolidation and affirmation to existing projects.

Uniquely, the competence Framework inspired five very different projects, all from one consensus concept. It allowed local/national ideas, cultural aspects, language barriers and regional differences to be celebrated and interpreted into appropriate, meaningful materials for the promotion of health. The Framework provided a guide to ensure effective and comprehensive coverage of key diet, active lifestyles and energy balance concepts for children and young people.

A high level of consensus between multi-disciplinary groups of European experts was achieved which helped to ensure the success of the project, as well as provide a springboard for future work using the Framework, such as auditing school lessons, informing curriculum/qualification change and guiding resource development.

Session 2.12. Pre- and post-natal programming of adult health

Epigenetic regulation of gene expression – the key to understanding early life nutrition programming?

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Southampton and Director, NIHR Southampton Biomedical Research Centre in Nutrition

Intrauterine life may be a critical period for the programming of later body composition and risk of cardiovascular and metabolic disease. Experimental studies in animals indicate that particular maternal exposures during pregnancy can have long-term effects on offspring body composition and metabolic risk. Within the Southampton Women's Survey, we have shown greater adiposity in the offspring in association with higher maternal adiposity, poor quality maternal diets in pregnancy (characterised by frequent consumption of energy-dense, micronutrient-poor foods), low maternal vitamin D status, excess gestational weight gain, and short duration of breastfeeding. In animals the environment during early life induces altered phenotypes in ways which are influenced or mediated by epigenetic mechanisms, but until recently there has been little direct evidence in humans. Using Sequenom MassARRAY we have found that greater methylation of a single CpG within the RXRA promoter measured in umbilical cord was strongly associated with greater adiposity in later childhood.1 Perinatal measurements of DNA methylation explained >25% of the variance in childhood adiposity. These findings were replicated in a second independent cohort.1 More recently we have shown that peroxisomal proliferator activated receptor-γ-co-activator-1α promoter methylation in blood at 5–7 years predicts adiposity from 9 to 14 years.2 Our data provide the first human evidence that epigenetic processes in non-imprinted genes have an important role in later body composition. Understanding developmental influences on childhood obesity and associated disorders has important implications for the design of intervention studies.

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Obesity in pregnancy; the role of nutrition in the health of mother and child:

Lucilla Poston, the UPBEAT trial consortium, Division of Women's Health, King's College London.

Clinical obesity (BMI≥30kg/m2) is associated with adverse outcomes in pregnancy, notably gestational diabetes (GDM), pre-eclampsia and large for gestational age (LGA) infants, the latter often leading to complications at delivery. Insulin resistance plays a major role. In utero exposure to maternal obesity/ excessive gestational weight gain has also been linked to increased risk of childhood adiposity. Because of the high prevalence of obesity amongst pregnant women globally, there has been a concerted attempt to improve maternal and childhood outcomes through dietary interventions to improve insulin resistance/reduce gestational weight gain. Many studies have been too small to address clinical outcomes, or of poor methodology. The recent UPBEAT trial of 1555 obese women (Poston et al, Lancet Diabetes and Endocrinology, 2015) showed that a theoretically based intervention of dietary advice and physical activity,delivered weekly over a period of eight weeks can reduce the dietary glycemic load, gestational weight gain and measures of body fat mass when compared to women receiving standard antenatal care, but this and another randomised controlled trial (LIMIT) adequately powered for clinical outcomes have shown no reduction in gestational diabetes, pre-eclampsia or LGA, with the conclusion that the degree of change achievable, whilst improving healthy behaviours is inadequate to prevent these serious clinical conditions. UPBEAT showed, however, that universal testing and appropriate treatment (diet/metformin/insulin) for GDM (primary outcome of the trial), is likely to reduce LGA independent of the intervention, and should be adopted as recommended in most guidelines, but seldom practiced, for all obese pregnant women. Ongoing follow up of mothers and children from this and similar studies will determine whether improved diet and reduced GWG in the mother is sustained beyond pregnancy and whether the improvement in maternal behaviours influenced the risk of obesity in the child.

Session 2.2. New statistical methods to derive intake data

General concept

Arnold L.M. Dekkers, National Institute of Public Health and the Environment

It is well-known that dietary intake surveys generally contain measurements of short-term intake. These measurements cannot be used directly to assess the proportion of the population which does not meet dietary reference intakes, since these are based on health effects of long-term intakes. Fortunately, in the last decades, more and more statistical software became available to assess relative easily the usual (long-term or habitual) intake distribution based on the short-term observations. To mention some of them,

- ISU (Iowa State University, 1996),
- NCI (National Cancer Institute, 2006 and 2010),
- MSM (Multiple Source Method, DIFE, 2011),
- SPADE (Statistical Program to Assess Dietary Exposure, 2006, 2011 and 2014)
- MCRA (Monte Carlo Risk Assessment, 2011, for risk assessment).

All these programs provide usual intake distributions and proportions below or above a cut-off point for daily intakes (micronutrients) and episodical intakes (foods), and the last two automatically provide confidence intervals. In several studies it is shown that in most cases the results of the various programs are comparable.

But, what to do if the intakes come from several food sources and the distribution of the intakes shows multimodality; as this is in violation with one of the assumptions underlying the principle of estimating the usual intake? And, what should one do if the intakes are a combination of intakes from food and dietary supplements? Some studies show that simply adding the intake values prior to the use of the above mentioned models, may lead to invalid usual intake distributions.

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New, so called "first shrink then add method" models, estimating first the usual intake from the identified different sources (e.g. what causes multimodality or food and supplements) and thereafter adding these together to obtain the total usual intake distribution, are implemented in SPADE and provide valid results.

The NCI (2014) provides also a program which allows the user to model the intakes of different foods at once (e.g. potato, meat, vegetables), taking all possible correlations between the various foods into account

The concept of usual intake is generally used in monitoring studies. However, one may also be interested in the association between a specific behaviour and usual intakes. E.g. is the daily average time to watch TV associated with certain dietary habits, like eating fruit or snacking couch potatoes? Or, do dietary habits differ between SES (social economic status) categories? These questions can be answered by software which allows the use of covariables, like NCI and SPADE. A recent prototype of SPADE provides new functionalities for estimating the usual intake distribution accounting for covariables and for testing usual intake distributions on statistical significant differences between several categories of the covariate of interest, e.g. daily screen time, SES.

Combination of instruments

Sven Knüppel, German Institute of Human Nutrition Potsdam-Rehbruecke; Dept. of Epidemiology; Arthur-Scheunert Allee 114-116; 14558 Nuthetal; Germany

The prediction of individuals' usual food intake is a complex task due to the challenges of collecting and modeling nutritional data. Applying repeated short-term measurements like 24h dietary recalls (24HDRs) is the preferred assessment method to study the relationship between individuals' usual intake and health outcomes or diseases. 24HDRs are less prone to systematic measurement error compared to long-term measurements such as food frequency questionnaires (FFQ) which requires memory of food intake in the long past. Nevertheless, the food frequency information can be usefully applied as covariate in the statistical models improving the estimation of usual food intake derived from short-term measurements. Due to day-by-day variation of food intake 24HDRs are prone to random error. This random error can be minimized by repeated application of 24HDRs.

In this talk we demonstrate the usability of repeated 24HDRs under the consideration of FFQ information to estimate individuals' usual intake on empirical and simulated data. Additional, the effect of using covariate information, e.g. sex, age, weekday, and season, in the statistical models is shown. We illustrate the needed number of repeated short-term dietary measurements to estimate adequate individuals' usual food intake under different nutritional habits (regularly and episodically consumed foods).

Are complex models in nutritional epidemiology always worth the trouble?

Pietro Ferrari1, 1PhD, Statistician, Nutrition and Metabolism Section, International Agency for Research on Cancer, Lyon, France.

It has been repeatedly emphasized that diet could account for up to 40% among preventable causes of cancer, although the consensus around this estimate is not unanimous. Despite several decades of research, comparatively few nutrition-related factors have been established as playing a causal role in human cancer. The evaluation of role of diet on the occurrence of cancer has entailed a number of methodological challenges. First, extensive focus was given to procedures designed to perform correction of risk parameters for random and systematic measurement errors in individuals' dietary exposure estimates. Second, the evaluation of exposure/disease relationships in international multi-center study consortia motivated the need to exploit any level of etiological evidence, notably at the individual level (within-center) and at the aggregate level (between-center). Third, standard approaches have long focused on the relation between one or a restricted group of foods or nutrients and the risk of cancer, which requires a relevant use of statistical assumptions when controlling for potential confounding by other dietary and lifestyle factors. Recognizing the multi-factorial nature of cancer and other chronic diseases, complementary holistic methodologies have been employed to address the notion of dietary patterns, a concept conceived to address the inherent inter-correlations between dietary variables. Strategies relying on a priori (evidence driven) or a posteriori (unsupervised or data driven) approaches have been proposed, thus contrasting analytical simplicity with computational sophistication. The merits and the pitfalls of each of the above points will be illustrated and discussed. In an effort to provide workable tools to understand the etiology and possibly prevent chronic diseases, the day-to-day experiences of applied statisticians should be characterized by continuous concerns on the efficacy of cutting-edge statistical models to tackle biological complexity.

Session 2.21. Methodological considerations for evidence based dietary guidelines

Role of meta-analysis for evidence based dietary guidelines

Heiner Boeing, Department of Epidemiology; German Institute of Human Nutrition Potsdam-Rehbruecke (DIfE); Arthur-Scheunert-Allee 114-116 14558 Nuthetal Germany

It is well recognized that nutritional recommendations and guidelines need solid evidence generated by human studies. In the recent years, concepts of evaluation of studies and deriving the evidence from those studies have been developed and applied in practice. Per example, the Germany Society of Nutrition has publish guidelines for the preventive potentials of the macronutrients carbohydrates and fat and has evaluated foods and food groups for their impact on disease occurrence. The evaluation of nutrients and foods by the German Nutrition Society during the last decade usually included mostly individual studies and less reviews and meta-analyses.

During the last three to four years, a sharp increase of publications summarizing the study results to one research topic by even quan-

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titative Meta- and Meta-regression analyses could be observed. For important public health questions such as intake of vegetables and fruits and risk of type 2 Diabetes or red meat intake and mortality, even several meta-analyses exists published in different journals with sometimes only a short time distance. All meta-analyses claim to consider the totality of published studies so far but could come to different conclusions. For the evaluators of the evidence such meta-analyses will guide the decision process regarding the strength of evidence since the selection of appropriate studies to a topic is already been done by the authors of a meta-analyses and no further studies should exists that could contribute to the topic. However, it needs to be taken into account that also meta-analyses could have different degrees of quality and that it might matter which study results contributed to the overall estimate of effect.

Thus, overall quality criteria for meta-analyses need to be agreed upon, and to be applied more often. Moreover a critical appraisal of sequential meta-analyses over time is required. The new situation of often more than one meta-analysis for nearly all topics could help to reduce the workload to generate evidence to justify specific recommendation or guidelines in the nutritional field. However, this also bears the danger that point estimates and statistical significance from a meta-analysis are over-interpreted. A careful examination of a meta-analysis and sensitivity exercises could help to estimate the stability of the conclusion.

Novel approaches for meta-analyses

Lukas Schwingshackl, PhD, Department of Epidemiology; German Institute of Human Nutrition Potsdam-Rehbruecke (DIfE); Arthur-Scheunert-Allee 114-116 14558 Nuthetal Germany

Introduction: Lifestyle is a crucial factor in the prevention of non-communicable diseases. In 2013, the number of deaths worldwide and throughout all age groups amounted to nearly 55 million people, with 70% of them caused by non-communicable diseases. 32% of global fatalities were caused by cardiovascular or circulatory disease, followed by cancer mortality with 15%.

Objective: By means of systematic reviews and meta-analyses, the objective of the present papers was to add scientific knowledge for guidelines in the field of public health aimed at the prevention of chronic diseases.

Method/Design: The meta-analyses were planned, conducted and reported in adherence to standards (PRISMA, MOOSE, Cochrane Handbook) of quality for reporting meta-analyses. Pairwise and Network meta-analyses and meta-regression were performed for synthesis of quantitative evidence. Assessment of methodological quality was carried out using the risk of bias assessment tool by the Cochrane Collaboration for RCTs or the Newcastle Ottawa Scale for observational studies. For pairwise meta-analyses, data were analysed using the Review Manager software, for meta-regression analyses, the statistical package Stata was used and network meta-analyses were conducted using Markov chain Monte Carlo simulation implemented with the open-source software WinBUGS.

Results/Conclusion: Based upon new systematic reviews and meta-analyses, the present works adds important scientific knowledge for evidence-based public health recommendations, especially nutrition related topics for the prevention of chronic diseases. In particular, the main results suggest that future dietary recommendations should not focus primarily on nutrients (i.e. macronutrients), but rather on dietary patterns and specific foods. With respect to physical exercise as a modifiable lifestyle factor, a combination of resistance and aerobic exercise training should be highly recommended as the primary exercise regimen in the prevention and management of non-communicable diseases.

Food versus nutrient: fish and n-3 PUFA in disease prevention

Romina di Giuseppe, German Institute of Human Nutrition (DIfE), Nuthetal, Germany

Fatty acids (FAs) are components of all biological membranes, but also precursors of crucial compounds involved in both inflammatory and thrombotic processes (prostaglandins and leukotrienes, for instance). Thereby, fatty acids are directly involved in the pathogenesis of chronic diseases and the interest in this field is high. In human tissue, the majority of FAs are non-essential meaning that they can derive from both endogenous synthesis and diet. However, some FAs named "essential", such as the omega-3 alpha-linolenic acid (ALA), eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA), cannot be de novo synthesized in humans therefore we must get them from food. The health effects of omega-3 FAs come mostly from EPA and DHA which are prevalent in marine animals. ALA, found in land plants, however does not confer the same health benefits of EPA and DHA. ALA from vegetarian sources needs to be converted in the body to EPA and DHA; yet only a small amount can be synthesized in the body from this process and many people do not make these conversions very effectively. Though the strongest evidence for beneficial effects of omega-3 FAs has to do with cardiovascular disease, omega-3 fats may furthermore play protective roles in cancer and other conditions, and have been linked to healthy aging throughout life. Therefore, their provisions are of particular interest for nutritional recommendations. Yet, there is still an ongoing debate within the nutrition community: eating fish versus key nutrient omega-3 FAs in disease prevention. Indeed, fish may have health benefits but it may also contain contaminants which generate controversy and confusion over its protective role. However, potential risks of fish consumption need to be placed in the context of potential benefits.

Session 2.27. Markers in Nutrition Research

Introduction

Diána Bánáti, ILSI Europe

The scientific projects presented in this session are part of the working programmes of 3 out of 11 task forces ILSI Europe runs in the area of nutrition and food intake. ILSI Europe's activities in the field tackle the problem that many health claim dossiers are being rejected

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as the markers used in human intervention studies lack proper validation. Following to achievements on scientific definitions and concepts of functional foods in Europe, ILSI Europe has published guidelines for designing, conducting and reporting human intervention studies for the substantiation of health claims. Furthermore criteria for the evaluation and approaches for the scoring of markers have been developed and published. The stepwise approach of the ILSI Europe Marker Validation Initiative follows the ultimate goal of developing a database of validated markers in different areas of nutrition research (talk by Prof. Calder). Another activity aims to establish an efficacy model to assess the impact of dietary interventions on the risk, presence or penetrance of the metabolic syndrome (talk by Dr Russell). The third activity presented in this session aimed at evaluating if validating subjective measures are associated with a response of long-term health relevance (talk by Prof. Dye). ILSI Europe is partner in eight collaborative research projects funded by the European Commission (e.g. PATHTWAY-27) and is moreover represented in the scientific advisory board of further projects like FoodBall (JPI-HDHL) that includes a systematic exploration and validation of biomarkers to obtain a good coverage of the food intake in different population groups within Europe.

Measuring and Validating the Subjective Effects of Foods on Mood and Mental Performance

Louise Dye, University of Leeds, UK

The ILSI Europe Marker Initiative aimed to identify evidence-based criteria for selecting adequate measures of nutrient effects on health through comprehensive literature review. Two areas are summarised in this presentation. Firstly, the output which resulted from the work of experts in cognitive and nutrition sciences who identified and examined domain specific cognitive tests that are sensitive to nutrient interventions and provided guidance related to the application of selection criteria for choosing the most suitable tests for proposed nutritional intervention studies using cognitive outcomes. Secondly, the output of the expert group tasked to examine how to best capture subjective performance and mood, and consider what constitutes a meaningful effect in relation to translating results from standardized questionnaires into everyday life will be presented. The proposed approach extends the traditional cognitive approach of using standard 'objective' measurements to also include the consumers' subjective experiences in relation to food. The material in this presentation serves as an overview for industry, consumers and researchers interested in assessing the effects of food or food components on mood and cognitive test performance.

Development of Criteria for the Selection of Markers for Use in Nutrition Research: Follow-up of the ILSI Europe Marker Validation Initiative

Philip Calder, University of Southampton, UK

Biomarkers can be an essential component of medical diagnosis and an important means by which to monitor the efficacy of an intervention or treatment. In nutrition research (bio)markers are important because they provide vital information on the function and robustness of physiological systems and because monitoring long-term health and disease outcomes is often not feasible. The need for validated markers is well recognised by regulators as part of the process for substantiation of health claims on foods. ILSI Europe has a history of activities focussing upon identifying markers and establishing criteria by which they can be selected, evaluated and validated. ILSI Europe launched its "Marker Initiative on Nutrition Research" by identifying preliminary criteria for the evaluation of markers by means of a literature review and a subsequent consensus workshop. These activities concluded that a marker should be validated according to recognised methods, should reflect an endpoint (there should be a significant association between the marker and an endpoint in a target population), and (ideally) should respond to a dietary intervention. Recently, a multidisciplinary expert group set out to challenge and refine these preliminary criteria. The criteria were tested using a total of 13 markers selected from a breadth of fields of nutrition research. This lead to some revision in the criteria considered to be important in establishing a valid marker for an outcome of interest. A template was developed in order that stakeholders could use the criteria to evaluate any potential marker. Subsequently a system for scoring a marker and an associated template were developed. This system would enable researchers to evaluate and to compare different candidate markers within the same field of nutrition research in order to identify their relative usefulness. The expert group believe that the refined criteria and the tools developed will make marker assessment easier and more robust. This presentation will explain this process and will present the templates for discussion.

Establishment of Efficacy of Intervention in those with Metabolic Syndrome

Wendy Russell (on behalf of an International Life Sciences Institute Europe expert group), Rowett Institute of Nutrition and Health, University of Aberdeen, AB21 9SB, Scotland

Metabolic syndrome (MetS) is defined by a number of features associated with excess body weight, abnormal blood lipids, high blood pressure and blood glucose. Although there are inconsistancies in how these definitions are characterised, presentaion of at least three of the currently accepted defining paramaters are increasingly recognised as a significant risk factor for both cardiovascular disease (CVD) and type 2 diabetes melitus (T2DM). Many lifestyle intervention studies attempt to correlate the impact of diet on disease outcome. However, randomised contolled trials investigating individual dietary components, generally focus on individual defining paramaters of MetS and there is little understanding of the relative impact, or the combination of these features on CVD or T2DM. The objectives of this activity are to 1) establish the imact of dietary intervention on the currently recognised features of MetS, 2) to identify additional risk factors that are modulated by diet, 3) to understand the relative pathological impact of the individual components on CVD and T2DM and 4) by utilising a modeling approach, attempt to quantify the imporance of diet on disease outcome.

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Using a comprehensive literature review, high quality data was obtained from randomized controlled trials for dietary interventions (>8 weeks duration) in subjects exhibiting three or more defining features of MetS. In addition to the currently accepted defining parameters, data on potential novel risk factors has also been captured. These include several indices of inflammation, adiposity and renal function, as well as additional markers of lipid, glucose and insulin dysregulation. Data from observational studies (>5 years) in subjects also exhibiting three or more defining features of MetS on disease outcome will also be collected. It is anticipated that evaluation of this data set will provide a consensus report on the efficacy of intervention in MetS and the impact of risk factors on CVD and T2DM.

Session 2.3. Novel methods to assess diet

Food metabolome and dietary biomarkers: opportunities and challenges for nutritional epidemiology

Augustin SCALBERT, International Agency for Research on Cancer, Nutrition and Metabolism Section, Biomarkers Group, 150 cours Albert Thomas, F-69372 Lyon Cedex 08, France.

The food metabolome is defined as the part of the human metabolome directly derived from the digestion and biotransformation of foods and their constituents. It forms one of the most complex fraction of the metabolome in urine or blood and its composition varies widely according to the diet. Many constituents of the food metabolome may be used as biomarkers of food or nutrient intake. So far, considering the considerable diversity of food-derived compounds in human biofluids, only a very limited number of dietary biomarkers have been identified. However several parameters should concur to the rapid development of our knowledge on dietary biomarkers: (i) several hundred food-derived signals can be detected in blood or urine using highly sensitive high-resolution mass spectrometry (MS) techniques; (ii) fully agnostic metabolomic approaches applied to dietary intervention or cross-sectional studies can speed up the discovery of such food-derived metabolites; (iii) food metabolite databases such as Phenol-Explorer or FooDB facilitate their annotation.

Examples will be given on the identification of novel biomarkers of intake for fruits, beverages, meat and fish in the European Prospective Investigation on Cancer and nutrition (EPIC) calibration study using urine or blood samples and MS-based metabolomics. These newly discovered dietary markers can be used together with other known biomarkers to define (large) panels of markers to be measured in nutrient-wide association studies (NWAS), either to validate other instruments of dietary assessment or to study associations between diet and disease risk. To aid in this task, we developed Exposome-Explorer, a new online database containing highly detailed information on dietary biomarkers, their measurement in population studies and their state of validation. Still some challenges will need to be solved before these NWAS are applied in epidemiological studies: firstly robust and fast analytical methods will be needed to quantify these panels of biomarkers in large series of biospecimens; secondly the reproducibility over time of these panels of biomarkers will have to be evaluated to ensure they can be used in cohort studies where only one biospecimen has often been collected at baseline.

New approaches to measure dietary intake

Janet CADE, Nutritional Epidemiology Group, University of Leeds, Leeds, UK LS2 9JT.

Dietary assessment has, at last, reached the 21st century! Although the variety of foods available are now more varied and complex than ever before, we have a chance to measure this through the application of web-based and mobile eHealth technology. This advance provides the potential to capture detailed dietary data on large numbers of individuals without the need for costly and time-consuming manual nutrition coding. These new approaches may help to reduce measurement error and advance our understanding of nutritional determinants of disease.

Web-based tools will be the main focus of the talk exploring their potential, limitation and challenges. A practical example of the development of a web-based tool to assess diet 'myfood24' will be given. This will highlight the importance of usability testing in the development process and describe the generation of a new food composition database using back-of-pack information. Results from ongoing validation studies will be presented. In addition, results from a systematic review of the potential for new technologies to be used in national diet and nutrition surveys will be presented. This will include an itinerary of new and emerging technologies that could have the potential to improve, complement or replace existing methods. Exemplars from five technology categories (web-based diet diary, web-based 24-hour recall, handheld devices, non-automated cameras to complement traditional methods, and non-automated cameras to replace traditional methods) will be presented. The review was supported by focus group research with adults who used, and did not use, new technologies.

New methodologies applied to dietary assessment could provide us with a step-change in our ability to reliably characterise food and nutrient intake in population studies. In this fast-paced field of development, it is recommended that progress in technology development, validity and acceptability is monitored.

Mobile Diet Applications: smart options for research and practice

Beer-Borst, Sigrid, University of Bern, Faculty of Medicine, Institute of Social and Preventive Medicine ISPM, Bern, Switzerland

Smartphones and tablets are in almost everyone's hands today, irrespective of gender, age, social status, literacy level etc. Users of handheld devices with mobile internet access may download applications (apps) and access information with or without charges anytime, anywhere. The commercial and scientific/research driven market of health-related apps is growing.

In view of the obesity epidemic, many mobile health apps are developed, tested and made accessible to people to support them in weight

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management. Weight management is an issue of energy balance and thus of food consumption (dietary/energy intake) and physical activity (energy expenditure). Focusing on Mobile Diet Application software (mDietApps), we may distinguish three major areas of interest to consumers, food scientists and regulators, health professionals and nutritional epidemiologists. (1) Apps that offer access to food product information about for example food composition and the presence of allergens and additives. (2) Commercial and scientific phone-based dietary interventions applying different strategies by making use of phone features (photographs, text messages etc.) and employed for self-monitoring with or without professional/dieticians' support. (3) Phone-based dietary assessment research, which may potentially offer new opportunities in population surveys thanks to automated real-time coding (cost factor) or use of photos for intake quantification etc.

A general overview, which can only represent a snapshot of the large ongoing work in the field of mDietApps will be presented. Opportunities, limitations and related research needs will be identified using specific examples of apps in the three areas, for example on the issues of app literacy, users' e-literacy, usefulness, data quality, validity, and privacy of big data.

Session 2.4. Design of intervention studies

Bias, misreporting and new solutions for diet and weight data in intervention studies

Fredrik Bertz, University of Gothenburg

Randomized controlled trials (RCTs) provide the critical possibility to provide causal inference; evidence to show that an intervention causes an outcome. In RCTs where the objectives are dietary intake and/or body weight related outcomes some problems of measurement may arise that attenuates our possibility to detect true differences between intervention and control participants. However, by designing trials to provide possibilities for measurement triangulation, and by collecting repeated measurements in novel ways using new technology, potential solutions to two problematic issues will be presented here.

Underreporting of dietary intake is problematic, but basically norm. This common knowledge may lead to the assumption that after considering the well-established characteristics of under-reporters (or under-eaters) such as individuals with overweight, women, and elderly, the degree of underreporting is constant. However, in trials of weight loss an additional potential problem arises; that intervention and control groups may systematically underreport differently during follow-up. For several reasons an intervention group receiving dietary treatment may report their diet differently from untreated controls. Thus a bias is introduced that may attenuate the possibility to determine true differences between groups, i.e. effect of intervention, and thus ultimately obscure role of diet in health and weight. By triangulation using doubly labeled water or estimation equations for total energy expenditure, DXA for body composition changes and calculating the change in energy content of body tissues, and diet data of choice for dietary intake; individual underreporting can be estimated. Even among lactating women a factor for milk energy output can be included. These estimates can be used to adjust statistical analyses to reduce the bias it reveals.

A second issue with known, but hard to deal with problems, is body weight data collection. Weight may vary one to two kg, or sometimes more, on a day-to-day basis in a mainly random manner. When small changes are investigated, like weight maintenance or the prevention of age-related weight gain this is highly relevant. However, it is also important in weight loss trials with modest weight loss goals. With multiple measurements per subject at each data collection time point better estimates of body weight can be achieved, i.e. day-to-day variation is reduced. However, multiple weighing during a week at a clinic is unlikely feasible, even in a small trial. Self-reported weight data may not be accurate for several reasons. A potential solution is the use of internet-connected "smart-scales". Such can be provided to subjects to facilitate collection of objective, multiple weights; also over long periods of time.

Large scale studies: trials, observational studies and long-term adherence

Miguel A. Martínez-González, University of Navarra

The assertion that observational studies can only provide evidence of statistical associations but not of true causation is frequent in nutrition research. The underlying assumption is that randomized clinical trials (RCTs) with hard clinical events as end-points are the only solution to circumventing substantial problems inherent to observational epidemiology which mainly include residual confounding and measurement errors. Nonetheless, RCT are far from perfect, and also present considerable limitations. These limitations include lower external validity, the rigidity of the initial design (regarding doses, duration of follow-up period, and type of comparator), losses to follow-up, ethical requierements to prematurely halt the trial and contamination of the control group with aspects of the intervention. However, the most important and often unavoidable potential flaw of a RCT in nutrition is the frequent suboptimal compliance of free living subjects in the long-term with the intended intervention. Consequences of this phenomenon are towards-the-null biases because the contrast between the active intervention arm and the comparator is shrunk and may even become negligible.

Substantial efforts are needed from the very beginning of the design of a RCT to provide incentives for high retention and compliance. A variety of assessment tools frequently repeated (including FFQs and short questionnaires) contributes to increase compliance. A powerful incentive is the provision of free food items at no cost in the education sessions. Another powerful incentive is a high motivation and commitment of dietitians and the rest of the staff. Participants' awareness that objective biomarkers are used to evaluate their adherence can further foster compliance.

In addition, the symbiosis between properly designed RCTs and large observational cohorts with due precautions to improve dietary measurements, including repeated measurements of diet, and appropriate and careful control of potentially confounding variables are currently the best possible option to ascertain the health effects of dietary exposures.

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Session 2.5. Data bases and data sharing

Approaches for meal pattern analysis

Dr. Heléne Bertéus Forslund, Affiliation: University of Gothenburg, Sahlgrenska Academy, Department of Internal Medicine and Clinical Nutrition, Gothenburg, Sweden

Meal patterns, that is, when and how often we eat, vary among cultures and over time. There is a trend in affluent societies to eat more frequently throughout the day. Epidemiological studies have reported a shift to higher intake frequencies, especially snacking, the last 30 years. Not only food patterns but also meal patterns might have an impact on health. Recently, studies on meal patterns have received considerable attention. Numerous studies have reported that eating frequency is associated with energy intake, BMI and metabolic risk factors but results are far from consistent. A major reason for this inconsistency is methodological problems. Besides various meal pattern assessment methods, there is no consensus how to define different intake events and temporal distribution.

When analyzing meal patterns these methodological problems need to be addressed. Food records and 24 hour recalls are often used to assess meal/eating patterns as well as specific meal pattern questionnaires and specific questions, all which have advantages and limitations. In the literature, when approaching meal patterns analysis, a huge variety of definitions has been used, for example; intake occasions, eating occasions, meals, snacks, drink/beverages regular/irregular eating. Meals and snacks are the predominating terms used for eating events. Definitions have been based on time of consumption, energy content, time intervals, social interaction or self-reported by subject. In addition, underreporting of energy intake concomitant with underreporting of eating frequency needs to be considered in the analysis. The method used, underreporting and the definition of eating occasions are crucial for the outcome and the interpretation of results. Different approaches in the analysis may lead to inaccurate associations between meal patterns and health. Hence, the consequence of various definitions is difficulties to compare results from different studies and this has prevented our ability to evaluate health and meal patterns relations as well as making evidence-based recommendations.

Dietary survey data and their scientific use

Liisa Valsta, National Institute for Health and Welfare, Nutrition Unit, Helsinki, Finland

Dietary survey data are collected by 85% of the EU Member States and also by other European countries. The main use of the data is national nutritional monitoring, forming the basis for planning and implementation of nutrition and public health policy actions at country level. Food consumption data obtained from surveys are also the key for dietary exposure estimates for risk assessment purposes. Most of the countries use their dietary survey data at the national level e.g. for chemical exposure assessment purposes. In the recent years, the need for dietary survey data has become evident also in planning and executing of total diet studies in several European countries. Parallel with the national use of dietary survey data, they are a key element of risk assessment activities at European level carried out by the European Food Safety Authority (EFSA). At the moment, over 20 Member States have provided data from over 50 dietary surveys to EFSA´s European Comprehensive Food Consumption Database. Due to the efforts of the Member States, EFSA and other European infrastructures, also the numbers of occurrence and nutrient values today are impressive allowing a large variety of dietary exposure and nutrient intake assessments in the EU. Some European countries also have a long history in collecting human bio-monitoring samples in combination with dietary data in the surveys. This allows studying associations between food consumption, nutrient intake and nutritional status of different population groups. Collecting both dietary and biological marker data further supports the search and validation of useful dietary biomarkers. Dietary survey data are further used for cross-sectional analyses in the area of nutritional epidemiology studying the associations between different dietary patterns and health. The interest in international collaboration warrants further harmonization of food consumption data collection and better understanding of the uncertainties involved in dietary survey data.

urine to date.

Session 2.6. Nutrition Research opportunities

National nutrition monitoring in Germany: a perspective

Ingrid Hoffmann, Carolin Krems, Department of Nutritional Behaviour, Max Rubner-Institut, Karlsruhe, Germany

The National Nutrition Monitoring of the adult population in Germany consists so far of two National Nutrition Surveys (NVS I and II), the German Nutrition Survey (GeNuS) 1998 as cross sectional studies and the NEMONIT study as longitudinal survey. NVS I was conducted between 1985 and 1989 in the Western part of Germany before reunification. Information about nutritional behaviour was obtained of about 25,000 participants. With the NVS II (2005/2007) food consumption and further aspects of nutritional behaviour were assessed of almost 20,000 participants from the united Germany. In-between NVS I and II, assessment of nutritional behaviour of about 4,000 adults took place with GeNuS 1998. From the NVS II a subgroup (about 2,000 participants) was recruited for the longitudinal NEMONIT survey with annual data collection from 2008 to 2014. The focus of NEMONIT was on trends in Germany, especially of food consumption and nutrient intake. For the upcoming years, NVS III is planned and further national nutrition surveys are strived for every eighth year.

With the NVS III information on nutritional behaviour including food consumption and nutrient intake of 10,000 German adults will be assessed. New in the scope of the German National Nutrition Monitoring is that nutritional status of all participants will be determined by collecting blood and urine samples. Study design and methods are

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in line with European recommendations to achieve harmonized food consumption data to allow international comparisons.

National nutrition surveys for infants/toddlers and children/adolescents in Germany are available from 2001/2002 and 2006, respectively, and follow-up surveys are currently carried out.

The German National Nutrition Monitoring provides high quality and representative data on nutritional behaviour. These are mandatory for planning and implementing nutrition policy programs, for updating national food- and nutrient-based recommendations, and for decision making support in the context of national and European food laws.

The Cluster "NutriAct": Nutritional Intervention for Healthy Aging: Food Patterns, Behavior and Products"

Tilman Grune (on behalf of the cluster consortium), German Institute of Human Nutrition Potsdam-Rehbruecke (DifE), Germany

The main purpose of the cluster is to address the demographic changes of the modern society by the means of generating new knowledge on nutritional behavior of a pre-aged population and determining the principal determinants of their food choice. By testing the flexibility of the dietary pattern of a median aged population principal possibilities for a switch to a more healthy diet will be tested. The main components of nutrition addressed in the cluster are fibers, plant protein and unsaturated fat. New technologies will provide the basis for the production of new food products. Their acceptance and health impact will be tested in an intervention trial.

So, the interdisciplinary structure of the cluster connects experimental, epidemiological and clinical nutrition research with behavioral science and social medicine and both, subsequently, with food technology and food production.

JPI HDHL Joint Action: DEDIPAC

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Joint programming is a process by which Member States engage in defining, developing and implementing a common strategic research agenda, based on a shared vision of how to address major societal challenges that no Member State is capable of resolving by himself. Setting up a Joint Programming Initiative (JPI) should also contribute to avoiding unnecessary overlap and duplication of research. Moreover, it should foster harmonisation of methodologies on a European level by enhancing the development and implementation of standardised research tools, protocols and procedures for data management. The DEDIPAC Knowledge Hub (KH) is the first action of the European JPI 'A Healthy Diet for a Healthy Life'. DEDIPAC KH is a multi-disciplinary consortium of 46 research groups and organisations supported by joint programming grants from 12 countries across Europe. This interdisciplinary consortium aims to improve the understanding of determinants of dietary, physical activity and sedentary behaviours. The work is divided in three thematic areas: (I) Assessment and harmo-

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nisation of methods for future research, surveillance and monitoring, and for evaluation of interventions and policies; (II) Identification of determinants of dietary, physical activity and sedentary behaviours across the life course and in vulnerable groups; and (III) Evaluation and benchmarking of public health and policy interventions aimed at improving dietary, physical activity and sedentary behaviours. During the three-year funding period which started in November 2013, DEDIPAC KH will organise, develop, share and harmonise expertise, methods, measures, data and other infrastructure. This should strengthen European health research and improve the broad multidisciplinary approach needed to study the interactions between multilevel determinants in influencing dietary, physical activity and sedentary behaviours. Eventually, new knowledge will be gained and will be translated into more effective interventions and policies for promotion of healthier behaviours and more effective monitoring and evaluation of the impacts of such interventions.

Metabolomics in food and nutrition research at the max rubner-institut (MRI)

Bernhard Watzl, Sabine E. Kulling, Max Rubner-Institut, Federal Research Institute of Nutrition and Food, Karlsruhe, Germany.

The Max Rubner-Institut (MRI) advises the German Federal Ministry of Food and Agriculture (BMEL) in the area of nutrition, nutritional behavior as well as food quality and safety. A prerequisite for advising the BMEL is the knowledge and application of the latest analytical tools in nutrition and food sciences. Metabolomics has recently become an important approach in nutrition and food research, which is rapidly developing within this field. It allows analyzing a wide range of small molecules present in biological systems including foods (food metabolome) as well as human blood and urine (human metabolome). Currently, the major determinants of the composition of the human metabolome are not yet well defined, e.g. the impact of the consumption of specific foods, of acute and long-term food consumption, and of the level of physical activity. In addition, environmental factors such as cultivation conditions, but also the diversity of food processing technologies (from storage conditions to the latest technologies) have a substantial impact on the food metabolome, but detailed studies are also lacking. Based on data available so far, metabolomics is particularly suitable to gain a deeper understanding of these processes.

The primary objective of the MRI was to establish an analytical multi-platform for metabolome analysis covering a large number and a broad range of diverse metabolites representative of the whole metabolome. Therefore, the MRI platform set-up comprises different analytical methods including NMR, GCxGC-MS, and LC-MS, combining targeted and untargeted approaches. In case of GCxGC/MS a complete workflow for data processing including a new drift correction algorithm was developed. Data are analyzed by univariate and multivariate methods including predictive modelling using different machine learning algorithms.

The multiplatform is used for different tasks: In order to gain insight into the major determinants of the human metabolome, a cross-sectional study (KarMeN; Karlsruhe Metabolomics and Nutrition) was set-up to assess the human metabolome in a well-defined healthy cohort and its major life-style-related determinants (diet, physical activity, age, gender) under highly-standardized and controlled conditions. In the case of food metabolomics projects to understand the postharvest physiology of fruits are currently in the focus of interest. Further details of the metabolomics research at the MRI are presented by Weinert et al., Frommherz et al. and Rist et al. at the FENS 2015. The MRI is a member of the JPI-coordinated FOODBALL (The Food Biomarker Alliance) consortium, which applies metabolomics techniques to identify new exposure markers of food intake within Europe. In conclusion, metabolomics will be an indispensable new tool in food and nutrition research and will assure that the MRI continues to advise the BMEL at the highest level.

MIRDIET Circulating microRNAs as markers of dietary intake

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The MIRDIET project aims to identify circulating miRNAs as quantitative biomarkers for dietary intake. The project focuses on 4 dietary end-points i) calorie intake; ii) polyphenol enrichment; iii) dietary protein intake and iv) glycemic index/glycemic load.

miRNAs have prolonged stability in various sample preservation conditions making them suitable biomarkers. Profiling of miRNAs is possible using microarrays or next generation sequencing, and miRNA can be easily and accurately quantified using real-time quantitative PCR.

Adipose tissue has a pivotal role in obesity-related complications as a key tissue in the inter-organ crosstalk, dysregulation of which can lead to the development of metabolic and cardiovascular diseases, as well as cancer. In vitro and in vivo mouse studies have shown that miRNAs control a variety of processes in adipose tissue.

MIRDIET applies data from dietary interventions with careful assessment of the nutritional contents, as well as collected adipose tissue and blood samples. Already initiated adipose tissue miRNome studies are being analyzed to identify miRNAs associated with dietary intake parameters. The next step is to verify whether these adipose tissue miRNA species are present in blood with similar associations. The candidate circulating miRNAs can then be validated in large dietary interventions and habitual dietary conditions.

The MIRDIET consortium is composed of 3 French laboratories (ICAN Paris Prof. K. Clément, CARMEN Lyon Prof. M. Laville and I2MC Toulouse Prof. D. Langin) gathered in the F-CRIN-labeled FORCE (French Obesity Research Center of Excellence) consortium, two Swiss entities at Department of Physiology (Prof. L. Tappy), University of Lausanne and Service of Endocrinology, Diabetes and Metabolism (Prof. F. Pralong) at Lausanne University Hospital and a Dutch center, NUTRIM (Prof. E. Blaak) at Maastricht University.

JPI HDHL Joint Action: BioNH

Edith Feskens, Project Coordinator the JPI HDHL funded project FoodBAll Wageningen University. The Netherlands.

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A major issue in nutritional science is the quality of dietary assessment. Assessment of the

intake of foods, food ingredients and food contaminants is an extensive challenge and questionnaires may give biased results. Biomarkers covering several foods and food components may provide an objective measure of actual intake and/or status, and provide an important adjunct to classical methods for dietary assessment. However, only few foods are currently covered by validated intake biomarkers.

The Food Biomarker Alliance (FOODBALL) proposes to carry out a systematic exploration and validation of biomarkers to obtain a good coverage of the food intake in different population groups within Europe, by applying metabolomics to discover biomarkers, exploring use of easier sampling techniques and body fluids, revising the current dietary biomarker classification and developing a validation scoring system, applying these on selected new biomarkers, and exploring biological effects using biomarkers of intake.

The FOODBALL consortium includes 22 partners from 11 countries incl. Canada, and has wide access to samples and data from large cohorts and dietary interventions with specific foods. It has nearly unlimited access to state-of-the-art analytical platforms allowing measurement of thousands of metabolites/biomarkers in these samples. The project started early 2015, and will take 36 months. The first work has focused on preparing acute studies. Currently, a top list of foods has been identified and a protocol for the acute studies has been set up. Next, a number of reviews covering biomarkers of specific foods have been initiated. A dedicated website (www.foodmetabolome.org) has been launched to disseminate tools and resources.

FOODBALL will provide a unique platform for sharing knowledge and resources within and beyond the project through development of public databases on food metabolites, software tools, and chemical libraries. It has the potential to revolutionise the nutrition biomarker field.

"ENABLE" Cluster

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The enable Cluster represents a consortium of experts and institutions from Bavaria (region Munich – Freising – Nuremberg) committed to create new interdisciplinary collaborations focusing on nutrition, food and health. The interdisciplinary Cluster comprises academic research groups with a long-standing expertise in nutrition, food and health sciences, consumer and social science, information and communication technologies (ICT) and food industry. As a unique feature and guiding principle, the enable Cluster brings together experts for dietary needs in specific stages of life, ranging from pregnancy and early childhood, adolescence/young adulthood, middle age to the elderly. Thus, the enable Cluster covers all the stages of life, in which individuals are vulnerable to diet-related health problems. Main aim of the Cluster activities is to develop and evaluate healthier food options with improved nutrient composition, optimized taste and higher consumer acceptance to facilitate healthier food choices in defined stages of life and in population groups at risk.

A central part of the common activities will be the recruitment and phenotyping of 4 enable cohorts covering the four stages of life establishing a comprehensive phenotyping platform using state-of-the-art technologies. In work package (WP) 1, consumers will be characterized in their food preferences, behaviours and metabolic conditions. The goal of WP 2 is to develop healthier foods with convenience food as a show-case to improve the health value of popular fast foods preserving sensory attractiveness and consumer acceptance. Newly developed food products or concepts will undergo a rigid and structured evaluation process using the knowledge platform and the enable cohorts. WP 3 will utilize novel Information and Communication Technologies (ICTs) to provide and promote healthy eating options in a targeted manner by applying various nudging concepts. Thus, the enable Cluster will provide a sustainable framework for science collaboration across a network of 39 partners from academia and industry in 22 projects. The cluster builds on unique research capacities and forms unusual alliances on the 'cross-roads of sciences' to explore the innovation potential of these alliances for consumers' dietary needs along the specific stages of life. There is strong commitment within the enable Cluster to become a leading centre of nutrition research.

The Data Sharing Initiative for Nutrition (DASH-IN) under ENPADASI

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Introduction: A large number of expensive nutritional studies are conducted in Europe and all over the World but the data from most studies are used only for a limited purpose and then stored without public access, yet the data could be mined and used to resolve many other burning questions related to nutrition and health. Presently researchers are hesitant to share data as they are unaware of the sharing conditions so a defined framework should open up for much wider data sharing.

Objectives: To deliver an open access research infrastructure that will contain data from a wide variety of nutrition studies, ranging from mechanistic/interventions to epidemiological studies including a multitude of phenotypic outcomes allowing graded data sharing options and facilitating combined data analyses.

Methods: Standards and minimal requirements for shared studies will be defined; data entry templates and the actual distributed infrastructure for the data sharing system will be technically developed, tested and released along with system codes (open source), ontologies for use in the system and tools for integrated analyses. Policy issues related to ethics, data protection and sharing etc. will be resolved using commonly developed materials and educational activities related to the data sharing system will be developed for distribution. In the second part of the project a set of tools will be developed to enable rapid and efficeint data based queries of the existing databases through the improved metadata resources made available by ENPADASI.

Results: ENPADASI is a 2y feasibility project, launched by the Joint Programming Initiative "A Healthy Diet for a Healthy Life" (JPI-

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HDHL). The ENPADASI project started in Jan 2015 with 15 partners from 9 European countries and builds upon the former Nutritional Phenotype Database (dbNP) initiated by NuGO (the NutriGenomics Organization) and will deliver the DASH-IN infrastructure. The ENPADASI consortium has so far developed the minimal requirements for study data, quality appraisal tools and templates for uploading experimental and observational studies and their data into a common framework. The first few datasets have been uploaded and campaigns as well as educational materials to include as much sharing as possible from JPI-HDHL member countries are under development. In the current phase the central tools for data sharing approvals and for combined analyses are under development and guidelines are being drafted for efficient and legal sharing of data, resolving ethical, data protection, intellectual property, and data sharing policy issues. Much of the achievements are reached by building on existing initiatives and using them in a combined effort. These include NuGO, ESFRI, ELIXIR, EuroDISH, ECRIN, STROBE, COSMOS/Metabolights, BBMRI and many others. Close collaboration has so far been initiated also with other JPI-HDHL initiatives, including DEDIPAC and BioNH (FoodBAll).

Conclusion: The Data-Sharing Initiative for Nutrition (DASH-IN) is well underway to develop a database and infrastructure allowing researchers to present their ongoing and finalized studies and to share their data with others under a well-defined umbrella structure taking into account accessibility and ethical limitations.

Joint Programming Initiative A Healthy Diet for a Healthy Life

Martijntje Bakker, vice-chair of the Joint Programming Initiative A Healthy Diet for a Healthy Life

Introduction: Many governments are struggling with the growing social and economic burden of diet- and lifestyle-related diseases. This major societal challenge cannot be tackled by single countries.

Objectives: The aim of the JPI HDHL is to better understand the factors that determine food choices and physical activity behaviours and thus human health. Subsequently, the goal is to translate this knowledge into programmes, products, tools and services that promote healthy food choices.

Method: The JPI HDHL brings together 251 countries. It aims to provide a holistic approach to the development and implementation of a Strategic Research Agenda (SRA) to understand the interplay of factors known to directly affect diet-related diseases, discover new relevant factors, mechanisms and strategies, as well as to contribute to the development of actions, policies, innovative products and diets, with the aim of drastically reducing the burden of diet-related diseases.

Results: Three key interacting research areas and their challenges have been described in the SRA:

1. Determinants of diet and physical activity
2. Diet and food production.
3. Diet-related chronic diseases

1 Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Ireland, Italy, Latvia, Netherlands, New Zealand, Norway, Poland, Romania, Slovenia, Slovakia, Spain, Sweden, Switzerland, Turkey, UK (bold = full member).

Since its start JPI HDHL has launched 7 Joint Actions of which four research consortia are already up and running. In addition JPI HDHL works together with its member countries on its ambition to align national research programmes and to stimulate knowledge transfer in the area of Nutrition and Health.

Conclusions: JPI HDHL has made an important strategic investment in the past couple of years. The second Implementation Plan 2016-2018 needs to build on this investment to work towards its vision.

BMBF Competence Cluster for Nutrition and Cardiovascular Health (nutriCARD)

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Introduction: Cardiovascular diseases (CVD) are a leading health problem and the main cause of death in industrialized countries. Our diet is crucial for the prevention of CVD, as it affects almost all modifiable cardiovascular risk factors. The consumption of processed food products rich in energy, saturated fat, salt and refined carbohydrates characterizes nutrition in the developed world, thereby increasing the risk of CVD.

Objectives: The aims of the nutriCARD initiative are to develop healthier food products, to improve nutritional behavior and to better understand how nutrition affects CVD. The long-term objective is to improve cardiovascular health and to reduce the number of diet-related CVD events in Germany.

Methods / Design / Results: The nutriCARD cluster was initiated by researchers in Halle, Jena and Leipzig to substantially improve nutrition research and cardiovascular health. Access to cohort data (CARLA, EPIC, LIFE, LURIC and National Cohort), expertise in cardiovascular cell and animal models, human intervention studies, food technology and hygiene, communication as well as economic activities in the Central and Eastern part of Germany are essential strengths of nutriCARD and the basis to realize the concept from idea to application. To achieve its aims, the holistic, interdisciplinary and translational approach of the nutriCARD cluster addresses 4 major issues: (i) development of cardioprotective food by using novel approaches in food technologies, (ii) research on the contribution of nutrients to CVD which emphasize gender and age aspects, (iii) identification, characterization and validation of biomarkers and gene-nutrient interactions in large cohort studies, and (iv) development of marketing strategies as well as innovative communication strategies to improve cardiovascular health in the broad population.

Conclusions: nutriCARD has the vision to become a strong research hub to invigorate nutrition science in Central and Eastern Germany and to improve cardiovascular health.

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Diet – Body – Brain (DietBB): From epidemiology to evidence-based communication

Ute Nöthlings on behalf of the DietBB Cluster, Nutritional Epidemiology, Department of Nutrition and Food Sciences, University of Bonn

Dietary factors play an important role in cognitive development and cognitive decline across the lifespan, and development of neurodegenerative diseases. To date, studies have focused on specific aspects of diet such as the intake of micro- or macronutrients, but research on diet as a whole is warranted as this incorporates the complexity of the whole diet and facilitates communication of the results to the public. Evidence-based dietary recommendations are intended to minimize the risk of chronic diseases in the population; however, effective strategies to achieve corresponding long-term changes in dietary behavior in the population are missing. The cluster, Diet – Body – Brain (DietBB), will investigate the relation between dietary factors, particularly food intake and dietary patterns, and the development, maintenance, and decline of cognition across the lifespan, and elucidate the mechanisms underlying the relation between dietary factors and cognition. Furthermore, the cluster will investigate determinants of food choices to increase the effectiveness of consumer communication. The DietBB cluster will jointly address these overarching research questions spanning from in-depth epidemiologic and interventional evidence to recommendations to the public to improve health. These goals will be achieved through six thematic areas (TA). The work performed in these TA includes the development of novel assessment methods to standardize exposure measures across studies (TA1), the conduct and analysis of epidemiological studies across the lifespan (TA2) and dietary intervention studies (TA3), genetic and epigenetic research to get insight into biological mechanisms and to elucidate nutrition-environment interactions (TA4), identification of the determinants of consumer choice (TA5), and integrating the research findings into communication strategies (TA6). The DietBB cluster acts in the region of Bonn-Cologne and includes 13 academic partners, the German Nutrition Society, and two industry partners, all located within a radius of 30 km around Bonn.

Session 2.7. Behaviour change - from science to implementation

Policies rising from consumer food choices – do we need translators?

Monique M Raats, Food, Consumer Behaviour and Health Research Centre; University of Surrey, United Kingdom

There is an increasing recognition of the need to use evidence based on social science paradigms and approaches such as dietary attitudes and behaviours. Food choice behaviour is habitual and thus difficult to change through information provision. Whether habitual or carried out consciously, food choice is not related to health when health is conceptualised as disease prevention unless it is personally relevant. In order to make food-related behaviour personally relevant to the majority, one needs to take account of consumers' relationship with food, i.e. social, economic issues, food literacy, emotional knowledge as well as physical and psychological traits – some refer to this as food-related wellbeing. Increased relevance can in part be achieved through addressing a broader range of meanings of health when designing intervention programmes. Incorporating the emotional, spiritual, the more positive aspects of health may then trigger more individuals into readiness to change their food-related behaviour. Consumer acceptance which is in part determined by attitudes, beliefs and habits) is a necessary precondition for any successful policy option. It is important recognize the difference between "choice/buying behaviours" and "eating behaviours" given that former precede the availability of an option at home (or at the table). On the other hand "eating behaviours" encompass choosing how much to eat and the cultural conventions of how we construct our meals. The Public Health Nutrition Policy-making Framework can be used to classify the three types of consideration that influence public health nutrition policy: (1) science (as an institution and process) and scientific community; (2) the policy-making process and its institutions/actors; and (3) wider contextual elements. This framework can be used to analyse how evidence is collected and assessed in order to better understand how to develop suitable evidence-based public health nutrition policies Illustrations will be provided.

Eating Behaviour – Intelligence from the latest science

Katherine Appleton, Department of Psychology, Bournemouth University, Bournemouth, UK

The field of eating behaviour aims to understand why people eat. Determinants of eating behaviour range from physiological requirements to hedonics, emotions and cognitions, and these determinants typically explain everyday eating very well. Healthy eating however is different. Healthy eating is largely determined by cognitions, and strategies to improve healthy eating are largely based on cognitive models of health behaviour or health behaviour change. Increasingly, researchers are recognising the importance of everyday eating in healthy eating. Nutritionists have long known that for healthy eating to have heath impacts, it needs to be sustained, habitual, and essentially to become everyday eating. Recently, researchers have begun to use the determinants of everyday eating for impacting on healthy eating, and strategies utilising these determinants are achieving success.

Successful innovative methods of behavioural interventions

Rebecca Beeken, Senior Research Psychologist, University College London, UK

The traditional approach to changing health behaviours rests on the provision of information and education. However, this is rarely sufficient for prompting individuals to make long-term changes. Unhealthy eating behaviours, in many cases, are not simply a consequence of lack of knowledge. Complex interventions take into account

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the many factors that influence behaviour including psychological, social, societal and contextual determinants. Such interventions are typically based on psychological models of behaviour and have achieved modest and variable success. However, the majority focus on deliberate actions, driven by conscious reflection on the consequences of engaging (or not) in a behaviour. More recently, novel interventions targeting automatic processes have shown promise, with habit-formation theory offering a unique perspective from which to derive a new approach to behaviour change. Habits are automatically-triggered actions, learned through repetition of the action in a consistent context. Interventions targeting automatic actions have application where level of engagement or motivation means that the more traditional behavioural approaches, with inherently high demand for commitment, achieve limited adherence. Furthermore, once an action has become automatic it is more likely to be maintained in the long-term. Moving forward, new technologies offer exciting possibilities for intervention development. Such technologies not only provide creative ways for delivering information and support, but also make personalised or tailored approaches easier on a larger scale. Future research is needed to explore the optimal use of these innovative interventions and to address the new challenges they bring.

Session 2.8. New statistical methods for food intake

The Dietary Patterns Methods Project: Key findings to date and new challenges relevant to dietary guidance

Angela D. Liese, PhD, MPH. Professor of Epidemiology, Department of Epidemiology & Biostatistics, Arnold School of Public Health, University of South Carolina, USA

The Dietary Patterns Methods Project (DPMP) was initiated in 2012 to strengthen research evidence on dietary indices, dietary patterns, and health for upcoming revisions of the Dietary Guidelines for Americans. DPMP investigators developed research questions and standardized approaches to index-based dietary quality analysis, resulting in 3 published cohort-specific papers and one synthesis paper. This presentation focuses on the synthesis of findings across the cohorts and an overview of new challenges. The cohort studies included the NIH-AARP Diet and Health Study, Multiethnic Cohort, and Women's Health Initiative Observational Study (WHI-OS). The Healthy Eating Index 2010, Alternative Healthy Eating Index 2010 (AHEI-2010), alternate Mediterranean Diet Score, and the Dietary Approaches to Stop Hypertension (DASH) Score were examined across cohorts for correlations between pairs of indices; concordant classifications into index score quintiles; associations with all-cause, cardiovascular disease (CVD), and cancer mortality; and dietary intake of foods and nutrients corresponding to index quintiles. Across all cohorts in women and men, there was a high degree of correlation and consistent classifications between index pairs. Higher diet quality (top quintile) was significantly and consistently associated with an 11-28% reduced risk of death due to all causes, CVD, and cancer compared to the lowest quintile. This was true for all diet index-mortality associations with the exception of AHEI-2010 and cancer mortality in WHI-OS women. Interestingly, relatively small intake differences distinguished the index quintiles. Moreover, the trends toward reduced mortality risk started at relatively lower levels of diet quality. Thus, the DPMP findings suggest that all four indices capture the essential components of a healthy diet. NIH-AARP data are currently being used to create visual representations of index components across quantiles using radar plots. Future work of the DPMP will incorporate measurement error correction methods and explore the complexity within and differences between dietary indices.

Methodological consideration regarding exploratory food pattern analysis

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It is currently still a debate how to define a food pattern. The most convenient definition is the combination of foods associated with each other. Next to predefined patterns, often explorative methods are being used to examine empirical data sets and to derive novel information how food intake is interacting and is influencing disease risk. The most often applied statistical approach to explore a data set for such interactions is principal component analysis. The method is nearly exclusively applied to habitual dietary intake assessed for individuals. The result of a principal component analysis is a series of food factors with weights (factor loadings) assigned to all foods of the analysis. However, a food factor is neither a combination of foods nor can be practiced by individuals. Thus, several years ago the idea to derive unweighted combinations of foods from such factors and to investigate the combination of such foods instead of a food factor was developed.

Principal component analysis is not the only approach to examine a data set for interaction between foods and lately combinations of foods existing in a study population. A more hypothesis driven approach is Reduced Rank Regression that uses response variables – usually intermediate exposure variables – to derive food factors. Also this method generates weights for foods and the method is similarly to principal component results not directly translatable into dietary advises. Similarly, treelet transform analysis has been used to generate food factors that explain the difference between outcome variables. Whereas the results of treelet transform analysis are easy to interpret and are less complex than the results of principal component analysis, there is still the issue of weights that makes the results less directly applicable.

A novel approach to understand interactions of food intake is Gaussian Graphical Models that identify the mutually adjusted correlations between foods. By this method clustering of food in a study population can be identified and graphically displayed. Such network analyses could add further knowledge regarding the internal structures of food intake in a study population.

However, the portfolio of methods applied at the level of the individual will not give insights how food patterns are formed and how the combinations of foods on the habitual level are generated. Thus,

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food pattern methodologies need also to be applied to food intake at days and at meals. There is the expectation that particularly meal pattern analysis will shed light on the formation of food patterns and subsequently their change through intervention.

Adaptation of pre-specified food patterns to different dietary cultural settings: a critical appraisal.

Mariette Gerber, Expert at French Food, Environment and Work Safety Agency (ANSES). Former INSERM Senior Scientist. Montpellier Cancer Institute. France.

Introduction: Nutritional epidemiology evolved from the analysis of the effect of single nutrients to that of dietary patterns. Nowadays the importance of a priori or a posteriori dietary patterns in understanding the relationship of food intake with diseases is generally recognized.

Objectives: The pre-specified food patterns so far in use focus on a list of typical foods, sometimes nutrients, without considering either the food source of the nutrients, the food processing nor other cultural aspects attached to food intake, which are correlated variables to the food pattern. This presentation aims to understand the importance of these variables in the relationship between food intake and chronic and/or metabolic diseases, and how to deal with this difficulty.

Method/design: The pre-specified Mediterranean food pattern is the most frequently used, and will be examined with regard to the results obtained in different studies by countries, populations, modifications and adaptations. An application of anthropological methods to various cultural characteristics related to the Mediterranean diet will be shown. Other pre-specified food patterns will be recalled and compared.

Results: It will be shown: i) that fixed quantitative data for the foods introduced in the pre-specified food pattern are mandatory, in contrast to variable quantity retained from the considered population; ii) that the use of nutrients instead of the main food source is misleading, this is especially demonstrated by the replacement of olive oil by mono- or unsaturated fatty acids; iii) that cultural characteristics such as structure and daily organization of meals together with a fidelity to the main principles of the diet are necessary.

Conclusion: Although part of the list of pre-specified food patterns appears almost universal, different dietary cultural settings appear responsible for the variations in the results obtained. However there are correlated cultural variables that are difficult to detect through usual food questionnaires.

Session 3.1. Advanced phenotyping including metabolomics and imaging

Imaging Derived Phenotypes (IDPs) in Nutritional Research

Jimmy D Bell, Research Centre for Optimal Health (ReCOH), Department of Life Sciences, University of Westminster, W1W 6UW, London, UK.

Obesity has become the major preventable cause of type II diabetes, hypertension, cancer, and is a significant risk factor in the development of cardio-vascular disease and accelerated ageing. More recently the role of body fat distribution is eliciting growing interest as it is being increasingly recognised as a key indicator of risk. For example, it has been known for some time that coronary heart disease (CHD) and diabetes are linked to total adiposity (1,2), however, traditional body composition assessment such as BMI and waist circumference do not account for all people who develop coronary heart disease (3-5). Indeed, although there is a strong relationship between body mass and CHD, a recent study has shown that the mortality in individuals with a BMI <25 kg/m2 was comparable to those with a BMI > 25 kg/m2 (1).

A number of epidemiological and interventional studies have also shown that significant improvements in metabolic profile can be obtained in the absence of changes in body weight, BMI or anthropometric measures (6-8). These improvements appear to be related to changes within specific fat-depots, in particular changes in abdominal fat content and distribution (9-13). Moreover, the use of non-invasive magnetic resonance imaging (MRI) techniques to obtain image derived phenotypes (IDPs) has shown that a significant number of the general population has abnormally elevated levels of abdominal fat despite having normal BMI ratings (14).

In this presentation I will review the imaging techniques that are being implemented in the research arena, as well as population studies, to get a more informed view of the relationship between body adiposity and risk factors of disease. Furthermore, I will discuss how these IDPs are helping us to get a better understanding of the interplay between environmental and genetic factors.

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Genetic influences on human metabolic individuality

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Various extrinsic factors such as nutrition, physical activity and circadian rhythm are known to strongly influence the levels of numerous small molecules (metabolites) in human blood and urine. Despite these fluctuations in a person's metabolite profile, various studies demonstrated that metabolite profiles as assessed through metabolomics techniques are highly individual. On the one hand, the preservation of a person's lifestyle and microbiomes might be responsible for the stability of the profiles. On the other hand, high heritability estimates for the concentrations of many metabolites suggest that genetic factors also play an important role in the observed metabolic individuality. Today, the availability of high-throughput metabolomics and genotyping allows for investigating the specific impact of genetic variation on metabolite levels in large population-based cohorts. Genome-wide association studies with metabolic traits from metabolomics data (mGWAS) meanwhile revealed common genetic variants that affect the levels of metabolites in blood and/or urine at more than 150 loci. Interestingly, many of these genetic variants had previously been found to associate with the individual risk for common diseases such as chronic kidney disease, cardiovascular disorders, and diabetes, which are also strongly linked to lifestyle factors. In these cases, the associated metabolites can help to better understand how those variants, the corresponding genes, and lifestyle decisions and their interactions are implicated in biochemical processes underlying the diseases, and how personalized drug therapies or lifestyle interventions could improve the clinical outcome. In my talk, I will give an overview over the insights that have been gained from mGWAS regarding the genetic basis of human metabolic individuality and beyond. Thereby, I will mainly focus on the recent findings from the two largest mGWAS in blood and

Session 3.2. Linking genotype to phenotype

What have GWAS contributed to nutrition knowledge

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Numerous genome-wide association studies (GWAs) have provided us with knowledge of genes associated with the most common age-related diseases and their risk factors (i.e., CVD, diabetes, plasma lipids, obesity, blood pressure, cancer), as well as our food preferences. These genes and many others to be uncovered using newer approaches (i.e., exome and whole genome sequencing) reveal our genetic make up which include millions of genetic variants that have been accumulating generation after generation. Whereas these variants define our predisposition to common diseases or to specific dietary habits, the expression of this legacy depends on the environment to which we are exposed and our own habits. Multiple reports describing gene-environment interactions support this concept and whereas these interactions have included the analysis of environmental factors such as tobacco smoking, physical activity, drugs, etc., a most relevant environmental factor has been diet. Hence, scores of studies show statistically significant interactions between genetic polymorphisms at candidate and newly discovered genes and various components of the diet modulating disease risk factors and disease. Recently, emphasis has been placed on the association between epigenetic marks (i.e., methylation, microRNAs) and disease. Better knowledge of these relationships is relevant given the fact that whereas the genetic sequence cannot be easily modified, the epigenetic marks are susceptible to change when exposed to a different environment. This provides a mechanism by which we can outmaneuver our legacy with our behavior and thus change our predisposition to disease. Despite the fact that great heterogeneity still exists in the methodology and results obtained by nutrigenetic studies, the epidemiological design and the evidence level of these studies continues to improve. The results of these studies are crucial to obtain a higher level of scientific evidence and to bring the findings of these gene(epigene)-environmental interactions into personalized medicine and effective disease prevention.

Metabolic Diversity: Genes, Taste, Food preferences, Diseases and Diet:

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Taste is the most important factor of food preference/choice. The recent identification of taste receptors provides new perspectives on the interaction between genes versus the environment and food preferences and intake. Genetic variations in taste perception are well known for bitter, sweet and umami taste. In particular, TAS2R8 gene polymorphisms have a key role in determining differences in the capacity to perceive bitter compounds such as PROP (6-n-propylthiouracil) and PTC (phenylthiocarbamide) which are tasted bitter to some people, "called tasters", but are tasteless to others, so-called "no tasters". However, TAS2R38 gene accounts for up to 85% of phenotypic variance in PTC/PROP perception, suggesting that other factors (genetic or not) may also contribute to PROP/PTC responsiveness. Little is known on the genetic bases of human salt and sour perception. Updated data on genetics of taste will be presented and discussed. Moreover, sensitivity to the bitter taste of PROP or PTC has been associated with differences in food preferences, although this relationship has not been fully elucidated yet. Food preferences are the first factor driving food choice and thus nutrition. They involve numerous different senses such as taste and olfaction plus numerous other factors such as personal experiences and hedonistic aspects. Although it is clear that all of these have a genetic base up to now very limited studies have been conducted. Moreover recent literature suggests that food likings and preferences probably reflect actual consumption better than food frequency questionnaires. For these reason we have conducted the first large scale GWAS on food likings that comprises more than 4000 people coming from Europe and Central Asia. Food likings were assessed for 42 individual food likings through a standard 9-point scale questionnaire. Finally genome wide association analysis

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was conducted on each population. Two step meta-analysis revealed a series of genes most likely involved in food preferences for Artichokes, Bacon, Broccoli, Coffee, Chicory, Dark Chocolate, Blue Cheese, Ice Cream, Liver, Oil or Butter on Bread, Orange Juice, Plain Yogurt, White Wine and Mushrooms. None of the identified genes encode for taste or olfactory receptors highlighting new genes and pathways correlated to food preferences. These results represent a first step in uncovering the genes that underlie liking of common foods which in the end will greatly help understanding the genetics of human nutrition in general. Finally, the comprehension of the genetic basis of taste perception, food preferences, and their relation to obesity and eating disorders in specific populations is essential to elaborate preventive plans.

Session 3.21. Food Nutrition And Immune Function

Antioxidative micronutrients and immune function

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Micronutrients are essential for many body functions such as the immune defence. In this regard, antioxidant vitamins and minerals play particularly important roles as redox processes are central in immune reactions. Trace elements like iron, zinc, copper, and selenium are integral parts of enzymes needed for the generation of reactive oxygen and nitrogen species (ROS and RNS) during the respiratory burst in the fight against microorganisms. On the other hand, they are also co-factors of enzymes quenching free radicals, thus preventing excessive oxidative damage to the immune cells and surrounding tissues.

Oxidised antioxidants are restored by other redox systems, forming a network that encompasses lipophilic and hydrophilic substances (tocopherols, ascorbate) to cover the aqueous and the lipid milieus.

Moreover, changes in the redox balance serve as signals in cell regulation. In this, a central role comes to zinc whose binding to and release from cysteine residues of storage proteins is controlled by the redox status. Redox regulation has been shown for the cells of the immune system like T lymphocytes, for instance, and for the secretion of proinflammatory cytokines through induction of the transcription factors NFkB or AP-1. ROS are also involved in eicosanoid synthesis. Imbalances of the redox equilibrium have been associated with many diseases involving abnormal immune reactions like autoimmune diseases, allergies as well as with immunosenescence. The latter is characterised by an increase in proinflammatory eicosanoid production that can be mitigated by vitamin E.

Maintaining an adequate status of antioxidative micronutrients is therefore crucial for optimal immune defence as evidenced by numerous studies in healthy and diseased persons. However, in light of the interactions between the different antioxidants, high intakes of single substances are not beneficial and even potentially harmful making a varied balanced nutrition the best source for an optimal supply.

High fat meal as inducers of postprandial metabolic stress: the redox role of probiotics

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In western societies where most of the day is spent in the postprandial state, the existence of Metabolic stress conditions arising from sustained postprandial hyperlipidemia/hyperglycemia induce a rise in cardiovascular risk factors. Immune response after High Fat Meal (HFM) is mediated by pro-inflammatory cytokines, free radicals, glicemia/insulin response and oxidized lipids. In overweight subjects, the metabolic stress induced by HFM trigger an endogenous antioxidants response to counteract the onset of postprandial stress. When the stressor meal is consumed with plant foods, providing an exogenous source of redox molecules, the endogenous antioxidant response is significantly reduced. A large body of evidence have been provided on the health effects of probiotics, suggest to be linked to a down-regulation of inflammatory cytokines production. Probiotics consumption modulates the composition and metabolic activity of the intestinal microbiota. In this view, novel evidences suggests that flavonoids not absorbed in the small intestine are transformed by the colonic micro-flora to bioactive metabolites. We hypothesize that probiotics might mitigate metabolic stress induced by HFM through a modulation of endogenous antioxidant/anti-inflammatory defences. In order to test this hypothesis, preliminary experiments have been conducted on Caco-2 cells in presence and absence of free radical stressors and with or without probiotics. Pretreatment of Caco-2/TC7 cells with Lactobacillus casei Shirota (LS) significantly reduced the membrane damage to tight and adherent junction induced by oxidative stress. Cells pretreated with LS show a reduction of the P-p65 expression in comparison with the cells treated with free radicals only. When cells previously treated with LS were stressed, the expression of antioxidant responsive elements increased, suggesting a role for LS as inducer of redox defenses under oxidative/inflammatory stress condition. Despite further evidences are needed preliminary experiments do not disprove the hypothesis that probiotics might contribute to protect cellular environment from oxidative and inflammatory stress.

Mediterranean Diet and Inflammatory Biomarkers

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Introduction: Cardiovascular disease is nowadays considered as a low-grade inflammatory diease. Part of the cardioprotective effect of the Mediterranean Diet (MeDiet) has been attributted to their anti-inflammatory effects. Previous studies has demonstrated short-term

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anti-inflammatory effects of MeDiet, but little is known on its long-term immunomodulatory properties.

Objective: To assess the long-term effects of MeDiets supplemented with extra-virgin olive oil (EVOO) and mixed nuts with those of a low-fat diet (LFD) on endothelial and immune cell activation related to atherogenesis in subjects at high risk of crdiovascular disease (CVD).

Design: Randomized controlled trial.

Methods: 165 individuals at high risk for CVD were allocated into three diet groups: MeDiet supplemented with EVOO, MeDiet supplemented with nuts, or advice on a LFD. Changes in diet adherence, classical cardiovascular risk factors, and cellular and endothelial expression of adhesion molecules were assessed after 3 and 5 years of intervention.

Results: Both MeDiet groups increased adherence to the MeDiet ($P<0.001$; both). After 3 and 5 years, participants in the MeDiet+EVOO and MeDiet+nuts groups showed a significant reduction in total cholesterol ($P<0.001$), LDL-cholesterol ($P\leq0.009$), cholesterol/HDL ratio ($P<0.001$), and triglycerides ($P\leq0.03$) and an increase in HDL-cholesterol concentration ($P\leq0.04$). Moreover, we observed significant reductions of ≥16% in CD49d expression and ≥27% in CD40 expression on T-lymphocyte surface at 3 and 5 years in the MeDiet+EVOO and MeDiet+Nuts groups. A reduction ≥ 49% in the expression of CD49d and CD40 in monocytes was also observed in both MeDiet groups at 3 and 5 years ($P<0.001$;both).

Conclusions: Long-term adherence to the MeDiet improves cardiovascular risk factors and modulates inflammatory responses in the arterial wall. These results help to explain in part the cardioprotective effect of the MeDiet.

Immune Dysfunctions in Childhood Obesity

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Obesity is characterized by a systemic inflammatory condition maintained by a chronic release of proinflammatory cytokines derived from various cellular sources. Childhood obesity is object of current investigation since the number of overweight/obese children is rapidly increasing. In this framework, we have documented that immune dysfunctions in children are food-related even before a frank condition of overweight has been established. In our study, after recruiting normal weight children, we have provided them with healthy dietary suggestions [a Mediterranean type diet, even including physical activity (PA)] to be practiced for one year. At start, salivary levels of two interleukins (IL) were determined, namely IL-10 and IL-17. IL-10 predominantly released by T regulatory cells is a typical anti-inflammatory mediator, while IL-17, prevalently produced by T helper (h) 17 cells is a classical inflammatory cytokine. At the end of the clinical trial, children were divided into two categories: individuals who practiced the healthy dietary recommendations and PA and individuals who predominantly ate junk foods and were more sedentary. Quite interestingly, in the former group, an increase of salivary IL-10 and a decrease of IL-17 were noted. In the latter group, IL-17 salivary levels were higher than those of IL-10. Of note, in the group with elevated values of IL-17 a trend to increase of body mass index (BMI) was recorded at the end of the clinical trial. These results suggest that an inappropriate diet may lead with the time to a condition of generalized inflammation and increase in weight, ultimately converting into a frank condition of obesity. In another study, we have correlated salivary levels of nitric oxide (NO) with the youth healthy eating index (YHEI), BMI and PA in a group of school children. Quite interestingly, in overweight /obese children a positive correlation was determined between YHEI, BMI and NO, while an inverse correlation was found between BMI and PA. On the contrary, in normal weight children, a positive correlation between lower BMI, YHEI, NO levels and higher PA was detected. Taking into consideration that NO contributes to inflammation as a product of macrophages, its determination in obese children may represent a biomarker of an ongoing inflammatory process.

Cocoa polyphenolic extract induces macrophage switch from pro-inflammatory (glycolytic) M1 to anti-inflammatory (oxidative) M2 polarization

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Introduction. Macrophages function as control switches of the immune system, maintaining the balance between pro- and anti-inflammatory activities.Classic polarization (M1) and activation of macrophages into proinflammatory cells is paralleled by generation of reactive oxygen and nitrogen species, and proinflammatory cytokines, including TNFa, interleukin (IL)-6 and IL-1². An alternative polarization (M2) of active macrophages is characterized by secretion of anti-inflammatory cytokines like IL-10. Bioactive food components such as polyphenols have recently attracted attention for their anti-inflammatory properties. Cocoa (Theobroma cacao), a polyphenol-rich food, has many health-promoting activities, including anti-inflammatory effects.

Objectives. In this study, we investigated the hypothesis that cocoa polyphenol extract may affect macrophage phenotype by favoring an M2 anti-inflammatory state.

Methods. Cocoa polyphenols were extracted from roasted cocoa beans from Ghana, West Africa. Macrophages deriving from THP-1 cells were cultured at a starting density of 2-3 105 cells/mL for 24 h. Cells were then activated for an additional 12 h with either LPS (1μg/ml) and INF-γ (20ng/ml) for M1 activation, or with IL-4 (20ng/ml) for M2 activation. Specific cytokines were detected and quantified by ELISA assay. Cellular metabolism was evaluated as mitochondrial oxygen consumption by means of polarographic assays, and total and glycolytic ATP levels were measured using a luciferin–luciferase reaction system.

Results. Cocoa polyphenolic extract attenuated in vitro inflammation showing a significantly decreased macrophage response to M1 activation. This attenuation was demonstrated by a significantly lowered secretion of proinflammatory cytokines (TNFa, IL-6, IL-1²)

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after stimulation with LPS and INF-[3]. Moreover, treatment of M1 macrophages with cocoa polyphenols led to a significant increase of O2 consumption by mitochondrial complexes (I, II+III), and a higher production of ATP trough oxidative phosphorylation.

Conclusion: This study documents that cocoa polyphenolic extract suppresses inflammation in macrophage inflammatory phenotype, and influences macrophage metabolism by promoting oxidative pathways and M2 polarization of active macrophages.

Session 3.27. Personalised Nutrition and Nutriomics

Nutrigenetics and personalised nutrition: how far have we got and will we ever get there

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At a population level, the current generic food and nutrient dietary recommendations, of which they are approximately 50, are poorly adhered to. For example according to the latest UK National Diet and Nutrition Survey, only 30% of adults meet the '5-a-day' fruit and vegetable recommendation, average oily fish intake is about one third of the recommended one portion (140g) per week, with saturated fat intake (12.8% of food energy) significantly higher than the 11% of food energy dietary reference value. The future personalisation of advice provided at the individual or subgroup level may be associated with greater, compliance and associated 'health' benefit for the individual?

The absorption, metabolism and tissue status of a dietary component and the impact of status on biological processes is influenced by genotype, and genetic information may be an important criteria on which to base personalisation of dietary advice. Yet despite the hype and considerable research investment, dietary advice based on genotype has not materialised. Using APOE genotype and dietary fatty acids and their interactive impact on cardiovascular and cognitive health as an example, the ethos of nutrigenetics will be explored along with a consideration of practical issues (including ethical considerations) of the future use of genetic information in public health. APOE4 individuals are emerging as being more responsive to changes in saturated fat and the long chain n-3 PUFA, EPA and DHA (1).

However it needs to be ensured that approaches are not too gene-centric with approaches to personalisation also based on criteria know to influence nutrient needs and response to dietary change, such as habitual diet, age, medication use and overall health phenotype.

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Personalised Nutrition and Nutriomics

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Epidemiological studies have demonstrated that the prevalence of obesity and obesity-related manifestations, such as type 2 diabetes, dyslipidaemia and cardiovascular disease, is steadily increasing worldwide. Given that individuals may respond differently to the same dietary interventions, several investigations have been carried out to identify phenotypical and genotypical factors involved in this variability in order to implement a more individualised treatment. In this context, the field of nutriomics has provided an even wider range of global opportunities to identify the diversity in the response to different nutritional treatments, which can be also used for diagnosis and prognosis purposes. In this sense, Genome Wide Association Studies (GWAS) and meta-analyses of GWAS have identified a large number of polymorphisms associated with obesity and metabolic-related traits, which have been later replicated in different populations. Moreover, nutrigenetics has contributed to the identification of gene*diet interactions, which can provide an explanation about human phenotypic variability in response to a nutritional intervention. In addition to identifying different genotypical variations, transcriptomic studies have reported that the diet composition could affect the expression of genes involved in insulin signalling, lipid metabolism, oxidative stress and inflammation. Moreover, recent investigations have demonstrated the existence of several epigenetic mechanisms that may modify gene expression and could be involved in the development of different nutrition-related diseases and the response to specific dietary interventions.The description of new metabolic biomarkers by using proteomic and metabolomic approaches is important to improve the assessment of individual`s metabolic and health status. Both fields allow identifying biomarkers (proteins or metabolites) for defining health and disease outcomes and differentiate responders from non-responders subjects. Moreover, metagenomics studies have shown that the diet and other lifestyle factors can alter gut microbiota composition, which can have an impact on body weight regulation and type 2 diabetes. The benefits of the integration in the near future of nutrigenetic, transcriptomic, epigenomic, proteomic, metabolomic and metagenomic data into Personalised Nutrition will involve the implementation of more personalised dietary treatments to prevent non-transmissible chronic diseases and to optimize the individual`s response to the intervention.

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Exploiting the potential of big data in nutrigenomics and nutrition research – the Nutrition Researcher Cohort

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The efficacy by which diet influences health is currently determined by taking population-based approaches that can favourably shift disease risk factors in the entire population. For this, randomised controlled intervention studies are used as the preferred tool to provide evidence for foods and food groups to modulate such disease risk factors, and thus chronic disease development, However, physiology is complex and personal, and certain diets can benefit some more than others, depending on genotype, phenotype or environment. 'Health' may not necessarily equate with disease biomarkers being within the normal range, but more with optimal personal homeostasis, where each process needs to function optimally. To understand 'health' we will need insight in all of these processes. Therefore, nutritional sciences are slowly evolving from being a laboratory science into an information science. A number of international initiatives are currently building big data sets, using the world as a cohort to increase our understanding of individual health. Generated data usually become open access; new science and business models are developing on the awareness that it is more advantageous to share than not to share data. This will not only aid the understanding of factors that are important for personal health and predisposition to disease development, but also provide tools for individuals to receive 'easy' dietary choices based on a personal health profile, and monitor beneficial changes to individual health upon dietary changes. I will discuss a number of these initiatives, including the Nutrition Researchers Cohort (NRC, nrc.dbnp.org/). The NRC is a global cohort of researchers in nutrition and health sciences who gather self-assessment data on their lifestyle and their health, providing information on personal health trajectories, but also providing a powerful and valuable open access resource that allows participants to discover and publish new and important relationships between diet, lifestyle and health.

Session 3.4. Microbiomes and human nutrition

Gut microbiome and longevity, adaptation to the extreme limits of human lifespan

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Establishing an intense transgenomic metabolism with the host, the intestinal microbiota exerts a key roles in human physiology and, at the same time, provides the necessary metabolic and functional flexibility for the adaptation to environmental and endogenous changes. In particular, the gut microbiome describes an adaptive trajectory along human aging, changing its phylogenetic and functional configuration from our infancy to the old age. This process allows the gut microbiota to tune the pattern of physiological services provided to the host at the different ages, responding to the age-specific physiological needs. Even if the age-specific functions provided by the infant-type and adult-type gut microbiome are well known, it is still under debate when and how the microbiome changes along human aging, and whether age-related gut microbiome changes are of maladaptive or adaptive nature. It is a matter of the fact that several age-related factors, such as changes in diet, lifestyle, inflammation and frailty, force the deterioration of this intestinal microbiota–host mutualistic interaction and compromise longevity. However, the study of the gut microbiome structure in centenarians - the extreme limit of human lifespan – provided some glimpse on the adaptive gut microbiome changes, which can concur in the support of healthy aging and longevity.

Development of the early life microbiome – impact of probiotic intervention

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Early life probiotic intervention endeavors to resemble the gut microbial composition of formula-feds to that of breast-feds. Probiotic effects in infancy were studied intensely, however, primarily in association with gut and immunologically related disease prevention or alleviation. This double blind, randomized study is the first to describe the effects of four Bifidobacterium spp. on the fecal microbiota of healthy infants from birth until the first year of life with special emphasis on the comparison of fecal microbial composition in exclusively probiotic/non-probiotic formula fed to breast fed infants and a combination thereof. 106 infants were randomized in two groups receiving infant formula substituted with four Bifidobacterium spp., or a placebo without Bifidobacterium spp. 9 infants did not get any formula. Monthly fecal samples were sequenced and metabolic profiles were established.

Diet-microbiome-health interactions in older people

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Introduction

We previously showed that the fecal microbiota composition of 500 subjects in the ELDERMET cohort differed significantly between individuals; correlated with habitual diet; was directly proportional in diversity to the Healthy Food Diversity index. Gradients in microbiota composition correlated with gradients in several health parameters, after adjustment for possible confounders. Subjects in long-term residential care had the lowest microbiota diversity.

Objectives

To apply novel clustering methodology to identify fine-structure in the microbiota of older people and to relate this to diet and health.

Methods/design

We used 16S microbiota profiling to determine faecal microbiota composition, and shotgun metagenome sequencing to determine

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microbiome function. We followed ca. 250 subjects over 3 time points, time-zero, 3 months and 6 months. We adapted an iterative bi-clustering algorithm (iBBiG) originally developed for analysing microarray data.

Results

We now show by analysis of microbiota composition over 6 months that a low initial microbiota diversity level is associated with greater composition shift during 6 month follow-up. Residence in a long-term care facility was not required for a low-diversity microbiota, because subjects living in their own homes and consuming a low-diversity diet also acquired a low diversity microbiota. These individuals had lower scores for a number of health parameters. Shotgun metagenome sequencing in 223 subjects indicated that the low diversity microbiota of frailer subjects harbored significantly lower gene counts than the microbiome of subjects consuming a high Healthy Food Diversity index diet, especially for carbohydrate fermentation, amino acid metabolism, and nucleotide metabolism. We also noted differential abundance of sub-groups of a recently discovered order of archaeal methanogens. Application of iBBiG to microbiota composition data from 732 faecal samples from 371 ELDERMET cohort subjects identified distinctive microbiota configurations associated with ageing in both community and long-stay residential care elderly subjects.

Conclusions

These data provide a framework for analysing microbiota-health associations, distinguishing correlation from causation, and developing microbiota-based health surveillance for older adults.

Session 3.5. From animal models to the human population

Genetic-dietary interactions in obesity and non-alcoholic fatty liver disease

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Obesity is driven by complex interactions between genetic and environmental factors. While consumption of energy-rich diets along with sedentary lifestyles contributes to the development of obesity, how genetic factors affect an individual's susceptibility to obesity due to excess caloric intake remains poorly understood. Obesity poses a major health risk as it is tightly associated with increased incidence of metabolic disorders, such as type 2 diabetes and non-alcoholic fatty liver disease (NAFLD). To identify novel genes related to obesity and NAFLD, and to address directly gene-by-environment interactions, we have developed a new high resolution mapping tool in mice: a panel of about 100 well characterized strains of mice termed the Hybrid Mouse Diversity Panel (HMDP). We fed the HMDP mice with a high-fat/high-sucrose (HF/HS) diet for 8 weeks and examined a variety of clinical and molecular phenotypes. We observed dramatic strain-specific differences in obesity, insulin resistance, and hepatic lipid accumulation. Pathway analysis revealed that mitochondrial gene pathways were specifically enriched in steatotic livers and diminished complex I activity was associated with susceptibility to hepatic TG accumulation. Genome-wide association studies (GWAS) identified a number of loci contributing to obesity and insulin resistance. In addition, we identified a significant locus associated with hepatic steatosis on chromosome 7 and validated Gde1, encoding glycerophosphodiester phosphodiesterase 1, as the causal gene. Our results indicate that mouse GWAS and systems genetics analyses provide a powerful method to address gene-by-diet interactions that would be difficult to study directly in humans.

Nutritional approach to ApoE direct therapeutics in Alzheimer's disease

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Amyloid-β (Aβ) clearance from brain, which is decreased in Alzheimer's disease is facilitated by apolipoprotein E (ApoE). Recently, an ApoE directed therapeutics with bexarotene has proved useful to treat Alzheimer's in mice, by activating the retinoid X receptor (RXR) moiety of the RXR/PPAR-γ receptor. Genistein, a phytoestrogen present in soya, increases the expression and also acts as an agonist of peroxisome proliferator-activated receptor gamma (PPAR-γ). Treatment of an Alzheimer's mouse model with genistein results in a remarkable and rapid improvement in various parameters of cognition, such as hippocampal learning, recognition memory, implicit memory and odor discrimination. This is associated with a lowering of Aβ levels in brain, in the number and the area of amyloid plaques as well as in microglial reactivity. Positron Emission Tomography (PET) images confirm that genistein significantly reduce brain amyloid deposition. Thus genistein, with or without bexarotene, is effective in treating experimental Alzheimer's disease and lends itself as a possible treatment of human Alzheimer's.

Session 3.6. Systems Biology approaches to nutrition

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A computational modeling approach to human nutrition.

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Lifestyle parameters, such as diet, are recognized as major modulators of human health and have an important contribution to onset, progression, and severity of various diseases. The effects of diet and dietary adjustments need to be considered on an individual basis, tailored to one's genomic context and health state, that is, a personalized nutriogenomics approach is required. A computational modeling approach of increasing importance is constraint-based modeling, which has been applied to numerous biomedical and biotechnical questions. A chief advantage of this modeling approach is that it is scalable.

The human metabolic model, assembled by the research community, accounts for more than 7400 metabolic and transport reactions, encoded by over 1700 genes. Hundreds of molecular dietary components are considered and their effect on human metabolism can be simulated. Moreover, we have assembled metabolic models for 321 gut microbes, commonly found in the human gut. Having these models at hand, we can now systematically investigate diet-microbiota-host interactions. For instance, modeling the interaction between the human metabolic model and representative gut microbes under three different dietary regimes revealed a global effect of microbial presence on host metabolic phenotypes. The in silico gut microbiota served as an endocrine organ as it produced important precursors of host hormone synthesis. Moreover, the synthesis of important neurotransmitters was elevated in the presence of the gut microbiota. Gut microbes also contributed essential precursors for glutathione, taurine, and leukotrienes.

The presented computational modeling approach is mechanism-based and as such has the potential to play an important role in advancing personalized nutriogenomics.

The presented metabolic models can be queried at http://human-metabolism.org.

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Metabolic Diversity: Genes, Taste, Food preferences, Diseases and Diet.

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Taste is the most important factor of food preference/choice. The recent identification of taste receptors provides new perspectives on the interaction between genes versus the environment and food preferences and intake. Genetic variations in taste perception are well known for bitter, sweet and umami taste. In particular, TAS2R8 gene polymorphisms have a key role in determining differences in the capacity to perceive bitter compounds such as PROP (6-n-propylthiouracil) and PTC (phenylthiocarbamide) which are tasted bitter to some people, "called tasters", but are tasteless to others, so-called "no tasters". However, TAS2R38 gene accounts for up to 85% of phenotypic variance in PTC/PROP perception, suggesting that other factors (genetic or not) may also contribute to PROP/PTC responsiveness. Little is known on the genetic bases of human salt and sour perception. Updated data on genetics of taste will be presented and discussed. Moreover, sensitivity to the bitter taste of PROP or PTC has been associated with differences in food preferences, although this relationship has not been fully elucidated yet. Food preferences are the first factor driving food choice and thus nutrition. They involve numerous different senses such as taste and olfaction plus numerous other factors such as personal experiences and hedonistic aspects. Although it is clear that all of these have a genetic base up to now very limited studies have been conducted. Moreover recent literature suggests that food likings and preferences probably reflect actual consumption better than food frequency questionnaires. For these reason we have conducted the first large scale GWAS on food likings that comprises more than 4000 people coming from Europe and Central Asia. Food likings were assessed for 42 individual food likings through a standard 9-point scale questionnaire. Finally genome wide association analysis was conducted on each population. Two step meta-analysis revealed a series of genes most likely involved in food preferences for Artichokes, Bacon, Broccoli, Coffee, Chicory, Dark Chocolate, Blue Cheese, Ice Cream, Liver, Oil or Butter on Bread, Orange Juice, Plain Yogurt, White Wine and Mushrooms. None of the identified genes encode for taste or olfactory receptors highlighting new genes and pathways correlated to food preferences. These results represent a first step in uncovering the genes that underlie liking of common foods which in the end will greatly help understanding the genetics of human nutrition in general. Finally, the comprehension of the genetic basis of taste perception, food preferences, and their relation to obesity and eating disorders in specific populations is essential to elaborate preventive plans.

Session 3.7. Diet, clinical trials and metabolism

Is there a true place for omega 3 fatty acids to prevent cardio-vascular diseases?

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During the past decades, numerous observation epidemiological studies have analyzed the cardiovascular effects of omega-3 fatty acids raising strong hope on their potential benefits. Cohort studies from North-America, Europe and Asia have shown favorable associations between intake of fish, the most abundant source of dietary EPA and DHA, and the occurrence of cardiovascular events. Overall, the results of the meta-analyses of prospective observational studies indicate that consumption of fish or fish oil is associated with lower cardiovascular mortality, especially fatal myocardial infarction and sudden cardiac death, in populations without established CVD.

Indeed, a substantial number of large randomized clinical trials have investigated potential effects of fish or omega-3 PUFA consumption on CVD outcomes than most other food or nutrient. In contrast with earlier intervention, the most recent trials provide at best equivocal results, but most often show no effect of omega-3 PUFA on primary outcomes. The reasons for such discrepancies will be analyzed. It ap-

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pears that most recent studies add little information to our understanding of the effect of w-3 fatty acids on cardiac death prevention as the primary outcome of these trial seldom include coronary death, they lack sufficient statistical power or present methodological limitations. In these trials however, examination of secondary endpoints (cardiac death) is still suggestive of a beneficial effect of omega-3 fatty acids on cardiac death prevention in patients with coronary heart disease.

In conclusion, together with ecologic evidence of omega-3 PUFA consumption and CHD death rates across populations, provide strong concordant evidence that consumption of fish or omega-3 PUFA might principally reduce ischemia related cardiac death.

Is there a true place of marine omega 3 fatty acids to prevent insulin-resistance?

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Type 2 diabetes (T2D) is a worldwide increasing non-communicable disease characterized by the association with insulin- resistance and defects in insulin secretion. The main factors explaining this increasing prevalence beyond polygenic predisposition are obesity and sedentariness. The basic mechanisms sustaining insulin-resistance (IR) and defects in insulin-secretion are becoming better known. Insulin-resistance relates to the liver, muscle and adipose tissue (AT). Hepatic glucose production is excessive, due to increased gluconeogenesis, and uptake of glucose by muscle – that contributes the most to whole body glucose uptake – and to a lesser degree by AT, is severely impaired at stage of overt diabetes. In addition, the ability of insulin to inhibit lipolysis is also impaired, which contributes to the increased flux of non-esterified fatty acids (NEFAs). This increased flux associated to other factors such as: defect in fatty acid oxidation in muscle because of insufficient physical activity, lower mitochondrial oxidative capacity (in aged people), defect in fat storage into AT because of its defect of expandability (hypertrophy of adipocytes in obese people) lead in fine to ectopic fat storage into muscle, liver and ß cells (1). This ectopic fat storage associated with increased NEFAs flux leads to "lipotoxicity."

The great interest toward the potentiality of long chain n-3 polyunsaturated fatty acids (LC n-3 PUFA) – generally given as fish oils (FO) – to prevent IR relates to the pioneer experimental work of Storlien et al. in 1987 (2). These authors showed that a very high amount of fish oil (20%) protected rats from high fat diet-induced liver and muscle IR. Many mechanisms have been proven or advocated. Prevention of muscle IR by LC n-3 PUFA was associated to their incorporation into muscle cells membranes, to a lesser triglycerides ectopic storage, which alleviates lipotoxicity and to a prevention of both decrease in PI3K activity and GLUT4 transporters abundance (3). The lesser increase in muscle triglycerides (TG) was due to an increase in fat oxidation, which could be mediated through adiponectin, which is enhanced by LC n-3 PUFA (4). Adiponectin increases fatty acid oxidation through the activation of AMPK, p38 MAPK and PPARa (5). In liver, LC n-3 PUFA prevent IR through many mechanisms such as activation of PPARa, which stimulates FA oxidation, suppression of the nuclear abundance of SREBP-1c, ChREBP, and MLX, which depresses de novo lipogenesis and stimulates FA oxidation (6), activation of AMPK and alleviation of inflammation and oxidative stress.

Generally, if it has been shown that a high amount of LC n-3 PUFA prevented IR, data are contradictory with those obtained when lower amounts are given to rodents. A moderate dose of LC n-3 PUFA (7% FO) increases liver IR during high-fat diet and decreases insulin secretion while preventing muscle IR (7), but a 6% FO dose prevents both liver and muscle IR induced by a high sucrose diet (8) without being able to reverse IR when given once IR installed. In addition, a low dose of FO (2%) decreases PI3K activity in both liver and muscle and amplified the depressing effect of dexamethasone (a glucocorticoïd) on PI3K (9). However, physiologically IR was not aggravated.

In humans, works of Ebbesson's group in Eskimos from Alaska demonstrated that reintroduction of LC n-3 PUFA (traditional diet) in westernized Eskimos reduced drastically components of metabolic syndrome and incidence of diabetes (10). We observed that 1.8 g/d EPA + DHA given as fish oil decreased the insulinaemic response to oral glucose in healthy subjects (11) and partially prevented the hyperinsulinaemic response during dexamethasone-induced IR in healthy subjects (12). These data strongly suggested the ability of LC n-3 PUFA to increase insulin sensitivity and to prevent at least partially IR induced by a glucocorticoïd. However, recently we observed that a lower dose of FO (860 mg/d EPA + DHA) aggravated liver and peripheral IR in dexemathasone-treated healthy subjects.

Many meta-analysis have been performed with contradictory conclusions about the ability of LC n-3 PUFA to prevent T2D diabetes. It appears that LC n-3 PUFA have preventive effect towards T2D in Asian populations but may be not in western populations (13). However, a very recently published Finnish Diabetes Prevention Study carried out in 407 overweight patients with glucose intolerance (pre-diabetes) followed up 11 years concluded that serum LC n-3 PUFA concentrations at baseline predicted lower T2D incidence (– 28%)(14).

The contradictory data about a preventive effect of LC n-3 PUFA on IR and/or IR is likely to be explained of many confounding factors: a) the duration and dose consumed; b) the type of n-3: fish oils, ethyl esters, phospholipids, oily fish; c) the concomitant amount of other fatty acids such as LC n-6 PUFA which may counteract their effects; d) the counteracting effect of whole diet e.g. western diet rich in saturated fat, n-6 PUFA, sugars; e) the background consumption of n-3 (from the childhood or more recently; f) the genetic background of populations; g) the specific effects of EPA vs. DHA, which may differ or could be antagonistic towards some biochemical pathways.

The persistent controversy advocates for conducting other well-designed mechanistic studies in human models of reversible induced IR (for evident ethical reasons). The availability of very high concentrates (≥ 90%) of EPA and DHA would also permit to compare their potential benefit. The studies in animal models although not always extrapolable to humans remain required to better define the targets of the effects of LC n-3 PUFA and help to better focus the objectives of human trials. It would also been useful to better delineate in cross-sectional and intervention studies the phenotype of the subjects as well as the environmental factors such as composition of diet, physical activity, degree of overweight, etc...

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Is there any deleterious metabolic effect of fructose intake?

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Fructose, which has been a minor constituent of human diet throughout most of Man's history, represents nowadays close to 10% of our total energy intake. This is mainly due to a high consumption of fructose-containing caloric sweeteners (FCCS). Epidemiological data strongly suggest that FCCS intake is associated with obesity, diabetes mellitus, and cardio-vascular diseases. Animal studies further indicate that high FCCS dies induce metabolic dysfunctions in rodents similar to those associated with the metabolic syndrome in humans.

In humans, epidemiological studies suggest that consumption of FCCS is associated with body weight gain, possibly due to FCCS failing to adequately suppress food intake. There is also strong evidence that, when consumed at high doses, it can increase plasma triglyceride concentrations and intrahepatic fat concentration, and may thus promote the development of atherosclerosis and non-alcoholic fatty liver disease. The mechanisms underlying these effects remain debated.

The potentially adverse effects of high FCCS diets on metabolic health can be modulated by environmental factors. Physical activity and a high protein diet have been shown to attenuate the effects of FCCS. Future perspectives and practical implications for clinical nutrition and public health will be discussed

Association of polygenic genetic risk score with BMI is modified by the presence of deleterious alleles in monogenic obesity genes

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INTRODUCTION: Genome-wide association studies of body mass index (BMI) have identified numerous single nucleotide polymorphisms (SNP) with individually-modest effects. Although a combined genetic risk score (GRS) is robustly associated with BMI, it has low predictive value. The prevalence of predicted deleterious alleles in monogenic obesity genes is higher than previously thought and such alleles may interact with GRS to influence BMI.

OBJECTIVES: To examine the extent to which GRS for obesity and the 'load' of deleterious alleles in known obesity genes jointly contribute to obesity risk, and to investigate any influence this might have on weight loss after a period of controlled caloric restriction.

METHODS: 72 European Caucasian adults (age 50-65 years, BMI 24.7-35.6 kg/m2) were enrolled in the NutriTech cohort. 40 participants were assigned to a 12-week caloric restriction intervention. Whole exome sequencing was performed using the Agilent SureSelectXT Human All Exon V4+UTRs (71Mb) kit. 33 known obesity genes were screened for non-synonymous variants annotated as deleterious by SIFT and Polyphen2 prediction software. SNP genotyping was carried out using the Illumina Human OmniExpress v24 beadchip. GRS was computed using effect sizes from the latest GIANT meta-analysis.

RESULTS: Weighted GRS was not associated with BMI at baseline (n = 72). However an epistatic effect was seen (Pinteracton = 0.011; adjusted for age and gender) such that high GRS was associated with BMI (P=0.005) in subjects in the lowest tertile for deleterious allele, but not in the highest tertile for deleterious allele load, (P = 0.476).

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Analysis of the caloric restriction group (n = 40) showed a similar epistatic effect on percentage weight loss (Pinteracton = 0.026).

CONCLUSIONS: These results suggest that GRS makes a relatively greater contribution to BMI in subjects with lower genetic load of deleterious alleles in monogenic obesity genes.

Session 3.8. Nutritech - Phenotypic Flexibility as key mechanism in nutrition related health

Introduction on NutriTech and the concept of Phenotypic Flexibility

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NutriTech builds on the foundations of traditional human nutrition research using cutting-edge

analytical technologies and methods to comprehensively evaluate the diet-health relationship and

critically assess their usefulness for the future of nutrition research and human well-being. All methods are applied in an integrated manner to quantify the effect of diet on "phenotypic flexibility", based on metabolic flexibility (the capacity for the organism to adapt fuel oxidation to fuel availability) but extending the area of flexibility to all processes and mechanisms involved in absorbing metabolic challenges. NutriTech moves beyond the state-of-the-art by challenging metabolic and inflammatory homeostasis and applying the integrated technologies to assess the underlying and related cell biological and genetic mechanisms and multiple physiological processes of adaptation.

NutriTech aims to evaluate the value of emerging technologies in the quantification of subtle effects of dietary interventions on metabolic and physiological adaptive processes in response to a shift from a suboptimal to a healthy diet.

The human intervention study performed within NutriTech has been finalized, and included 72 participants who underwent two study parts. The first part deals with the quantification of food intake through a metabolomics based quantification of plasma (n=53 participants). For this purpose, the subjects consumed a set of standardized meals, with varying amounts of macronutrients over a period of three weeks. The second part of the intervention study was a parallel design where 40 subjects change their habitual food intake to a 20% dietary restriction and optimally healthy food choice. At the start and after the 12 week intervention, all subjects did a complete phenotypic quantification including three challenge tests, a whole body MRI, and multilevel omics assessments of plasma as well as, blood cells, muscle and adipose biopsies. Technologies include genomics, transcriptomics, proteomics, metabolomics, microbiome, laser scanning cytometry, NMR based lipoprotein profiling and advanced imaging by MRI/MRS.

The project is now finalizing a unique dataset on extensively phenotyped and genotyped subjects in the context of a dietary intervention study, revealing a multitude of minor changes.

NutriTech diet intervention study – classical biochemistry biomarkers help to evaluate phenotypic flexibility to a challenge test in healthy subjects

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Introduction: NutriTech project aims to quantify the effect of diet on "phenotypic flexibility" – the capacity of the organism to adapt to challenges. Phenotypic flexibility includes all underlying biochemical mechanisms and physiological processes.

Objectives: Our objective was to assess the impact of calorie restriction on classical biochemical and oxidative stress parameters, as well as on the response to challenge tests.

Method/Design: Intervention study included 72 healthy and overweight subjects, aged 50-65 years, males and females, randomly divided into two groups – intervention group that received 20% calorie restricted diet and control group that received isocaloric diet. Before and after the 12 week intervention a 4 day assessment period was included, when oral glucose tolerance test (OGTT, Day 2), mixed meal tolerance test (MMTT, Day 3) and MMTT with physical activity (Day 4) were performed. Classical biochemistry and oxidative stress parameters were measured in fasting samples and triglycerides in time course during challenge tests.

Results: Certain biochemistry and oxidative stress parameters changed significantly at the day after OGTT (at Day 3) as compared to the levels at day 1. Before the intervention a significant difference between the study groups was established regarding OGTT response. The intervention resulted in significant improvement of biochemical and oxidative balance parameters in the calorie restricted group only. However, a change in the response to glucose challenge was established in both groups. No significant impact of calorie restriction on triglyceride dynamics during tolerance tests was established.

Conclusion: OGTT triggers prolonged response that can be quantified on the next day and the response can be modified by diet intervention. Calorie restriction results in significant improvement of the biochemical and oxidative stress parameters in healthy overweight individuals.

Are Acylcarnitines in Plasma Markers of Phenotypic Flexibility?

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Introduction – Acylcarnitines are involved in the transport of acyl groups into the mitochondria, mirroring in composition the cellular pool of acyl-CoAs. These metabolites are also found in plasma and indicate changes in fatty acid and amino acid oxidation, serving as markers of inherited metabolic disorders.

Objective – The aim of this study was to assess plasma concentration of acylcarnitines in human volunteers during dietary challenges as a measure of phenotypic flexibility.

Methods – Within the Nutritech project, volunteers underwent a lifestyle intervention with 20 % reduced caloric intake during 12 weeks and were challenged with an oral glucose tolerance test (OGTT) before and after the intervention. Plasma samples were collected at 7 time points and acylcarnitines measured using the LC-MS/MS based AbsoluteIDQ p180 kit (Biocrates, Innsbruck, Austria).

Results – Despite resulting in a weight loss of 4.5±0.2 Kg (compared to 0.3±0.1 Kg in control group) the lifestyle intervention did not change fasting plasma concentrations or the kinetics of plasma acylcarnitines during the OGTT. As insulin and glucose levels increased following glucose intake, plasma concentration of acylcarnitines rapidly decreases as a consequence of inhibition of fatty acid oxidation and return thereafter to initial levels when insulin levels are declined. These dynamic changes appear to be linked to the efficiency of glucose homeostasis, since volunteers with faster glucose clearance also showed faster return of acylcarnitine concentrations to their initial values, while in participants with slow glucose clearance the return of acylcarnitine levels was not observed even at 240 min.

Conclusion – Plasma concentrations of acylcarnitines respond quickly to an OGTT and seem to follow in their dynamics the capacity of glucose clearance found between volunteers. They provide insights into the efficiency of insulin to suppress lipolysis as well as fatty acid and amino acid oxidation.

Effect of caloric restriction on transcriptional response in metabolic challenge tests in PBMCs of humans (part of NutriTech study)

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Introduction: Health has recently been redefined as an organism's ability to adapt and to implement own control in light of physical, emotional and social challenges of life. Within the NutriTech project we defined health as 'phenotypic flexibility': the capacity to adapt to the continuously changing environment in time and space. Examples of metabolic challenges to study phenotypic flexibility are the oral glucose tolerance test (OGTT) and the mixed meal test (MMT). Caloric restriction (CR), the consumption of less energy without malnutrition, is hypothesised to increase health and has been used as a model to investigate the response to metabolic challenges in different health-states.

Objectives: We aimed to study phenotypic flexibility by means of whole genome transcriptional response in human peripheral blood mononuclear cells (PBMCs) upon an OGTT and a MMT challenge before and after a CR diet intervention. As CR is expected to result in a healthier state, we expect an improved response to metabolic challenges and a change towards a healthier gene expression profile.

Design: 72 healthy, overweight men and women, aged 50-65, were subjected to an OGTT and a MMT, before and after a 12 week intervention with either a 20% CR diet or a control diet. Total RNA was isolated from PBMCs during the OGTT at time points: 0, 30, 60, 120 min, and during the MMT at time points: 0, 60, 120, 240, 460 min. PBMC RNA of all time points was used to evaluate whole genome gene expression response using Affymetrix microarrays.

Results: A total number of 1247 microarrays are currently analysed. Results will be available at the time of the conference.

Session 4.10 Nutrition and health throughout life cycle: the role of grain products

Health benefits of cereal foods and their components: an overview

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Background: Cereal foods are the most relevant source of carbohydrates in the human diet; they give a substantial contribution to the energy intake and play an important role in substrate metabolism. The available evidence has been reviewed in order to better understand the relationship between cereal food intake and chronic diseases.

Methods: A PubMed search was undertaken utilizing as key-words cereals (refined and wholegrain) plus other terms identifying relevant chronic diseases; both epidemiological and human intervention studies have been included.

Results: Relationships between cereal food consumption and health outcomes indicate that habitual wholegrain consumption is associated with a lower risk of cardiovascular diseases, type-2 diabetes and some types of cancer. Mechanisms underlying these associations are linked to carbohydrate digestibility in the small intestine (lowering postprandial glucose, insulin and lipid rises) and to fermentation of undigested carbohydrates in the colon. Cereal features able to influence these mechanisms are not yet completely elucidated; however, the role of the amount of fibre, nutrient composition, food structure, glycaemic index and polyphenol content has been clearly established. Cereal species vary for these features; this explains why their impact on disease risk factors may differ according to the cereal types. The ecological sustainability is another reason for supporting the consumption of cereal products. The Ecological Footprint is a measure of the extension of land or maritime plots necessary to regenerate the resources

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consumed and absorb the waste produced by a single human activity. According to this index, animal products have a three to five times larger ecological impact then cereal products.

Conclusions: The habitual consumption of cereal foods (particularly wholegrain) helps to reduce the risk of major chronic diseases like diabetes, cancer and cardiovascular diseases. In addition, it has a beneficial impact on ecological sustainability.

Science-based health messages to consumers and effective ways for increasing wholegrain consumption

Tetens I., National Food Institute, Technical University of Denmark, Denmark.

Introduction: Communication of wholegrain health messages to consumers should be based on scientific evidence.

Objectives: To provide an overview of the scientific substantiation of various categories of health messages to consumers on wholegrain and to discuss some 'best practice' examples of effective ways for increasing consumption of wholegrain.

Method/design: Different science based health messages including food-based dietary guidelines and nutrition and health labels, including claims are reviewed with respect to their scientific substantiation. Cases are provided on best practice for increasing wholegrain consumption in the general population.

Results: A number of food-based dietary guidelines including specific guidelines on wholegrain consumption is based on primarily observational data on associations between wholegrain intake and health outcome and/or risk of disease. The level of scientific evidence on the associations varies with regard to type of wholegrain and disease outcome. Dietary guidelines on whole grain are communicated in various ways and in some cases as quantitative advice. Quantifying the intake is a special challenge and sometimes includes considerations of dietary fibre. The scientific substantiation required in the legislation for nutrition and health claims in the European context include a characterization of wholegrains and/or the wholegrain product, substantiation from randomized controlled studies in the target population and possibly other supportive data. 'Best practice' cases on wholegrain campaigns suggest a potential for increasing wholegrain consumption in the general population and that many factors are important for success. The Danish Private-Public-Partnership on wholegrain will be discussed as such an example.

Conclusions: A review of various wholegrain health messages shows that the scientific substantiation and the level of evidence behind the messages vary. Case studies on successful wholegrain campaigns suggest that other factors than health messages are also important for changes in wholegrain consumption.

Cereal fibre and psychological wellbeing in young and middle-aged adults

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Introduction: Benefits of higher dietary fibre consumption for laxation and health are well recognised. However, few studies have explored potential additional benefits such as improved psychological wellbeing.

Objectives: To provide an overview of the effects of recent dietary cereal fibre interventions on psychological wellbeing.

Method/design: Data from three intervention studies which aimed to increase fibre intake, mainly derived from cereal or wheat bran, varying in duration from 2 to 12 weeks are reported. Low fibre consumers (<15g/day) increased their fibre intake by incorporating high fibre breakfast cereals and snacks into their usual diet for 2 weeks in two studies (Study 1: n=153 males and females; Study 2: n=23 females). Study 3 compared effects of two 12 week dietary interventions; general healthy eating alone (HE) and HE plus advice to increase fibre (HE+F) intake to 25g/day, in 71 overweight women. Daily ratings of psychological wellbeing were completed in all studies.

Results: In Study 1 and 2, significant improvements were found in subjective perception of general wellbeing relative to baseline – feeling less fat, stress, mental and physical tiredness, difficulty concentrating and more slim. In Study 1 participants also reported feeling significantly more mentally alert, happy and energetic during the intervention. In general these benefits increased with increasing cereal/fibre consumption. In Study 3, women following HE+F significantly increased their fibre intake up to 25g/day. Wellbeing symptoms improved significantly irrespective of diet. However, those following HE+F felt significantly less fat than those following HE across all 12 weeks and slimmer than those on HE alone during weeks 5-12 of the intervention.

Conclusions: Encouraging consumption of products high in wheat bran offers an acceptable strategy to increase dietary fibre intake and can produce improvements in psychological wellbeing in a relatively short period (2 weeks).

Cereal fibre and wholegrain: impact on gut microbiota and health

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Introduction: Gut microbial dysbiosis, meaning alterations of some specific bacteria or bacterial functions, is associated with the occurrence or the evolution of various diseases, metabolic and behavioural disturbances. Some dietary components, considered as prebiotics, appear as important modulators of the gut microbiota with positive consequences on host health. Arabinoxylans (AX), the most abundant non-digestible carbohydrates in wheat, mostly present in bran and aleurone fractions, are selectively degraded by intestinal bacteria expressing xylanases and arabinofuranosidases. Results: Most experimental data report the interest of short chain arabinoxylans in animal models of obesity, and in humans. In addition to AXOS (short chain AX produced by enzymatic processing), aleurone, wheat bran fractions or long chain AX induce caecal and colon enlargement, increase caecal Bifidobacteria, and improve obesity related metabolic disorders, including insulin resistance, in mice. Importantly, some wheat bran derivatives can modulate other types of bacteria (Rosebu-

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ria spp. Bacteroies/Prevotella spp.) which contribute to lessen systemic inflammation and adipogenesis. The potential mechanisms by which the wheat bran products act on host metabolism through interaction of the gut microbiota, are the production of bioactive metabolites (conjugated linoleic acids, short chain fatty acids…), changes in gut endocrine functions (increase in glucagon-like peptide-1), and improvement of gut barrier function (demonstrated for AXOS). Human intervention studies assessing the effects of wheat-derived AX(OS) on glucose metabolism allowed to point out in most studies, a decrease in glycaemia in diabetic patients.

Conclusion: Recent studies indicate that wheat bran (fractions) have beneficial effects on metabolic health. More research is needed to connect the effect of the different constituents of wheat bran on gut microbiota with the improvement of host metabolism, in the context of obesity, but also in all other situations in which dysbiosis associated with changes in gut barrier and gut functions occurs.

Session 4.1. Healthy Nordic diet and cardiometabolic disease prevention - Part 1 Cardiometabolic effects of healthy Nordic diet

Healthy Nordic diet and metabolic syndrome – the Sysdiet study

Matti Uusitupa, on behalf of the Sysdiet Study Group, Institute of Public Health and Clinical Nutrition, University of Eastern Finland, Finland

Introduction: Metabolic syndrome is a cluster of cardiometabolic risk factors associated with central obesity. It predicts the development of type 2 diabetes and increases the risk of atherosclerotic vascular diseases. Lifestyle changes form the cornerstone for the prevention and treatment of metabolic syndrome. Different dietary patterns have been suggested for the management of cardiometabolic disorders. Among these, the traditional Mediterranean diet has been most extensively studied. Objective and study design: The randomized Sysdiet study (N=166) was aimed to examine the effects of a healthy Nordic diet on cardiometabolic risk factors and low grade inflammation in individuals with features of metabolic syndrome. The study with 18 to 24 weeks duration was performed in six Nordic centers in Denmark, Finland, Iceland and Sweden. In order to keep body weight unchanged the diet was isocaloric. It consisted of Nordic choices for healthy diet; rapeseed oil, soft margarine, Nordic berries, fruits, vegetables, 3 fish meals a week, whole grain products and low fat dairy products. Intakes of sugar and salt were restricted according to Nordic dietary recommendations. Control group followed an average Nordic diet with lower fiber intake, but higher intake of e.g. saturated fats. Both diets were monitored with food records and dietary biomarkers. Results; The healthy Nordic diet resulted in better lipid and lipoprotein profile and lowered IL-1 Ra level as compared to control diet, but there were no differences in changes of glucose metabolism or office blood pressure between the groups. Better adherence to healthy Nordic diet was associated with more beneficial changes in serum lipids and blood pressure. Ambulatory blood pressure was lowered by healthy Nordic diet. Conclusion: Healthy Nordic diet results in substantial improvement in serum lipid profile and low grade inflammation, and seems to reduce blood pressure.

Nordic diet in obese subjects: results from the SHOPUS study

Thomas Meinert Larsen, Department of Nutrition, Exercise and Sports, Faculty of Science, University of Copenhagen, Denmark

Introduction: The Mediterranean Diet is known to induce weight loss and lower risk of disease, but it has been proposed that other regional diets could have similar health benefits.

Objectives: We tested the health effects of "The New Nordic Diet", a healthy, ecologically sustainable and palatable new food and eating concept based on regional foods and adapted to the local food culture.

Design: In the SHOPUS project, a total of 181 centrally obese Danish men and women were randomly assigned to either NND (high in fruit, vegetables, whole grains and fish) or an Average Danish Diet (ADD). Participants received cooking books, cooking courses and all foods ad libitum and free of charge for 26 weeks, using a shop model. The participants were invited to a 1-year follow up visit.

Results: A total of 147 adults completed the 26 weeks intervention (81%) (NND 81%; ADD 82%). High dietary compliance was achieved, with very significant differences in dietary intake between groups. Mean weight change was -4.7 kg (SEM 0.5) for NND versus -1.5 kg (SEM 0.5) for ADD (adjusted difference -3.2 kg (95% CI: -4.6, -1.8; $p<0.001$). NND induced greater reductions in systolic blood pressure (adjusted difference -5.1 mmHg (95% CI: -8.2, -2.1)) and diastolic blood pressure (adjusted difference -3.2 mmHg (95% CI: -5.7, -0.8)) than ADD. The NND participants expressed higher satisfaction with their diet. In the 1-year follow up period, those participants with higher compliance with NND and increased physical activity experienced lower body weight regain.

Conclusions: The Nordic Diet induces health benefits, including weight loss and lowering of cardiovascular risk factors among centrally obese individuals. These effects seems comparable with what can be achieved with the Mediterranean Diet, suggesting that more localized healthy food patterns could be adapted more broadly.

Introduction to a healthy Nordic diet: results from the NORDIET study

Dr Ulf Risérus, Clinical Nutrition and Metabolism, Department of Public Health and Caring Sciences, Uppsala University, Sweden

During the last five years, there has been an increased interest in the potential health benefits of a healthy Nordic diet. A healthy Nordic diet can be defined as a prudent diet that accord with current dietary guidelines and includes foods that are locally produced or traditionally used in the Nordic countries. A Healthy Nordic diet consists of a com-

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bination of healthy foods occurring in recommended dietary patterns (e.g. Mediterranean diet and DASH-diet), and is to a quite large extent a plant-based and fibre-rich diet that also includes fish. The Healthy Nordic diet is low in added sugars, red meat, saturated fat and trans fat, with the majority of fat coming from rapeseed oil, sunflower oil, seeds and nuts (e.g. hazelnuts, almonds) and fatty fish. Carbohydrate sources include wholegrain rye, barley and oats, but less from wheat. In addition, fruits (e.g. apples and pears) and berries, as well as legumes, vegetables, root vegetables and cabbages are also key foods. The randomised NORDIET trial was the first controlled study that aimed to investigate the cardiometabolic effects of a whole Healthy Nordic diet. NORDIET included overweight hyperlipidemic men and women who were randomised to consume either a Healthy Nordic diet (in line with the Nordic Nutrition Recommendations, NNR) or a habitual Swedish diet during 6 weeks. The intervention food was prepared and provided by the investigators and given ad libitum. The effects on cardiometabolic risk factors were pronounced with significant reductions in blood lipids (especially LDL cholesterol), blood pressure and insulin. In addition, body weight was significantly lowered compared with the control group. Notably, the lowering of body weight after the healthy Nordic diet occurred despite the diet were given ad libitum, probably reflecting the high-fibre content and low-energy density of the diet. The results of the NORDIET trial and more recent trials with longer duration suggest a potential preventive role of Nordic diet in cardiometabolic disease prevention. Further controlled trials are however warranted regarding the role of healthy Nordic foods in type 2 diabetes and cardiovascular disease prevention

Session 4.12. Yogurt consumption benefits: global findings & perspectives

Yogurt consumption for a healthier diet and lifestyle: overview from cohorts from different countries and continents

Angelo Tremblay, Department of Kinesiology, Laval University, Quebec City, Canada

Yogurt is generally considered as a healthy food because of its nutrient composition, its profile of fermented food, and its link with an improved metabolic fitness. Population studies show that yogurt consumers report a greater intake of some nutrients, e.g. calcium and protein, and fruits and vegetables compared to non-consumers. This is concordant with recent data demonstrating that diet quality is improved in yogurt consumers. Other cohort studies have shown that yogurt consumption is associated with a reduced body weight over time. Our research experience with the Quebec Family Study reveals that yogurt consumption might be the «signature of a healthy lifestyle». Indeed, female yogurt consumers report a better macronutrient composition of the diet than non-consumers; they are also more physically active and display feeding behaviors which are more compatible with body weight stability. This agrees with results of the Infogene Study demonstrating that yogurt consumers are more prone to adhere to a Prudent dietary pattern whereas non-consumers tend to exhibit a Western pattern. In summary, currently available cohort studies tend to show that yogurt consumption is associated with a healthy eating pattern and lifestyle.

Yogurt & diabetes: overview of the recent epidemiological studies

Jordi Salas-Salvadó, Human Nutrition Unit, Biochemistry and Biotechnology Department, IISPV, Rovira i Virgili University; and CIBERobn, Instituto de Salud Carlos III, Reus, Spain.

The possible effects of dairy consumption on diabetes prevention remain controversial. Largely owing to their saturated fat content, dairy products are conventionally perceived as having an adverse impact on health. However, they are nutrient-dense food and contain high-quality protein, vitamins (A, D, B2, B12, and menaquinones), and minerals (calcium, magnesium, and potassium), which have been shown to have beneficial effects on T2D risk. Yogurt has also some possible probiotic effects modulating glucose metabolism. In this review we analyse all the epidemiologic studies evaluating the association between yogurt consumption and diabetes. Most of the published studies have demonstrated an inverse association between the frequency of yogurt consumption and diabetes risk. In the frame of the PREDIMED study, a clinical trial aiming at assess the beneficial effect of the Mediterranean diet on the primary prevention of cardiovascular disease, total yogurt consumption was also associated with a lower T2D risk. In this study, an increased consumption of total low-fat dairy and total yogurt during the follow-up was also inversely associated with T2D. In addition, substituting one serving/day of a combination of biscuits and chocolate and whole grain biscuits and homemade pastries for one serving/day of yogurt was associated with a 40 and 45 % lower risk of T2D, respectively. Therefore, we conclude that a healthy dietary pattern incorporating a high consumption of dairy products and particularly yogurt may be protective against T2D in older adults at high cardiovascular risk highly predisposed to develop this condition. Clinical trials are warranted to definitively conclude that yogurt consumption have preventive effects on type 2 diabetes.

Yogurt & Weight: New Insights on the Evidence.

Richard L. Atkinson. Virginia Obesity Research Institute, Richmond, VA, USA

Introduction: Overweight and obesity cause major health problems worldwide in both developed and undeveloped countries. A high priority public health goal is to prevent further weight gain in normal weight and overweight people. Interventions that are feasible for the whole population are needed. Yogurt is a popular food worldwide recognized as a "health food." Although many bacteria have been included as probiotics for health, classically yogurt is defined by only two: Streptococcus thermophilius.and Lactobacillus delbrueckii.

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Objectives: Evaluate the world's literature on yogurt for weight management.

Methods: The York Health Economics Consortium and collaborators performed a comprehensive literature search identifying papers on yogurt and weight management. Selection criteria were studies of classical yogurt only, probiotic bacteria were excluded, as were studies on individuals with various diseases.

Results: From 13,000 potential papers, 69 met potential criteria and 22 were selected, including 7 cross-sectional, 6 cohort, 2 crossover, and 7 controlled trials. All cross-sectional and cohort trials showed a beneficial association of yogurt and one or more body weight/composition measures. Limitations were that all dietary data were self-reported, confounding variables not completely controlled, and correlation is not causation. Two crossover studies were small, short duration, and uninterpretable. Five of seven controlled trials had major limitations including self-report of intake, inadequate or irrelevant research design, few subjects, inadequate description, etc. One well controlled, randomized study had clear results showing a beneficial effect of yogurt, but improper design to address effects of yogurt alone. Five of six RCT showed a beneficial effect of yogurt, but only one was significant.

Conclusions: Yogurt is a "health food" accepted by most people and has potential for prevention and treatment of overweight/obesity. Previous studies give optimism for yogurt for weight management, but future well-designed randomized, controlled trials for proof of principle and large population studies for feasibility are needed.

Session 4.13. Lifestyle Medicine: Preventing and Treating Lifestyle-related Chronic Diseases in the 21st Century

Benefits of physical activity

Pekka Puska, Professor; MD, PhD, MPolSc, Ex Director General, National Institute for Health and Welfare (THL), Finland, President, Int. Ass. of National Public Health Institutes (IANPHI)

Physical activity is important for prevention of a number of major diseases and for promotion of good health and physical capacity. That is why in the WHO´s Global Strategy on NCD Prevention and Control physical activity is one of the four behavioural targets for global NCD prevention. The evidence for the major health benefits of physical activity is strong and has been reported in numerous international publications.

There is strong scientific evidence that regular physical activity helps to lower the risk of early death, coronary heart disease, cerebrovascular stroke, adverse blood lipid profile, type 2 diabetes, metabolic syndrome, colon cancer, breast cancer, weight gain, falls and depression and it improves cardiorespiratory and muscular fitness as well as cognitive function. There is moderate evidence for favourable effects on a number of other health benefits.

More recent attention has been put on the other side of physical activity: physical inactivity and sitting. From the public health point of view the critical thing is to have the large very sedentary and sitting part of the population to have at least some moderate activity daily. That is why the global target for 2010-2025 in WHO`s Global NCD action plan for physical activity is expressed as 10 % reduction in the insufficient activity of the populations. For individuals the usual recommendations suggest at least 30 minutes of moderate physical activity on most days, or 5.000-10.000 steps (aiming at 10.000) daily.

Actions and Interventions to Promote Physical Activity

Steven N. Blair, Professor, Departments of Exercise Science and Epidemiology/Biostatistics, University of South Carolina

The traditional approach to exercise prescription is a useful technique, but it falls short of meeting the needs of many individuals. Many people dislike vigorous exercise. Others are confused by the somewhat complicated instructions usually given as an exercise prescription. It is important that exercise scientists and clinicians develop new ways to encourage physical activity for the most sedentary and unfit members of society. Some patients with chronic disease require a medically supervised exercise regimen and some healthy persons may prefer the traditional exercise prescription method. For others, a different approach, termed Lifestyle Exercise, is proposed. A key feature of the lifestyle method is to help individuals become their own exercise counselor, and encourage them to follow problem-solving techniques to learn how to integrate more physical activity into their lives. In this approach the individual looks for opportunities to expend energy, even in short bouts of activity. We have not made full use of the behavioral medicine technology developed over the past 20 or 30 years as it can be applied to physical activity interventions. These methods should be applied to the problem of sedentary living. Behavioral principles and methods such as self-monitoring of activity, creating social support, making small incremental changes in behavior, and finding appropriate reinforcers should be adapted to physical activity interventions. Exercise scientists and clinicians are challenged to seek creative ways to help the public become more physically active.

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Session 4.2. Healthy Nordic diet and cardiometabolic disease prevention - Part 2 Systems biology to study Nordic diet

Nordic diet and disease – results from the Diet, Cancer and Health cohort

Anja Olsen, Danish Cancer Society Research Center

For decades, the Mediterranean diet has been associated with lower risk of chronic disease and has consequently been considered a model for healthy eating, whereas the interest in health effects of the traditional Nordic diet is much more recent. The aim of our research was to assess whether a diet based on healthy Nordic food items was associated with incidence of myocardial infarction, type 2 diabetes, colorectal cancer and to all-cause mortality.

The studies are based on the Danish prospective Diet, Cancer and Health cohort, where to 57,053 men and women aged 50-64 years were recruited between 1993 and 1997. Information on diet was obtained by food frequency questionnaires and incident cases of the diseases of interest were identified through record linkage with national registries. Six food items of Nordic origin with expected health promoting effects were selected a priori (fish, cabbages, rye bread, oatmeal, apples and pears, and root vegetables). Each participant was given one point for intake above the sex specific median for each food item, resulting in scores between 0 and 6 on the healthy Nordic food index.

After thoroughly adjustment for potential confounding, a higher score on the healthy Nordic food index was related to lower incidences of myocardial infarction and type 2 diabetes among both men and women. For colorectal cancer, the index was significantly associated to lower incidence among women but not men. For all-cause mortality, the association was strongest among men and only borderline statistically significant among women.

Adherence to a healthy Nordic food index was found associated to lower incidences of several major chronic diseases. The risk estimates were of magnitudes very similar to what has previously been reported for the Mediterranean diet index, supporting that a healthy Nordic diet may be a relevant alternative from a public health perspective.

Metabolomic response to Nordic foods

Dragsted, L 1, Acar, E2, Gürdeniz, G1, Andersen, M-B1, Poulsen, S1, Astrup, A1, Bro, R2, Engelsen, SB2., Savorani, F2, Brader, L3, Hermansen, K3, Schwab, U4, Kolehmainen, M4, Paananen, J4, Poutanen, KS4, Cloetens, L5, Åkesson, B5, Siloaho,M4,6, Savolainen, MJ6, Gunnarsdóttir, I7, Thorsdóttir, I7, Ulven, SM8, Rosqvist, F9, Riserus, U9, Uusitupa, M4, Larsen, TM1

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Introduction: Several studies have tested metabolic risk factors following dietary intervention with Nordic diets. The SYSDIET study tested a healthy Nordic diet according to the Nordic Nutrition Recommendation (NNR) in five different countries while the SHOPUS study in Denmark tested the "New Nordic Diet" designed to meet NNR while also being sustainable and palatable.

Objectives: To investigate whether metabolic profiles 1) reflect Nordic diets, 2) are improved by data fusion and 3) reflect dietary compliance.

Methods: Plasma and urine samples from both studies were profiled by one or several metabolomics platforms (LC-MS, GC-MS, NMR) and the data analysed by PLS-DA.

Results: Metabolic profiles of both urine and plasma reflected the Nordic or control diets with varying degree of performance, depending on the analytical platform used. The best ROC-curves for the SHOPUS study had AUC's above 0.8. Data fusion across platforms or sample types did not improve these models. The metabolic profiles from SYSDIET also discriminated between the countries and centres where the samples had been collected. There was only about 10% overlap between the volunteers identified as potentially non-compliant based on their most discriminating urine or plasma profiles. This may reflect that relatively many volunteers are only occasionally non-compliant while only few are more consistently non-compliant. For this latter group the marker patterns included markers of several foods that were clearly not part of the diet they were supposed to follow, supporting the interpretation that these subjects were in fact non-compliant and not just having individual characteristics of metabolism placing them outside the main pattern.

Conclusion: Dietary patterns with Nordic foods are reflected with good accuracy by metabolomics at the group level, but patterns of several samples from each volunteer may be needed to identify the more consistently non-compliant participants. Data fusion did not improve the models in this study.

Influence of Nordic diet on adipose tissue and blood cell transcriptomics

Marjukka Kolehmainen1, Stine Marie Ulven2, Ingrid Dahlman3, Mari Myhrstad4, Vanessa de Mello1, Jussi Paananen1, Matti Uusitupa1, on behalf of the SYSDIET research group

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A healthy dietary pattern is associated with a lower risk of chronic diseases. Healthy Nordic diet has been under intense investigation during the last few years, and the studies on healthy Nordic diet have shown many beneficial effects at the systemic level, such as its influence on the plasma lipid profile, low grade inflammation and blood pressure. The SYSDIET dietary intervention trial was done within the large Nordic consortium involving all 5 Nordic countries (Uusitupa M. et al. J Intern Med 2013). The objective of the transcriptomic SYSDIET sub-study was to investigate the effects of healthy Nordic diet (ND) on global gene expression profile in subcutaneous adipose tissue (SAT) (Kolehmainen et al 2015, Am J Clin Nutr) and in peripheral blood mononuclear cells (PBMCs) (Myhrstad et al, in review) in subjects with metabolic syndrome. Obese adults underwent an 18-24 week randomized intervention study comparing ND with the control diet (CD). The subset of participants included were: the SAT samples from 56 participants (ND: 31/CD:25), and PBMC samples from 66 participants (ND: 40/CD:26) from three SYSDIET study centres. The inclusion criteria for the participants to be included in the sub-study were: availability of samples, maximum weight change of ±4 kg, highly sensitive C-reactive protein concentration less than 10 mg/l at the beginning and the end of the intervention, and baseline BMI <38 kg/m2. Samples were obtained before and after the intervention and were subjected to global transcriptome analysis using Gene 1.1 ST Arrays Affymetrix®). Results for the SAT showed that 128 genes were differentially expressed in ND when compared to CD (nominal $p<0.01$, false discovery rate 24%). The genes were overpresented in immune response pathways, such as leukocyte trafficking and macrophage recruitment, adaptive immune response and reactive oxygen species. Global gene expression for PBMCs showed over 7,000 probe-sets that were significantly down-regulated after intake of a ND compared to a CD. Functional annotation analyses showed that the most strongly dietary regulated gene transcripts were overpresented (FDR q-value <0.05, Fold change >18%) in biological processes, pathways and networks related to immune response, and more specific to T cell mediated immune function. To conclude, a ND significantly decreases the expression of genes related to immune response in participants with metabolic syndrome when compared to CD. These results confirm that healthy Nordic dietary pattern has anti-inflammatory properties at the gene expression level.

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Session 4.22. Words, chats, tweets and more. Nutrition communication in public health - hot topics

The Swiss Health Campaign „Easier Living. With Movement – Nutrition – Relaxation"

Heinz Bonfadelli, Ben Fretwurst, Institute of Mass Communication and Media Research, University of Zurich, Switzerland

Abstract: Nutrition policy is still focusing on technical, legal and economic strategies. But these have to be supplemented by communication and education e.g. in the form of public communication campaigns as well. Results of the evaluation of the Swiss Campaign „Easier Living. With Movement – Diet – Relaxation" are presented and discussed, based on a theoretical system model for the conception, realization and evaluation of public communication campaign. Our theoretical model is based on elements like situation analysis, campaign goals and target groups, campaign messages and channels on the one hand and evaluation of campaigns on the other hand.

Nutrition communication in public health

Pekka Puska, Professor; MD, PhD, MPolSc, National Institute for Health and Welfare (THL), Helsinki, Finland

Nutrition is as a whole the most important determinant of non-communicable diseases, the diseases of lifestyle that dominate public health in most parts of the world. Unlike previous years, and with increase in standard of living, the great public is now well aware and interested in information and news about diet and health. Healthy nutrition has many aspects, and food choices and eating are much more than health. It is culture, price, taste, ecology, agriculture, broader lifestyle etc. Thus public nutrition discussion is nowadays very multifaceted. Because the topic is of great interest to people, media gives it a lot of coverage – looking for anything new and controversial. And the media and communication channels are now numerous, with increasingly heterogeneous groups participating.

The nutrition communication in the media involves nutrition experts, authorities, commercial players and a variety of lay participants. Science is challenged by personal experiences, and new fashions are coming and going. Solid science about fats is old news. Salt and hypertension is silent killer. Sugar is current top, and obesity is photogenic.

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Meat is under attack, supported by ecological considerations. In the middle of the often confusing and frustrating discussions the comfort for experts should be that in the long run usually hard scientific evidence wins; the other alternative would be return to the dark Middle Age.

Nutrition experts must also consider the objectives of the communication. Is it only dissemination of information from the current science, or is it also communication for change? And if also that, is it communication for individuals or for policy? Effective communication should have messages that are clear enough, match with the local situations and allow for interaction. Multiple channels and partners should be used. Communication for change should specify practical change skills and messages to increase social and environmental changes. A key issue is to combine communication programmes with practical health promotion activities in the field and, if possible, with related policies.

Session 4.24. Personalized nutrition: from science to service

Personalized nutrition: from science to reality

Ben van Ommen, TNO, The Netherlands

Ten years ago, the first "Personalised Nutrition Conference" was organised by NuGO with 300 participants. Since then, numerous nutrigenetics services, on-line personalised dietary advice services and research projects have passed, creating noise, scepticism, regulatory defence mechanisms, and a lot of review papers. So, where are we now?

Science – there is extensive scientific evidence for the benefit of nutrient consumption differing from dietary reference intake values for population sub-groups, which differ with age, health status, behaviour and goals. Genetic variation may be involved but is not, usually, the major contributor to this deviation.

Technology – nutritional systems biology technologies can quantify minute differences in health status, development, and the impact of nutrition. The use of stress response quantification allows this to be done close to optimal health. Minimally invasive sampling and "do-it-yourself" technologies are maturing, and allow personal participation in advice systems.

Infrastructure – data for nutrient/ dietary advice is scattered and needs urgently to be combined and harmonised, and made easily accessible for science, commerce and individuals. The FP7 QuaLiFY spin-off, Quisper (www.quisper.eu), fills this gap. In addition, to obtain personalised dietary advice, individuals need to store, access, understand and valorise their health data, and infrastructures ("bio-passports" and health data cooperatives) need to be established.

Socio-economic – there needs to be a shift from public health nutrition to personal nutrition needs, to coincide with a shift from disease economy to health economy: staying healthy needs to become profitable both for the citizen and the economy. Only then can tools, products and services for personal nutrition and health, ranging from molecular diagnostics to motivational tools, be professionalised.

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Using harmonised data and knowledge rules to deliver personalised nutrition services

Paul Finglas1, 2 & Siân Astley2, 1. Institute of Food Research & 2. EuroFIR AISBL

European public health campaigns have little impact on the dietary behaviour whilst personalised advice, delivered by healthcare professionals (e.g. family doctors) or independently (e.g. MyFitnessPal), has been shown to be much more effective. Globally, companies are developing devices and tools promising to make our lives better through connected health (personalised diet and health [e.g. sleep and exercise] advice). However, not everybody with the technical skills to deliver the tools and services has the necessary underpinning expertise in diet and health or access to country-specific relevant data and knowledge.

Personalised dietary advice needs to develop based on scientifically validated knowledge and resources to track and compare behaviours and food intake, and suggest achievable long-term changes in a positive framework. Together with three research institutes (TNO - NL, IFR - UK and JSI - SI), 13 European SMEs have created Quisper (www.quisper.eu), a server platform bringing together data and knowledge rules from previous EU-funded projects to improve existing and support new services for personalised dietary advice. It aims to facilitate access to existing empirical diet and health data, and foster trust through quality amongst healthcare and allied professions (e.g. dietitians) as well as consumers.

Dietitians working with obese children, children with eating disorders, and type 2 (pre-) diabetics are evaluating this approach before Quisper is launched on the market. Ultimately, Quisper will provide access to scientifically valid data (e.g. food composition, dietary intake) and knowledge rules (genotype- or phenotype-disease relationships) relevant to personalised nutritional products and services. It will help companies and researchers access and apply scientifically sound knowledge and data via an open-innovation platform with a wide range of web services and support connected health actors with access to experts to determine the scientific value of potential products and services.

How to connect to and make use of the QuaLiFY Server Platform (Quisper)?

Barbara Koroušić Seljak, Jožef Stefan Institute, Slovenia

Quisper is a new server platform that provides easy access to a set of web-services, bringing together data and knowledge rules for personalised dietary advice. It was developed by the EU-funded project QuaLiFY (http://qualify-fp7.eu/).

Data and knowledge about food and nutrition gathered by various EU-funded projects (e.g. EuroFIR, NuGO, EURRECA, Eurogene, Food4Me) have high scientific value, and are of great interest for commercialisation, but were fragmented and unharmonised. Through Quisper these data and knowledge rules have been unified to support

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nutrition research, and businesses in the development of new products, according to requirements of specific groups including those at-risk or clinically diagnosed (e.g. diabetic, obese, elderly).

Quisper clients are developers of health-related applications, providing services in personalised dietary advice. Such applications may connect to Quisper via secure API to retrieve data and execute knowledge rules, which can be combined to form a coherent service based on scientifically validated genotype-phenotype-nutrition interactions. Quisper can also host data and knowledge rules from these and other providers. For now, Quisper provides REST access to compositional data on generic and branded foods, European dietary reference values, and analytical results of biomarkers as well as to knowledge rules based on genotype-phenotype associations. Quisper is being tested with four distinct server and mobile apps to support three field labs on obesity and eating disorders in adolescents, and diabetic adults.

Quisper will be available for other customers, as well as for web service providers of new food- and nutrition-related data and knowledge rules, in 2016 when QuaLiFY ends and an open business model is launched. For more information, please contact info@quisper.eu or visit www.quisper.eu.

Current and future scenarios for personalized nutrition services

Jo Goossens, shiftN, Belgium

Personalised nutrition (PN) is emerging as a fundamentally new approach to address the growing health issues resulting from inappropriate dietary and lifestyle habits. By individualizing the advice, i.e. based on the individual's condition and his/her dietary and lifestyle preferences, PN aims to overcome the huge barrier of achieving a dietary behavior change that is lasting in time.

Food4me, an FP7 project exploring the barriers and opportunities of PN, has shown that PN has a significant potential to bring societal changes by affecting how people make informed food intake choices that are relevant for long term health. It will result in a whole new category of personalized nutrition integrators which link food, health, diagnostics and information sources to a large group of service providers that wish to offer personalized nutrition services to consumers, citizens, and patients. All of them will need to be able to rely on scientifically validated and coherent data and interpretations of this in order to deliver sound dietary and lifestyle advice based on individual analysis and preferences.

QuaLiFY, an FP7 project (http://qualify-fp7.eu/) especially designed to implement FP7 research results into a marketable solution, is developing Quisper (www.quiper.eu), a digital information platform that provides access to the necessary scientifically validated data and knowledge rules to interpret personal data and information to yield personalized dietary and lifestyle advice. Quisper will be a not-for profit association. Its suppliers of information and algorithm sources will be scientifically validated. Quisper will continuously explore to expand its services by further integrating sources into increasingly comprehensive algorithms that can interpret a combination of food intake data, physical parameters, biomarker analysis and genetic background into a comprehensive set of personalized diet and lifestyle advice.

Clients of Quisper are developers of health-related applications which connect to Quisper to retrieve data and execute knowledge rules, which can be combined to form a coherent service based on scientifically validated genotype-phenotype-nutrition interactions.

The aim is to make Quisper operational by the beginning of 2016.

Session 4.25. The Continuous Update Project: Recent Findings and Future Research on Diet, Nutrition, Physical Activity and Cancer

The Continuous Update Project: Introduction to the Project

Martin Wiseman, Affiliations: World Cancer Research Fund International (London, UK) and University of Southampton (Southampton, UK)

The remarkable variation in cancer incidence around the world and its plasticity when populations migrate or over time within countries demonstrates a strong environmental component to cancer patterns. Both epidemiologic and laboratory evidence point to food, nutrition and physical activity as key environmental determinants of cancer risk. To better explore their role in cancer, the World Cancer Research Fund/American Institute for Cancer Research (WCRF/AICR) commissioned an expert report (Food, Nutrition, Physical Activity, and the Prevention of Cancer: a Global Perspective) using the most rigorous systematic approaches. Published in 2007, this report is the most authoritative review of this area. Recognising the ongoing accumulation of evidence, WCRF has commissioned from Imperial College London a continuous update of the evidence, which is judged by an independent expert panel. Since its inception in 2007, updated reviews of the evidence linking diet, nutrition including body composition, and physical activity to risk of several cancers, as well as the impact in breast cancer survivors, have been published as part of the Continuous Update Project. These reviews continue to emphasise the important role of nutrition and physical activity as determinants of cancer risk.

The Continuous Update Project: Novel approach to reviewing mechanistic evidence on diet, nutrition, physical activity and cancer

Lewis S1, Martin R1, Higgins J1, Holly J1, Wiseman M2, Gaunt T1, Mitrou P2 , 1University of Bristol (Bristol, UK), 2World Cancer Research Fund International (London, UK)

In order to devise effective primary prevention interventions it is essential to understand the causal factors responsible for the condition of interest. The World Cancer Research Fund (WCRF) International

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Continuous Update project (CUP), building on the 2007 Expert Report Food, Nutrition, Physical Activity, and the Prevention of Cancer, has drawn conclusions on the likely causality of epidemiologically observed associations between dietary, anthropometric, biochemical and physical activity exposures and the risk of several cancers. In addition to aspects of the relationships between these exposures and cancer, this inference of causality depended critically on evidence for biological plausibility, and for relevant mechanistic pathways operating in humans. The scientific literature offering such evidence is not usually dedicated to answering this question, but may need to be interpreted in this light. It is often unclear from the literature to what extent any reported findings from studies in experimental models have been replicated by other workers. Finally, publication bias seems to be a particular problem in this area. Therefore it is difficult to know what level of confidence can be applied to any such potential mechanism identified in a review of the literature. In the absence of any existing method for systematically reviewing published mechanistic evidence, and in order to improve the quality of the evidence for mechanisms as part of the inference of likely causality in epidemiological observations, WCRF has commissioned work with the University of Bristol to develop a method for systematically reviewing mechanistic studies. The resulting framework will be independently peer reviewed, and tested independently for its utility and reproducibility. The method has several novel aspects that will be presented and discussed.

The Continuous Update Project: Recent Findings on Diet, Nutrition, Physical Activity and Cancer

Michael Leitzmann, Martin Wiseman, (on behalf of the Continuous Update Project Panel), University of Regensburg, Germany, World Cancer Research Fund International, London, U.K.

Introduction/objective: Evidence suggests that diet and lifestyle affect cancer incidence and prognosis. The World Cancer Research Fund International Continuous Update Project comprehensively summarises published epidemiologic data regarding such factors in relation to cancer prevention and survivorship.

Method/Design:

Data are summarised/meta-analysed on a continuous basis using standard methodology and are subsequently independently evaluated by a panel of international scientists. The current presentation highlights the latest findings regarding selected cancers.

Results:

Liver cancer: based on 34 studies and 24,600 liver cancer cases, there is strong evidence for increased liver cancer risk with overweight/obesity, intake of alcohol, and consumption of aflatoxin-contaminated foods. In contrast, there is strong evidence for decreased liver cancer risk with drinking coffee, and limited evidence for decreased liver cancer risk with consuming fish and engaging in physical activity. Gallbladder cancer: data from 14 studies and 8,300 gallbladder cancer cases reveal strong evidence for increased gallbladder cancer risk with overweight/obesity. Prostate cancer: a review of 104 studies and 191,000 cases of prostate cancer shows strong evidence that overweight/obesity are associated with increased risk of advanced prostate cancer. By comparison, consuming beta-carotene (in foods or supplement) is unlikely to substantially affect prostate cancer risk. Also, there is limited evidence for increased prostate cancer risk with high intakes of dairy products and calcium. Breast cancer survivorship: based on data from 85 studies and 164,416 women, a healthy body weight, physical activity, and greater consumption of fibre and soy are related to increased survival, whereas a diet high in fat and saturated fat before diagnosis is associated with decreased survival. However, the latter findings may be confounded by limitations in the quality of the studies reviewed, which precludes making specific recommendations.

Conclusions: the presentation concludes with a brief summary of future research priorities in the area of diet, nutrition, physical activity and cancer.

Session 4.26. Methodologies for Food and Fluid Intake Assessment - Where Do We Stand Today and What Will the Future Bring?

Recording of Fluid and Water Intake at Population Level in Europe

Joan Gandy, British Dietetic Association

The European Food Safety Agency (EFSA, 2010) recommendations on adequate water intake are based on intakes from population studies, desirable urinary osmolarity values and desirable water volumes per unit of energy consumed. These intake data were collated from population surveys, however there was a lot of variability in these data. For example the average daily total fluid intake for women varied from 917 to 1895 mL/day and 1027 to 1585 mL/day for men. Variations in activity levels, climate or culture are unlikely to explain this variation. The most likely explanation for this variation is the diversity of methods used in the population studies. This variability raises issues about recommendations and limits comparisons between European countries.

The ILSI (Europe) Food Intake Methodology Task Force convened an expert group to establish current methods for recording and reporting water and fluid intake across Europe. An electronic questionnaire was developed and sent to the scientific lead of the 21 European national nutrition and diet surveys. There were 12 responses and 10 complete surveys were summarised.

There was increased awareness of the need to accurately assess fluid intake however a variety of methods were still in use. None used a methodology validated for water and/or fluid intake. There was also a lack of clarity in the classification of beverages and few estimated water intake from food. The expert group formulated several recommendations aimed at creating a unified approach to surveying and quantifying water, beverages and water in foods across Europe. The recommendations included, among others, the calculation of water content of foods and standardised definitions for the categories of

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water and beverage classification. The lack of validated methodologies published in peer reviewed journals represents a scientific gap in nutrition knowledge.

Uncertainties in Dietary Exposure Analysis – A Challenge to Be Addressed

David Tennant, Food Chemical Risk Analysis, UK

Introduction

A clear understanding of the strengths and limitations of dietary exposure assessments is vital for informed risk management decisions. Expressing the uncertainties associated with these analyses is critical to understanding the reliability that can be placed on them, identifying the need for more or better information and determining the optimal course of action.

Objectives

A structured and tiered methodology for uncertainty analysis in dietary exposure analysis can provide a framework that allows for both commonly encountered sources of uncertainty and those that are or specific to different dietary exposure assessment methods.

Method / Design

A Workshop on "Assessing and Reporting Uncertainties in Dietary Exposure Analysis" organized by the ILSI Europe in February 2014 was attended by 22 external experts from Europe and the USA.

Results

The workshop considered the identification, description and classification of uncertainties to provide a scientific basis and develop a consensus for the description of uncertainties and their classification. A qualitative overview of general and specific uncertainties relevant to different dietary assessment methods was developed and a general strategy for tiered uncertainty assessments produced.

Conclusions

A generalised model for expressing uncertainty in dietary exposure analysis can be applied. However, this requires further development and refinement and in particular the consideration of a more quantifiable approach.

Future trends in food intake assessment

Jeanne HM de Vries, Affiliation: Wageningen university, Human Nutrition, the Netherlands

Keywords: dietary assessment, novel technologies

Assessment of dietary intake is notoriously difficult. Self-reports such as 24 hour recalls, food records, and food frequency questionnaires are challenging and subject to measurement error. People forget to report foods, are not aware of the type of foods they consume and not able to estimate portion sizes. Researchers try to improve the assessment of intake by using new technologies, identifying and correcting for measurement error, and investigating potential biomarkers of intake. Innovative technologies, including Mobile-phone, web based, and scan- and sensor based technologies appear to be more cost- and time effective than the conventional methods. However, validation studies show that they have similar methodological problems. An important improvement can be achieved by standardisation of the performance of dietary assessment methodology and data processing across studies in order to improve comparability. New knowledge on the type and extent of measurement errors of methods can help to correct for these errors for example in estimates of the diet-disease relationships. Biological markers of intake can contribute to objective assessment of intake despite their limitations. There are only a few biomarkers of exposure available, their reference period is not always appropriate for the aim of the assessment, and they are invasive. However, new developments, for example in chemical analyses and metabolomics data can take the identification of potential biomarkers further. Another way to go is integrating data from different sources such as derived by sensors, databases, and personalised information.

Session 4.3. Diet and neurodegenerative diseases

Omega-3 fatty acids (ω3 FA) in the prevention of cognitive decline in humans

Jan Palmblad, MD, PhD, Emeritus Professor of Medicine

Dept. of Medicine, The Karolinska Institutet, Karolinska University Hospital Huddinge, Stockholm, Sweden.

Abstract: The brain is a lipid rich organ where the w3 FA docosahexaenoic acid (DHA) is enriched (but surprisingly not eicosapentaenoid acid, EPA), having anti-inflammatory effects and being important for neural function. The potential role for DHA (and EPA) in prevention of cognitive decline, including Alzheimers disease (AD) has attracted interest for several decades. My review presents some aspects of recent observational, interventional and experimental studies, aiming to provide answers to salient question: Can w3 FA intake modulate cognitive function, primarily during aging, and particularly prevent or delay appearance of dementia? Longitudinal observation studies have shown inverse relationships between fish intake or serum concentrations of DHA and future cognitive impairment. Intervention studies with EPA/DHA supplementation in healthy old subjects are so far negative, i.e. after up to two years of treatment, no differences in cognitive decline between treated and non-treated subjects have been observed. When EPA/DHA is provided to adults with mild cognitive impairment (MCI) or age-related cognitive impairment the data now seem to be positive. However, when patients with established AD are supplemented with EPA/DHA no benefit is gained. As indicated for studies on healthy subjects, a major concern is that the treatment periods may have been too short and doses of w3 FA too low. There might also be subgroup effects due to the carriage of ApoE4 alleles. Experimental studies appear to be consistently positive, i.e. EPA/DHA supplementation in rodents over a substantial portion of their lives reduces Ab deposition, hippocampal neuron loss and improves cognitive functioning. Although we are getting closer to availability of evidence based recommendations on marine oil intake in order to facilitate memory function during old age, it is advised to follow general dietary recommendations of 2-3 fish meals per week or equivalent intake of the long chain w3 FA s, particularly DHA.

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Nutrition and Alzheimer's Disease

Anna Rita Cerenzia, Lorenzo Gaggi, Luca Pelini, Roberta Radicchi, Clara Tinarelli, Mariagiovanna Cozza, Carmelinda Ruggiero, Virginia Boccardi, Patrizia Mecocci, Institute of Gerontology and Geriatrics, Department of Medicine, University of Perugia (Italy).

Several evidences support the notion that nutrition plays an important role in the prevention and development of Alzheimer's disease (AD). Epidemiologic data suggest that nutritional intake may influence the progression of AD (Gillette-Guyonnet, 2013) High adherence to the Mediterranean diet (MeDi) has been related with lower AD risk (Scarmeas, 2006) and MeDi dietary pattern, that combines antioxidants, B vitamins, n-3 fatty acids and other nutrients, has been inversely related to the risk of dementia (Féart, 2012).Some micronutrients modulate the production and activity of neurotrophins, have vasoprotective effects, and favor the clearance of β-amyloid (Prina, 2014).When folate or vitamin B12 are deficient, homocysteine levels rise, which may contribute to amyloid and tau protein accumulation and neuronal death (O'Leary, 2012). Also antioxidants seem to play an important role in AD prevention and treatment (Mecocci & Polidori, 2012). Consistent associations were reported in studies on vitamin E where low plasma tocopherols and tocotrienols levels have been associated with increased odds of mild cognitive impairment (MCI) and AD. (Mangialasche, 2012). Among lipids DHA and EPA are the major omega-3 PUFA evaluated in observational studies and clinical trials but results on supplementation are inconsistent to recommend their use either for the prevention or treatment of dementia. Nutritional approaches to influencing the progression of AD are among the newer strategies proposed by scientists. Specially designed medical foods in various combinations are under evaluation (Swaminathan & Jicha, 2014). The rationale behind this approach is that AD is linked to biochemical alterations in complex metabolic pathways that are dependent on multiple nutritional compounds and co-factors. For this reason more detailed studies, able to link clinical and biochemical evaluation, are urgently needed to offer a strong scientific basis to the role of diet and medical foods both in prevention and in treatment of cognitive impairment and of dementia.

Diet and depression

Giuseppe Grosso

Integrated Cancer Registry of Catania-Siracusa-Messina-Enna, Department of Medical and Surgical Sciences and Advanced Technologies "G.F. Ingrassia", University of Catania, Catania, Italy

Depression is a mental health disorder estimated to affect 350 million people worldwide. The increasing trends registered over the last decades have suggested that modern lifestyles may have been responsible of current incidence rates. A significant body of evidence pointed out the attention on nutrition as a major determinant in mental health. Several studies have shown a positive correlation between the severity of the symptoms of depression and the increase in the inflammatory status. Consequently, it has been hypothesized that consumption of foods high in anti-oxidant and anti-inflammatory content may modulate the risk of depression. Pooled analyses exploring the association between dietary patterns and depression suggested that high intakes of fruit, vegetables, fish, and whole grains may be associated with a reduced depression risk. Individual food and content analyses proposed fish and n-3 polyunsaturated fatty acids among the main candidates as potential beneficial factors to prevent depression. Among other foods, analyses on coffee and tea found certain protective association with depression. Caffeine and polyphenols may be responsible for their beneficial effects, but evidence is yet too preliminary to draft final conclusions. Overall, results are promising but more high-quality prospective cohort studies and randomized controlled trials controlling for potential confounding factors are needed to confirm finding such findings.

Session 4.32. Heelsum Collaboration on Nutrition Guidance in Primary Care: "Present and Future of Nutrition and Lifestyle Counselling in Primary Care Practice

Intrapersonal, social-environmental, and physical-environmental factors which predict healthy eating practices in Dutch adults

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Introduction Despite global efforts to make healthy choices, the easiest choices, people's eating practices are still challenged daily. We can identify multiple challenges in our modern 'obesogenic' environment. For instance, the sheer overabundance of food, as well as marketing techniques and pricing strategies which favor the overconsumption and accessibility of sugary and fatty foods. Much of the past research on food choice has focused on studying individuals that do not manage these challenges and as a result make unhealthy food choices. However, very little research has focused on the small number of individuals that DO make healthy food choices despite these challenges. What factors enable them to cope with these risks successfully and as a result make healthy food choices? This study aimed to study these enabling factors which support healthy eating in Dutch adults.

Materials and Methods This research applied Antonovsky's salutogenic framework for health development.This is a positive-oriented framework which studies factors which enable coping, health-promoting behaviors and good health. We used the framework to develop a survey instrument to study intrapersonal, social-environmental, and physical-environmental factors which predict healthy eating practices in a cross-sectional study of Dutch adults. Participants (n=703) aged

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18 years and older completed the study's survey in January 2013. Bivariate and multivariate logistic regression analysis was performed to test the association of survey factors on the outcome variable high dietary score.

Results In the multivariate logistic regression model, six factors were significantly ($p < .05$) related to high dietary score: being female; living with partner; sense of coherence (a construct from the salutogenic framework, relates to one's capability to deal with stress), flexible restraint of eating, and self-efficacy for healthy eating.

Key Findings Findings support previous studies which found associations between healthier eating practices and sense of coherence. Within the multivariate model, intrapersonal factors were more significant predictors of a high dietary score whereas socio-environmental and physical –environmental factors were not significant. Previously identified predictors of food choices including income; education level; employment; and nutrition knowledge were not significant factors in our overall model. Future research should further study these intrapersonal factors identified in our study to better understand their origins and mechanisms in relation to healthy eating practices.

Type 2 diabetes prevention from evidence to practice: the SLIMMER lifestyle intervention

Geerke Duijzer1, Annemien Haveman-Nies1,2, Sophia C Jansen2, Josien ter Beek2, Gerrit J Hiddink3, Edith JM Feskens1, Heelsum Collaboration on Nutrition Guidance in Primary Care: Present and Future of Nutrition and Lifestyle Counselling in Primary Care Practice

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During the last two decades many large-scale randomised controlled trials have shown that type 2 diabetes can be delayed or prevented by lifestyle intervention in high-risk individuals. Many of these trials have been implemented in real-world settings and showed significant reductions in weight but inconclusive results for metabolic indicators of diabetes risk. To date no diabetes prevention interventions have been effectively implemented in Dutch primary health care. Therefore, the evidence-based Study on Lifestyle intervention and Impaired glucose tolerance Maastricht (SLIM), conducted in an experimental setting and revealing a 47% diabetes risk reduction, was translated into the SLIMMER intervention (SLIM iMplementation Experience Region Noord- en Oost-Gelderland) for the real-world setting. This translation was done in a joint decision making process between SLIM intervention developers and local health care professionals. The aim of the SLIMMER study was to reduce the risk of developing type 2 diabetes by improving lifestyle behaviour in subjects at high risk. The SLIMMER intervention consisted of a 10-month lifestyle intervention with a dietary and physical activity component, including case management and a maintenance programme. Pilot-testing of the adapted intervention showed that implementation of the SLIMMER intervention was feasible in Dutch primary health care and that it was likely to achieve desired impact. These results served as input for the broader implementation and evaluation of the intervention in a randomised, controlled trial in Dutch public and primary health care. Results of this effectiveness study showed that measures of glycaemia, dietary intake, physical activity, and quality of life improved more in the intervention group than in the control group both at 12 and 18 months.

Self-regulation of eating behavior in a food-rich environment

Emely de Vet, Affiliation: Wageningen University

Abstract: Many people eat unhealthy which bears great consequences for public health. The tempting food environment is often held responsible for suboptimal dietary patterns. The current food environment is characterized by easy access to and wide availability of unhealthy palatable foods. This environment places a great demand on individuals' ability to self-regulate; that is, their ability to steer their attention, thoughts, emotions and behaviors towards larger future outcomes also when in the midst of competing options that tempts them to pursue short term rewards. I propose that individuals differ in their response to a tempting food environment and that self-regulation is crucial in this respect. In the presentation I will first discuss results from two large survey studies among multiple European countries that illustrate that self-regulation might reduce the negative impact of a tempting food environment on unhealthy eating. Next I will discuss the implications of these findings for behavior change interventions. I will discuss possibilities to train self-regulation skills in a food-rich environment, and what role the food environment should play in building self-regulation. I will present some preliminary experimental evidence that controlled exposure to tempting foods may actually be required for learning how to deal with tempting foods. Further, I will introduce novel techniques for making changes in the food environment to facilitate automatic self-regulation. An example is nudging. Nudges are subtle changes in the food environment that help individuals to make healthier choices in a non-deliberate, automatic way. I will present the result of experimental studies illustrating that with nudges, individuals may make healthy choices on impulse without requiring self-regulation efforts. In sum, state-of-the-art research illustrating the importance of self-regulation in a food-rich context as well as guidelines for novel behavior change interventions acknowledging difficulties in self-regulation are presented.

Session 4.4. Diet and the development of type 2 diabetes and cardiovascular disease: insights from EPIC-InterAct and EPIC-Heart/EPIC-CVD projects

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Fatty acids and risk of type 2 diabetes and cardiovascular disease

Nita Forouhi, MRC Epidemiology Unit, University of Cambridge School of Clinical Medicine, Institute of Metabolic Science, Cambridge, United Kingdom

There is considerable ongoing interest in the potential contribution of types of dietary fat consumption to cardiometabolic health outcomes. Public health guidelines have long recommended a reduction in saturated fatty acid (SFA) consumption as a cornerstone of nutritional advice for the prevention of cardiovascular disease. However, this has recently been called into question based on lack of definitive evidence. Guidelines also encourage replacing SFA intake with higher consumption of polyunsaturated fatty acids (PUFA) and avoidance of dietary trans fatty acids, but uncertainties remain on strength and quality of evidence and whether the direction of association with risk of type 2 diabetes and cardiovascular disease is similar or divergent. Past research has relied on self-reported dietary assessment which is limited by issues of measurement error and inability to examine individual fatty acids, but recent developments in technology have opened up the possibility to measure blood fatty acid concentrations in large-scale epidemiological studies. Using objectively measured fatty acid biomarkers the EPIC-InterAct and EPIC-CVD projects, within up-to 10 countries of Europe, are enabling the generation of novel evidence on the association between a comprehensive panel of individual fatty acids and the development of type 2 diabetes and cardiovascular disease. Within the EPIC-InterAct case-cohort study with 12,403 people with new-onset type 2 diabetes and a sub-cohort of 16,154 individuals, different individual plasma phospholipid SFAs were associated with type 2 diabetes in opposite directions. Even-chain SFAs (14:0, 16:0, 18:0) were significantly positively associated, but by contrast, odd-chain SFAs (15:0, 17:0) and very-long-chain SFAs (20:0, 22:0, 23:0, 24:0) were inversely associated with incident diabetes. This suggests that SFAs are not homogeneous in their effects and highlights the importance of recognising individual subtypes of fatty acids and their food sources rather than considering all SFAs as a single entity. Similar work is ongoing for cardiovascular outcomes within the EPIC-CVD project.

Food, nutrition and the development of cardiovascular disease: insights from EPIC-Heart and EPIC-CVD projects:

Professor Tim Key on behalf of EPIC-CVD, Cancer Epidemiology Unit, Nuffield Department of Population Health, University of Oxford, United Kingdom

Introduction and objectives: the role of major food groups in the aetiology of cardiovascular disease is not well understood. Our aim was to examine these associations in a large contemporary European study.

Methods: EPIC (the European Prospective Investigation into Cancer and Nutrition) is a cohort study of 500,000 men and women in 10 countries in whom diet was assessed by validated dietary questionnaires in 1992-2000. The EPIC-CVD project has followed participants for incident or fatal cardiovascular disease, and used a case-cohort approach to compare dietary characteristics and biomarkers in incident cases and a random sample of non-cases.

Results: 13,143 participants diagnosed with ischaemic heart disease during follow-up were compared with 16,683 non-cases. Participants with a high intake of total meat and meat products had an increased risk for incident ischaemic heart disease; for the highest versus lowest fifth of intake, relative risk (RR)=1.39 (95% CI 1.23-1.58), P trend <0.0001. Risk was also positively associated with intakes of red meat and processed meat. Risk was not associated with intake of poultry, white fish, fatty fish, milk, or eggs, and was weakly inversely associated with intake of yoghurt and cheese. Risk was also inversely associated with the total intake of fruit and vegetables; for the highest versus lowest fifth of intake, RR=0.79 (0.68 to 0.91), P trend=0.0002). Analyses of biomarkers suggested that the increased risk associated with meat and meat products may be partly due to increases in plasma non-HDL cholesterol and systolic blood pressure.

Conclusions: The risk for ischaemic heart disease was strongly positively associated with intake of meat and meat products, and moderately inversely associated with intake of fruit and vegetables.

Session 4.5. Dietary needs of people

Vitamin deficiencies later in life

Lisette de Groot, Wageningen University, Division of Human Nutrition, PO Box 6700 EV, Wageningen, the Netherlands

The ageing process is-apart from chance or good luck-not only influenced by factors intrinsic to the individual, but also by extrinsic factors that include environmental and lifestyle variables. This paper deals with the epidemiological evidence for the role of some key nutritional concerns in relation to survival and ageing related disorders that present themselves in later life.

Vitamin deficiencies and low dietary intakes among community-dwelling older adults are often associated with functional decline, frailty and difficulties with independent living. As such, studies that seek to understand the types and magnitude of dietary inadequacies might be beneficial for guiding interventions. Specific nutritional concerns relate to vitamin D and vitamin B12. Several systematic reviews present inadequacies for B-vitamins as well, including thiamin and riboflavin. Some of these deficiencies are not confined to the older population, and/or are even more pronounced in care dependent older adults.

The extent to which reported inadequacies are relevant depends on a variety of factors, including dietary assessment methods, hindrance of vitamin absorption and utilisation, vitamin and mineral supplement use, and the selection of the reference value. In view of these considerations, the present presentation evaluates vitamin deficiencies as a major public health concern later in life.

Glycemic index, glycemic load and cancer risk

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Glycemic index (GI) and glycemic load (GL, i.e. GI multiplied by the quantity of carbohydrates), have been related to the risk of a number of cancer sites. To obtain an up-to-date quantification of the association between dietary GI and GL and the risk of cancer, we conducted a systematic review and meta-analysis of observational studies to 2015. We derived summary relative risks (RR) using random effects models. Seventy-five reports were included in the systematic review (147,090 cases), and 72 were included in the meta-analyses of sites with at least four studies. Considering hormone-related cancers, summary RRs comparing the highest versus the lowest GI and GL intake were, respectively, 1.05 and 1.07 for breast, 1.13 and 1.17 for endometrial, 1.11 and 1.19 for ovarian, and 1.06 and 1.04 for prostate cancer. Considering digestive-tract cancers, summary RRs for GI and GL were, 1.46 and 1.25 for esophageal (squamous cell carcinoma), 1.17 and 1.10 for stomach, 1.16 (significant) and 1.10 for colorectal, 1.11 and 1.14 for liver, and 1.10 and 1.01 for pancreatic cancers. Heterogeneity across studies was observed in most analyses. In subgroup analyses, case-control studies and studies from Europe tended to report higher RRs. Thus, high GI and GL diets are related to moderately increased risk of cancer at several common sites. If real, such associations would be of relevance on a prevention and public health level, considering the high incidence of several of these neoplasms. There are however uncertainties in interpreting these results, considering the moderate associations (i.e. 1.1 to 1.3), the heterogeneity across studies and study design (cohort versus case-control). Additional issues are possible inadequate allowance for confounding or interactions, in particular with the dietary factors, body weight and other aspects of the so called metabolic syndrome.

Session 4.7. Spices and Herbs: Improving Public Health through Flavourful Eating

The Potential of Spices and Herbs to improve Public Health through Improved Diet Quality and/or Physiological Outcomes. An overview

Anne-Marie Roussel, PhD, PharmD, Emeritus Pr, Joseph Fourier University, Grenoble, France

Herbs and spices have been used for both culinary and medical purposes for centuries all over the world. There is a growing amount of literature reporting the potential benefits of a spicy diet from a health perspective. A wide variety of active phytochemicals, mainly polyphenols, has been identified in herbs and spices. These components can act as potent antioxidant, anti-inflammatory and/or insulin potentiating compounds, or are involved in the regulation of thermogenesis and energy balance. Adding herbs and spices to the diet not only adds variety, flavour, colour and aroma to the diet, but, also, as reported by recent clinical studies , is a low-calorie modality for increasing intake of vegetables (1), decreasing salt intake in free living subjects (2), improving acceptability of lower saturated fat and calorie foods(3) , inhibiting fat oxidation during grilling(4) and preventing dietary –induced pathologies such as obesity, metabolic syndrome and diabetes, cognitive decline, inflammation, osteoarthritis, hypertension and cardiovascular diseases (5).

In this overview, recent research regarding the main bioactive components of herbs and spices, their role in maintaining health and preventing dietary-induced pathologies will be presented with a special focus on the promising use of herbs and spices as an effective strategy for helping individuals to meet dietary guidelines.

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Enhancing consumer liking of low salt tomato soup over repeated exposure by herbs and spices

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Sodium chloride is an important constituent of many food products where it is used for used for taste, texture and preservation. In addition to eliciting salty taste, sodium chloride can suppress bitterness, increase sweetness at low concentrations and enhance the perception of volatile flavour compounds However, dietary salt intakes are much higher than nutritional requirements in most countries There is strong evidence for a link between high dietary sodium and hypertension; thereby increasing the risk of cardiovascular disease and leading to a drive to reduce salt content of foods. In western populations, approximately 75% of dietary salt is derived from processed food. However, decreasing salt content in processed foods is a major challenge for the food industry as it has an adverse effect on product sensory profile and hence consumer acceptability In this study, herb and spice blends were used to enhance consumer acceptability of a low salt tomato soup (0.26% w/w). Subjects (n = 148) scored their liking of tomato soup samples over 5 consecutive days. The first and last days were pre-and post- exposure visits where all participants rated three tomato soup samples; standard (0.5% sodium chloride), low salt and low salt with added herbs and spices (oregano, bay leaves, garlic, celery and black pepper). The middle 3 days were the repeated exposure phase where participants were divided into three balanced groups; consuming the standard soup, the low salt soup, or the low salt soup with added herbs and spices. Reducing salt in the tomato soup led to a significant decline in consumer acceptability, and incorporating herbs and spices did not lead to an immediate enhancement in liking. However, inclusion of herbs and spices enhanced the perception of the salty taste of the low salt soup to the same level as the standard. Repeated exposure to the herbs and spice-modified soup led to a significant increase in the

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overall liking and liking of flavour, texture and aftertaste of the soup, whereas no changes in liking were observed for the standard and low salt tomato soups over repeated exposure. Moreover, a positive trend in increasing the post-exposure liking of the herbs and spices soup was observed. The findings suggest that the use of herbs and spices is a useful approach to reduce salt content in foods; however, herbs and spices should be chosen carefully to complement the food as large contrasts in flavour can polarise consumer liking.

The Effect of Spices and Herbs on Overall Liking of Foods Reduced in Fat, Saturated Fat and Calories

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Most adults consume more fat and saturated fat than recommended by most dietary guidelines. We examined whether adding herbs and spices to reduced-fat foods typically consumed at breakfast or lunch would improve their consumer liking. We randomized adults to taste a number of breakfast and lunch foods, each in 3 different conditions: full fat (FF), reduced fat with no added spice (RF), and reduced fat plus spice (RFS). For RF foods, total energy was reduced at lunch meals by at least 30% and total fat and saturated fat by at least 60%. For breakfast, total energy was reduced by 15% and total fat and saturated fat were reduced by at least 42%. Subjects rated their liking of these foods and the overall meals on a 9-point hedonic Likert scale. Subjects came weekly for 3 weeks to consume meals that were randomized to the condition order. We enrolled 148 subjects who were predominantly female (n = 101, 68%), had a mean age of 35.9 years, and body mass index of 24.4 kg/m2. Subjects reported habitual diets as 36% of total calories from fat (2005 Block Food Frequency Questionnaire). Reducing fat content alone significantly dropped overall liking of breakfast and lunch meals compared with FF and RFS conditions ($P < 0.0001$). The RFS overall meals were liked as well as the FF condition. FF and RFS conditions were liked significantly more than RF conditions for most individual meal items. However, liking of some foods was not completely restored to the level of FF by the addition of herbs and spices. These results show that reducing fat, saturated fat and calories can be achieved in many foods by adding herbs and spices while still delivering the flavor people desire.

Capsaicine, energy metabolism and satiety

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Capsaicin is the pungent, active ingredient of hot red peppers (Capsicum frutescens L., Solanaceae). When placed in the mouth, it is perceived as heat, pain, and taste. Several studies have tested satiating and metabolic effects. A meta-analysis of 12 clinical studies in humans shows that capsaicin given in meals (1.03-30 g of red pepper providing 2.25-33 mg of capsaicin) increased energy expenditure (Standard Mean Difference [SMD] = 0.56, 95% CI = 0.06 to 1.05) and fat oxidation (SMD = 0.53, 95% CI = 0.88 to 0.17 and SMD = 0.58, 95% CI = 1.02 to -0.15, respectively). Thus, capsaicin appears to augment energy expenditure and fat oxidation in humans, but the magnitude of its effects is small (SMD = 0.11, 95% CI = -0.06 to 0.29). A Japanese study showed that capsaicine responders were also cold-induced thermogenesis responders, by activating brown fat. Furthermore, 0.9 g of red pepper (0.25% capsaicin; 80,000 Scoville Heat Units [SHU]) in tomato juice or in capsules vs. placebo given to 24 healthy men and women lowered average daily energy intakes by 10% (in capsules) and 16% (in tomato juice). This was explained by a change in food choice, and accompanied by an increase in satiety. In negative energy balance these effects counteract the normal increase in appetite and decrease in energy expenditure. In conclusion, capsaicin appears to reduce energy intake through sensory, food choice, and satiety mechanisms. Doses of capsaicin between 2.25 mg and 33 mg in meals has been shown to increase energy expenditure and fat oxidation, which suggests positive benefits for individuals in negative energy balance, as occurs when dieting.

Session 4.8. Population-based interventions - what works?

Weighing up the evidence: the characteristics and approaches of effective public health interventions to tackle inequalities in obesity

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In high income countries, obesity levels are higher in those of the lowest socioeconomic status. Addressing inequalities in obesity therefore has a very high profile on the public health agenda internationally.

Some effective universal public health interventions may increase inequalities by disproportionately benefitting less disadvantaged groups ('intervention-generated inequalities' or IGIs). Such IGIs may arise at a number of points in the implementation of an intervention, including intervention efficacy, service provision or access, uptake, and compliance. Theoretical work, and the findings of recent systematic reviews of public health interventions, are consistent with the idea that 'downstream' preventative interventions are more likely to increase health inequalities than 'upstream' interventions.

One would expect that effective targeted (at those most disadvantaged) public health interventions, in contrast, avoid the problem of IGIs. Indeed, this appears to be the case from a recently study looking at mortality data in England,

It is also possible that the way in which a complex intervention is organised and implemented (i.e. context) can impact on its ability to reduce inequalities. The limited evidence suggests that interventions which involve shared decision making (and increase participant engagement) may be more beneficial to disadvantaged groups compared with those of higher literacy/socioeconomic status.

Our recent review found that individual, community and societal-level interventions that aim to prevent or treat obesity do not increase socioeconomic inequalities. Many of the universal interventions have the potential to slow the widening of the obesity gap, and some of the interventions which are targeted at low SES groups may be effective in decreasing obesity

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amongst lower socio-economic groups. Our review also highlights the fact that we lack the knowledge of which specific intervention components are most effective to ensure that the equity gradients are reduced.

Nutrition interventions for young adolescents: lessons learned and the way forward

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In recent years, health behaviour models and frameworks such as Socio-Ecological models and the Environmental Research framework for weight gain emphasized the significant influence of the environment on children's eating behaviours however also individual determinants still contribute to explaining the variance in eating behaviours in young adolescents and need to be addressed as part of a comprehensive nutrition policy.

Interventions targeting nutrition and weight status in young people have largely taken place in school settings as they spend a large amount of their time at school and schools have many opportunities to intervene (i.e., health education lessons, provision of healthy school meals, contact with parents). However, school-based interventions had only moderate to limited effect on behavioural outcomes and on reducing overweight prevalence .

Therefore, new approaches are needed to change eating behaviors in youth. Interventions are often based on providing general information: all participants receive comparable information on nutrition and eating behavior, irrespective of their individual differences. Interventions with information that is tailored to the individual needs, i.e., the role of a specific rewarding value of food for a particular adolescent, are expected to have a higher likelihood of being effective in establishing sustainable behavior change. However, this approach has not been fully evaluated yet. Although self-regulation theory is the basis of the most commonly delivered intervention techniques, operant learning theory may be a better explanation for health behavior change. According to the operant learning theory, behavior is learnt as a result of contingencies between behavior and consequent events. The frequency of this behavior is influenced by changing antecedents (e.g., cues, reminders) and consequences (e.g., rewards, punishments). Implementing these theoretical insights in a game context, attractive for young adolescents, might improve the effect sizes of nutrition interventions. The development of the REWARD intervention, based on these principles, will be discussed.

Session 5.1. Effective communication strategies for behavioral change

Healthy consumer choice? – Lessons to be learnt from researching food marketing and consumer health information

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Abstract:

Consumer´s food choices and preferences at the point of sale are impacted by food product marketing and food-related trends. Consumer's food purchases determine healthy eating habits and healthiness of citizen's diets. Thus, it is crucially relevant to explore how consumer's choices and preferences are influenced by food marketing and food product communication. The presentation reports on findings from three research studies on consumer´s food choices and preferences with regard to health, and discusses the implications of these for public policy efforts into improving citizen's behaviour change and healthiness of diets. The results highlight that 1) the context of the choice can be much more impactful than variations in nutrition labelling, 2) non-scientific health-related framing of information, especially on 'naturalness', might be perceived much more favourably than scientifically well-founded health claims, and 3), success factors identified through cases of successful commercial food marketing might indicate how social marketing for healthy eating should be designed in order to be effective.

Public Health and the Value of Disobedience

Gerard Hastings, University of Stirling and the Open University and L'École des Hautes Etudes en Santé Publique

Voluntary Servitude in the 21st Century

In 15482 French writer Etienne de la Boétie1, at the age of 18, set about explaining what is the great mystery of political science: why are we all so obedient? Throughout history he observed, regardless of polity, the vast majority of the population acquiesce to a tiny minority. This minority is not special in any way – in La Boétie's words they have 'only two eyes, only two hands, only one body, no more than is possessed by the least man among the infinite numbers dwelling in your cities'. And it matters not how they attain power; autocracies and democracies are alike in this respect: the power of the elite is utterly dependent on the cooperation of the populace; those at the top have 'nothing more than the power that you [and I] confer upon' them.

500 years after it was written, La Boétie's concern with our 'voluntary servitude' has an uncanny resonance in a consumer capitalist world. The essential problem is exactly the same: from obesity to melting ice caps we are voluntarily collaborating in our own destruction. His analysis of the causes remains as cogent as ever: corporate marketing ensures we continue to fall for the threadbare offerings of bread and circuses (ubiquitous processed food) dressed up in evocative symbolism (branding), and we profit, however meagrely, from playing ball (consumer satisfaction). Finally, his solution also holds its veracity: we need to start rebelling – not by fomenting revolution or building barricades, but simply by withdrawing our cooperation.

In this era of industrial epidemics, over-bearing inequality and a planet straining under the burden of gross over-consumption, public health has to pick up La Boétie's gauntlet. We should see ourselves in his vanguard of the cognoscenti who recognise the flaws in the system and pledge to use our skills and insight to ensure that as many of the populace as possible join us in demanding change. The purpose of public health can no longer be limited to micromanaging specific behaviours – eat more fruit, drink less Coke, get moving - however beneficial these changes might be for the individual. Nor can it just

2 Michel de Montaigne says 1546, making La Boétie only 16 when he picked up his pen

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be a matter of moving upstream and nudging people into these better behaviours with policy measures, which are in any case increasingly hard-won or watered down thanks to the power and influence of corporate marketers. The problems we face defeat the capacity and compromise the ethics of such limited ambitions.

Waking Up and Fighting Back

In this new public health, 'Marmot's focus on the social determinants of ill health needs to be matched with an equal concern for the commercial determinants of ill health'2, and this agenda should be built on three pillars3. First the pathogen of corporate marketing needs to be contained by independent, comprehensive and robust regulation. The purpose should be to radically reduce everyone's exposure to commercial marketing, and corporate operators should not be involved in developing or deploying these new rules, merely in obeying them. Second commercial marketing needs to be countered with public health messaging and robust deconstruction. The recent CRUK 'Smoke This'4 digital campaign attacking the tobacco industry neatly illustrates the former, and BUGA UP5, the Australian graffiti-based social movement against tobacco advertising of a decade ago, the latter. Thirdly, and most importantly, critical capacity needs to be built in the population. Small steps in this direction have been taken with media literacy, but the idea has to be pushed much further, addressing not just advertising but the whole neoliberal business system. The marketing mix, stake holder marketing and the fiduciary imperative which requires corporations to prioritise profit each need to be unpacked and critiqued. Not so much media literacy, then, as marketing literacy.

These three Cs of containment, counteraction and critical capacity are mutually dependent: regulation without public support is severely weakened, whilst a politician's inclination to regulate is greatly increased by popular demand – and both are aided and abetted by effective counter marketing (see Figure).

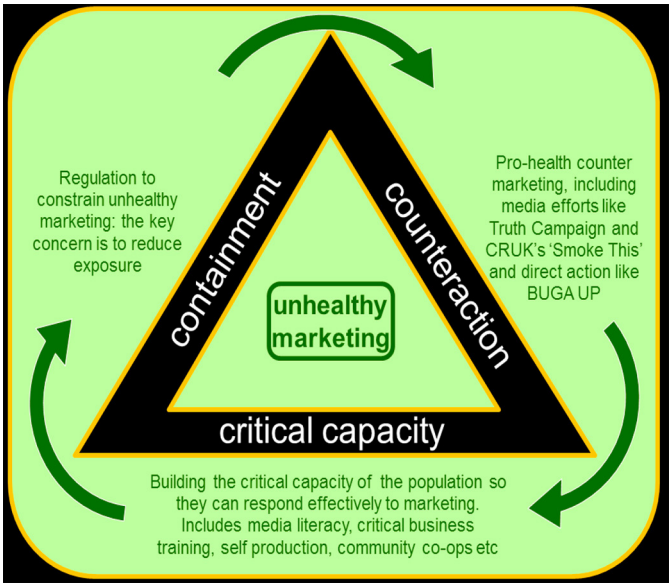

Figure: A Public Health Response to Corporate Marketing

The move to smokefree public places in Scotland during 2006 perfectly illustrates this strategic potential: the near perfect alignment of public and parliament defeated a notoriously powerful multinational industry and delivered what many would consider to be the greatest single achievement of the McConnell Government.

In conclusion, if the aim of corporate marketing is to encourage obedience, to get us to do as the marketer says, that of public health has to be more than simply saying 'no, do as we say'. It must be about enabling people to question current assumptions, understand the manipulative power structures these entail and withdraw their collaboration; about replacing obedience, not with another form of obedience, but with disobedience.

Session 5.2. Sustainable Diets - Do Organic Food Systems Contribute?

Sustainable Diets from a Consumer Perspective - the Nutrition-Sustainability-Health Nexus

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The worldwide rise of childhood obesity is one of today's biggest challenges. Beyond impairing individuals' lives, obesity also impacts societies' sustainability, most notably with regard to the social, the cultural and the economic dimension. Lately, also the environmental dimension – in particular via high-meat, high-protein, non-sustainable diets – has received more attention. Both academics and policy makers are increasingly thinking childhood obesity in a "nexus" mode and therewith leaving old "silos".

On the policy level, curbing childhood obesity has become a goal in several national and international policy strategies aiming for a better, healthier and more sustainable life. The focus is typically on children since their health behaviour is expected to have a strong impact on consumers in adulthood.

The presentation analyses the influencing factors, looks at the nexus of these three dimensions and suggest elements of an effective policy toolbox. Examples from Germany, Denmark and the US are used, both from the literature as well as from own empirical studies. Beyond traditional tools such as regulation, information and education, behavioural informed strategies based on choice architecture and "nudging" are discussed. The latter seem to be most promising but yet still underused options.

Organic food for sustainable and healthy diets – lessons from the nordic diet?

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Introduction: The New Nordic Diet (NND) was developed in 2004 by chefs and food professionals from the five Nordic countries. The goal for the NND was that it should be based on traditional regional food products but healthier than the traditional eating habits. The NND builds on four key principles: Nordic identity, health, gastronomic potential and sustainability.

Objectives: Can the NND be used as a model for a sustainable diet in other geographical regions?

Methods/design: The NND can be described by a few overall guidelines: 1) more calories from plant foods and fewer from meat; 2) more foods from the wild countryside and 3) more foods from sea and lakes. In many ways, the New NND is very similar to a Mediterranean diet but relies on rapeseed (canola) oil instead of olive oil and ramson instead of garlic. The diets differ in their types of produce due to regional differences in climate, soil and water.

Results: The health effects and sustainability of the NND has been tested in a number of scientific studies, including the OPUS project (Optimal Well-Being, Development and Health for Danish Children through a Healthy New Nordic Diet) supported by the Nordea foundation (http://foodoflife.ku.dk/opus/english/nyheder/publikationer/) in which the NND was compared to the Average Danish Diet (ADD). The use of mostly local products and reduction of the meat intake were of both socioeconomic and environmental advantage. Including organic produce increased environmental impact of the NND.

Conclusion: In line with the Mediterranean diet the NND is a predominantly plant-based diet, and although the two have not been directly compared, it would be fairly safe to assume that they are equally healthy. Overall, the NND is just a regional interpretation of the tenets of healthy eating. Basically the principles of the NND could be incorporated into any regional diet.

Nutritional behaviour and lifestyle factors of consumers purchasing organic food: Outcomes from the German National Nutrition Survey II

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Introduction: It is widely assumed but rarely investigated that buyers of organically produced food exhibit a healthier food choice and a more favourable lifestyle than non-buyers of organic food.

Objectives: To examine food consumption and lifestyle factors of buyers in comparison to non-buyers of organic food.

Method/design: Based on their purchase behaviour assessed by a questionnaire 13,074 participants (18-80 years of age) of the representative German National Nutrition Survey (NVS) II (2005/07) were classified as buyers and non-buyers of organic food. Buyers were further differentiated into intensive, occasional and infrequent purchase groups. Food consumption was assessed with diet history interviews. Overall diet was evaluated by comparing food consumption with dietary guidelines and summarizing it to a healthy eating index (HEI-NVS II). For BMI, height and weight were measured; interviews and questionnaires were used for socio-demographic description and lifestyle factors.

Results: More buyers are female (61%) and belong more often to a high socio-economic status (60%) compared to non-buyers (49% female, 44% high status). Buyers of organic food consumed more fruit (17%) and vegetables (23%) as well as less meat/sausages (25%) and soft drinks (58%) than non-buyers ($p < 0.001$, resp.). Overall diet assessed with the HEI-NVS II revealed more favourable results for buyers of organic food ($p < 0.001$). All results are more pronounced for women and for intensive buyers. Buyers of organic food also exhibit a healthier lifestyle: They are more often non-smokers, physically active, and less often overweight.

Conclusions: The results of the representative NVS II confirm the health consciousness of organic food buyers and demonstrate that their food choice and lifestyle are actually more in line with according recommendations compared to non-buyers. The potential health effect of this behaviour is independent of a potential additional health effect through the consumption of organically produced foods.

New results obtained with the Bionutrinet cohort study in France – the organic perspective.

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Introduction. Lifestyle, dietary patterns and nutritional status of organic food consumers have rarely been described, while awareness of a sustainable diet is markedly increasing.

Objectives. Our aim was to investigate in a large French adult cohort how current organic consumers fit with the definition of sustainable diets (FAO, 2010).

Method / Design. Consumer characteristics and frequency of use of organic products were first assessed in 54,311 adult participants in the Nutrinet-Santé cohort and subsequently in a more quantitative manner in 28,245 adults.

Results. Regular organic product consumers (RCOP) were more highly educated and physically active than non-consumers of organic products. They also exhibited dietary patterns with more plant foods and less sweet and alcoholic beverages, processed meat or milk. They were much more frequently vegetarians or vegans. Overall organic foods are more present in plant products than animal products. Their nutrient intake profiles (fatty acids, most minerals and vitamins, fibers) were better/healthier and they more closely adhered to dietary guidelines. In multivariate models (after accounting for confounders), compared to non-consumers, RCOP participants showed a markedly lower probability of overweight (excluding obesity) ($25 \leq BMI < 30$) and obesity ($BMI \geq 30$): -36% and -62% in men and -42% and -48% in women, respectively ($P<0.0001$). RCOP participants also showed lower probability of having type II diabetes, hypertension and cardiovascular diseases (only in men), but a higher probability for allergies.

• Conclusions. The data obtained and partly published (PlosOne, 2013) indicate that organic food consumers show a more sustainable profile.

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Session 5.21. What are the future perceptions of 'food and health' by the European consumer

Tomorrow's healthy society - research priorities for foods and diets

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Health promotion and disease prevention are increasingly recognised as crucial to Europe's Health challenges, especially for non-communicable diseases (NCDs), which in Europe account for the majority of disease burden and deaths. Major, but preventable, NCD risk factors include poor lifestyle choices such as smoking, alcohol abuse, physical inactivity and unhealthy diets; the latter contribute directly to overweight and obesity, as well as increased risk of heart diseases, diabetes and certain cancers. Notwithstanding current efforts to promote healthier diets, ensuring a healthier future requires continuous adaptation of policy commitments and the relevant scientific research to inform them. Thus, the European Commission's Joint Research Centre has conducted a foresight study entitled 'Tomorrow's healthy society - research priorities for foods and diets', aiming to identify research priorities for foods and diets for the future and support the implementation of Horizon 2020, the EU Framework Programme for Research and Innovation 2014-2020. This foresight study followed an exploratory scenario-building approach with 2050 as a time horizon and focused on the European consumer and factors that can influence diets and health. The study involved three workshops with participants stemming from various institutional backgrounds and having a wide range of food and health expertise. During the study four alternative future scenarios were developed; each was used to pinpoint potential challenges and opportunities for foods and health in 2050, and identify and prioritise research areas needed to address them. Ten research priorities that fall into four thematic areas were highlighted: 1. Towards healthier eating: integrated policymaking, 2. Food, nutrients and health: cross-interactions and emerging risks, 3. Making individualised diets a reality, 4. Shaping and coping with the 2050 food system. The study also emphasised the need to develop frameworks and methodologies that support a systems approach and an integrated policy making to address the future of healthy, affordable but also sustainable diets.

How the food industry can contribute to healthy and sustainable food systems

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European consumers are increasingly health conscious. Nevertheless, in 2010 people in Europe associated eating and food with enjoyment, and only about 20% of the respondents had safety concerns, mainly of chemical contaminations, according to a Eurobarometer survey1. A more recent report published in January 2015 about healthy eating trends globally by the Nielsen group highlights that people seek "fresh, natural and minimally processed foods", as well as "beneficial ingredients that help fight disease and promote good health"2. In parallel, a public debate is intensifying about how to secure sustainable food systems.

The food industry is in a unique position to build the bridge between healthy and sustainable. Adopting a public health approach means applying nutrition epidemiology methods to understand what and how people consume, targeted research and development to modify diets, and health economic assessment to determine benefits to society. In parallel, environmental sustainability means adopting sustainable sourcing and production practices, for example exploring the use of plant proteins, or a multidimensional environmental assessment. A food industry developing responsible practices both in the domain of public health and environmental sustainability can positively contribute to shaping successful policies involving various stakeholders.

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Session 5.22 Nutrition, Science, Industry and Consumers

Nutritional Sciences - why is the media concerned about links between Academia and Industry?

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Abstract

Food production, food manufacturing and the catering and food retail industries have made major contributions to improving Public Health in Economically Developed countries. However, more recent 'innovations' have not always taken the nutritional/health impact into consideration. For example improved palatability, portion sizes, energy density, 'free refills' have all been identified as potentially contributing to the increasing problem of obesity. By contrast, while Nutritional science has identified factors associated with health improvements, there is often a failure to recognise the challenges of turning nutritional recommendations into realistic diets.

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In order to improve the health of the population there is a need for effective dialogue between Nutritional Scientists, the Food Industry and Government Policymakers. In addition, in many European countries and the EC itself, research in food and nutrition is often expected to involve collaborations between academia and the food industry. Many food companies also have scientific advisory boards, which involve top research scientists providing updates of food, nutrition and medical science, commenting on research undertaken by such companies and identifying dietary changes which are needed to improve health.

Interestingly such involvements with industry have led to allegations of bias on the part of the scientists involved, with the media and some public health academics claiming that such scientists should not also provide advice to governments. Such views challenge the integrity of the scientists involved, in the absence of any evidence that the advice provided by such scientists to policymakers is influenced by their links with industry.

This debate provides an opportunity for these issues to be discussed.

Trends in U.S. media coverage about obesity and influences on consumers' attitudes about governmental and industry solutions

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Abstract: The objective of this presentation is to discuss factors that influence nutrition policy in the United States, specifically the role of American public opinion about solutions to the obesity epidemic. Results from several empirical studies will be presented, on news media presentation of obesity in the United States and survey research showing level of U.S. public support for various governmental and industry solutions. The presentation will discuss the factors that contribute to public support for policy action, including consumers' attitudes about the food and beverage industry, their political orientation, and how the problem of obesity is framed.

Session 5.23. Science for policy making: nutrition and health for 500 million EU consumers

Science support to policy: the Joint Research Centre (JRC)

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As the European Commission's in-house science service, the Joint Research Centre's mission is to provide independent, evidence-based scientific and technical support throughout the whole EU policy cycle. While promoting innovation through the development of new methods, tools and standards, the JRC's work has a direct impact on the lives of citizens by contributing with its research outcomes to a healthy and safe environment, secure energy supplies, sustainable mobility and consumer health and safety. Considering the latter, the JRC hosts and develops multi-disciplinary activities cutting across chemistry, nanoscience, biology, toxicology, nutritional and behavioural science and information management. It produces methodologies, knowledge base and information for the assessment of potential risks to human health, and provides reliable methods and standards for harmonised testing in Europe. More recently, the JRC is increasingly called for a more comprehensive scientific support to public health policies. With this purpose, the JRC has been developing scientific competencies to tackle the rising number of public health issues that can be dealt with most efficiently at the European level.

Making nutrition and health science heard by EU decision makers

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Diet and lifestyle related health issues pose a large burden on the quality of life of EU citizens as well as national health care systems. The complex nature of this public health challenge is now recognised and multifactorial integrated solutions are seen as the way forward. Decision makers are nonetheless expected to propose policies and interventions based on sound evidence. Paradoxically, an abundance of scientific publications goes along with a scarcity of scientific data on specific aspects, such as the effectiveness of policies and interventions targeted at improving diet and physical activity.

This talk will illustrate the approaches and methodologies used to inform the decision making process in this complex area:

- Bringing together global research evidence (through systematic reviews) and local evidence to produce policy briefs that inform plans about policies and programmes. This goes hand in hand with policy dialogues, structured discussions where policy-makers, stakeholders and researchers exchange knowledge, real world views and experiences to advise on policy issues. This process has the potential to generate profound insights into how a range of people likely to be involved in, or affected by, decisions might approach the issue and options to address it.
- Mapping policies, approaches, interventions and common indicators across EU Member States to describe and benchmark best-practices and support the setting of realistic yet ambitious targets
- Applying decision analytical tools, such as public health economic evaluation, multi-decision criteria analysis, as well as collecting other relevant data and views to support impact assessment of policy options.

Our approach relies on a constant dialogue with EU public health policy makers and stakeholders to support nutrition and physical activity related policies, in particular the EU Action Plan on Childhood Obesity 2014-2020

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Anticipating future EU food and nutrition challenges: foresight for policy preparedness

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Today's food systems are challenged by a number of social, economic and environmental changes on European as well as on global level. These will influence our ability to provide sufficient, safe, nutritious and affordable food. While the need for increased food production to feed future populations has experienced a lot of interest, potential future challenges for the quality of food in terms of food safety and nutrition received less attention. With the aim to assess the EU's current food policy capacity to respond successfully to the challenges and to identify appropriate policy responses, the JRC, in collaboration with the Directorate General for Health and Food Safety, carries out a Foresight study on food safety and nutrition in 2050. Foresight is a medium-to-long-term vision building process aimed at present-day policy or business decisions.

Considering future possible trends in e.g. climate change and natural resources, trade, technologies, and food values, four scenarios for the EU in 2050 were developed:

- A global, complex food chain provides convenient, highly processed foods for the world
- The EU embraces the circular economy and targets self-sufficiency in food
- An economically weak EU relies on technology imports and a strong north-atlantic partnership
- A strong EU "Phood" industry provides high-tech foods for health-conscious consumers

In participatory workshops, involving a broad range of relevant stakeholders, participants identified potential future food safety and nutrition challenges on the basis of the scenarios. These challenges are then used as test cases for the resilience of the current EU regulatory and policy framework. Preliminary results will be presented.

Session 5.24. Nutritional behaviour research: transferring knowledge into daily life

How can we modify nutritional behaviour? A systems perspective dealing with complexity

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As nutritional behaviour (NB) is a complex phenomenon, starting points for successful modification must be deduced from a systems perspective.

A cause-effect model which allows deducing promising starting points was developed by identifying factors of NB and their direct causal relationships on basis of current literature and expert consultation. The relationships were specified by strength (weak, medium, and strong) and type (promoting and restricting). To develop the model and for subsequent analyses, elements of three instruments were combined: (1) Nutrition-ecological modelling (NutriMod, Schneider and Hoffmann 2011), further developed to NutriMod+ST (strength, type), was especially used to depict the model. (2) Sensitivity model (SeMo) was amongst others used for analysing roles of factors in the system which e.g. indicate whether a factor is suitable as control lever or indicator (Vester 2007). (3) Cross-impact balance analysis (CIB) was amongst others used to analyse effects of external impulses on the system based on consistent scenarios. Thereto, scenarios with and without impulses were compared (Weimer-Jehle 2013).

The model demonstrates each factor's degree of influence on the system and each factor's own influencability. The model also presents the interplay of all relationships and therefore reveals cause-effect chains, feedback loops, multicausalities, and side effects and consequently eigendynamics within the complex phenomenon. Depending on the different analyses conducted, mainly four of nineteen factors, partly in combination, were identified as promising starting points to modify NB.

Taking into account several of these relevant factors in parallel and considering the interplay of all factors allows developing more promising measures. This makes it possible e.g. to prevent unintended side effects and uncontrolled reinforcement due to an intense influence of the system on some factors in addition to the impact of a measure. Therefore, future measures should consider and deal with complexity to be more successful in modifying NB.

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Theory into practice: working with families in weight management interventions

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The prevalence of childhood overweight and obesity continues to rise in low-income and middle-income countries across the world. One approach in addressing this rise in overweight is to work with families either in the clinical setting or within the context of a community based intervention. Understanding the different perspectives of

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those involved – family members and interventionists – may improve the efficacy of such interventions.

Observations of family dynamics presented here were taken from a variety of qualitative studies from 2001 onwards, including 1) interviews with children, parents of overweight children and personnel delivering interventions, 2) focus groups with parents who have taken part in family weight management interventions, and 3) personal perspectives of interventionists and from being part of the care of childhood obesity clinic (COCO) based at the Royal Hospital for Children, at Bristol.

Overweight children can impact the dynamics of a family in many and varied ways. The aim is to illustrate the perceptions of different members of the family with an overweight child and the dynamics that ensue. From the research base, this includes the opinions of mothers and the processes they go through when looking after their child(ren). Considerations will also be given to the interactions between mothers and fathers, grandmothers, and how other family members can help or hinder weight management efforts for the child. Other impacts (eg psychosocial) on family life such teasing and bullying, holiday locations, home locations and interactions with health care professionals etc. will not be included, but these are available on request. Another informative perspective comes from families taking part in weight management interventions and their experiences of what they found most helpful in changing behaviours for all. They faced similar challenges with other family members in line with the research findings, but the key element of taking part in an intervention was the social support from the interventionists and especially from other parents. Lastly, the perspectives of those delivering community-based programmes or working with individual families in a clinical setting are equally important. Here an often not appreciated, but critical aspect of what makes an intervention successful, was the emotional and social competences of deliverers.

Relationships and emotional literacy are important to working effectively with families. Understanding the potential influences within the family, and family members' perceptions, together with those of interventionists having a focus on weight management, may improve engagement in these interventions and sustainability of behaviour changes.

How should nutrition study eating behavior ?

Claude Fischler

Nutrition has been operating on the basis of assumptions. One is that its object consists of individual organisms considered in isolation. Another is that these individuals make « decisions », i.e. conscious, deliberate choices, on the basis of their « preferences », with results often detrimental to health. Consequently, public health policies and nutrition education have long been urging each and every individual to change their behavior for "healthy choices". So far, the least one can say is they have failed to curb the obesity « epidemic ». Eating behavior does not occur in a social void. It needs to be observed and understood in its full, real life context. Modern nutrition needs to be behavioral and social.

Session 5.25. The influence of media on food choice and health outcomes in children

Overview of the I.Family study design

Iris Pigeot, BIPS, Bremen, on behalf of the I.Family consortium

Many factors are at play today that make it difficult to choose the lifestyles that will help maintain health and well-being. The living environment, social conditions, economic pressures and family lifestyles have changed over recent decades. Self-prepared meals from local ingredients are replaced by fast and ready-made foods and cooking skills are lost. These changes profoundly impact children's health, particularly those in the most vulnerable groups. More and more are obese, experience metabolic disorders and are affected by psychological problems. Many of these disorders track into adulthood.

The I.Family study wants to unravel the factors at play and their complex interplay, to identify effective interventions and to support policy development, enabling more families to make healthier choices. For this purpose, the I.Family study builds on the IDEFICS cohort established in 2007 with 16.228 children recruited from eight European countries aged 2 to 9.9 years at the first examination. Some of the children are now experiencing changes around puberty, as they are in the transition between childhood and adulthood. Even if children have developed healthy eating and activity patterns, their lives change considerably as they become teenagers. The I.Family study invited the children of the IDEFICS cohort, their siblings aged 2 to 15 years and their parents to participate in an exhaustive examination protocol to learn more about the influence of family structure, familial characteristics and family life on behaviour, in particular food choice, and on health outcomes. Special examinations (e.g. fMRI, measurement of sleep quality and assessment of physical activity related to the built environment) are conducted in so-called contrasting groups, i.e. in children with a favourable weight trajectory compared with children with an unfavourable weight trajectory, e.g. excessive weight gain.

Young children's screen activities, sweet drink consumption and anthropometry

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Background: Previous studies have indicated that the influence of television (TV) on weight is through dietary intake rather than physical inactivity. The relationship between TV viewing and food behaviour could be explained by greater exposure to marketing of energy dense

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foods as well as eating in front of the TV. Research has encouraged focus on specific dietary habits as well as decreasing screen time and sedentary behaviour to prevent childhood obesity.

Aims: The general aim of the research was to examine associations between young children's screen habits, food habits and anthropometry. More specifically for two studies presented: a) To examine the association between young Swedish children's TV, computer and commercial exposure and their consumption of sweetened beverages, taking into consideration descriptive and injunctive parental norms regarding their child's sweetened beverage consumption. b) To examine associations between young children's TV viewing and other screen activities in relation to changes in consumption of sugar-sweetened beverages and changes in body mass index (BMI) and waist to height ratio (WHtR: Waist circumference divided by height) in eight European countries.

Methods

The studies were a part of the European prospective cohort study Identification and prevention of dietary and lifestyle-induced health effects in children and infants (IDEFICS), investigating diet, lifestyle and social determinants of obesity in 2-to-9-year-olds in a) Sweden (n=1733) and b) eight European countries (baseline n=16 225, two-year follow-up; n=11 038). Anthropometry was objectively measured. Age and sex-specific cut-points for overweight defined by Cole and colleagues were used, as well as BMI z-score. Behaviours were parent-reported. Screen habits included TV viewing time and total screen time (computer time added to TV time). The Swedish questionnaire was extended with questions on commercial TV exposure and parental norms on sweetened beverages.

Results: Associations between screen habits and sweetened beverage consumption were found independent of parental norms regarding sweetened beverages in the Swedish sample. The likelihood of consuming sweetened beverages at least one to three times a week was almost double for the children having parents who did not or partly limit their exposure to TV commercials (OR 1.94, 95% CI: 1.43-2.64) compared to children to parents completely limiting exposure to TV commercials. A longitudinal analysis revealed that sweetened beverage consumption at 2-year follow-up was predicted by exposure to commercial TV at baseline (OR 1.41, 95% CI: 1.07-1.87). In the larger European sample, associations were found between TV viewing and being in the highest quintile of % change in WHtR (each hour per day watching television: OR 1.26; 95% CI: 1.17-1.36) and in BMI (OR 1.22, 95% CI: 1.13-1.31). The odds ratio of having increased sweetened beverage consumption was 1.19 (95% CI: 1.09-1.29) for each hour per day watching TV.

Conclusions: The results indicate substantial effects of TV viewing and other screen activities for young children, both on their consumption of sweetened beverages and on an increase in BMI and central obesity. The results strengthen the assumption that it is possible to influence children's dietary habits through their screen habits.

New media and their association with lifestyle behaviour: concluding remarks

Wolfgang Ahrens, BIPS, Bremen, on behalf of the I.Family consortium

Children are increasingly exposed to electronic media like TV and computer games. Children spend a substantial proportion of their daily leisure time in front of a computer or TV screen. The sedentary character of corresponding activities is assumed to have direct effects on children's metabolic risk profile and contributes to an unfavourable weight trajectory. At the same time, the media content may influence children's well-being and the associated exposure to advertisements may modify their actual food preferences.

In the IDEFICS study we investigated cross-sectional and longitudinal associations of electronic media exposure and consumer behaviours with children's weight status and metabolic profile. We also assessed the association of TV and PC exposure with food preferences and the well-being of children.

We observed that higher exposure to TV is cross-sectionally associated with a preference for sugary/fatty foods and longitudinally with overweight/obesity and a higher consumption of sugar-sweetened beverages. Exposure to commercial TV is cross-sectionally associated with a more frequent consumption of sweetened beverages, irrespective of parental norms and duration of TV viewing. Often asking for items advertised on TV is longitudinally associated with overweight/obesity and a preference for fatty foods. Parents‘ resistance to these requests is inversely related to their child‘s preference for sugary/fatty foods. We also found that preference for sugary/fatty foods is associated with overweight/obesity. Our longitudinal analysis shows that well-being is negatively affected by TV exposure und PC use as indicated by increased peer and emotional problems in girls and an impaired family functioning in boys and girls (the latter holds true for TV).

The prevention messages resulting from our results are clear: No TV or DVD in children‘s bedrooms, please! Parental limits to reduce exposure to TV commercials and to resist children's pester power lead to more favourable food choices of their children. Finally we conclude that limiting TV advertising may foster healthier outcomes in children.

State of the Commercial Environment and Advertising to Children in Europe

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I-Family (http://www.ifamilystudy.eu/), a joint European 7th Framework Programme research project with 12 European partners, aims at gaining an understanding of the interplay between barriers and drivers towards healthy food choices of young consumers when they move into adolescence. The study tries to assess why young Europeans make certain food and lifestyle choices and what their impact is on their lifelong health. This is explored from a focus on family, environment, physical activity, social, behavioral and genetic influences. The study is conducted among eight different European countries comprising up to 16 000 children. Within the spectrum of influences, the present presentation – based on a recent report from the I-Family study – aims to contribute to a better understanding of the media influence on adolescent's health behavior. As food and beverage advertising has been widely recognized on having an effect in children´s and adolescents food energy intake and as a risk factor for childhood obesity and diet-related non-communicable disease, a broader overview on new forms of marketing trough new technologies such as the internet, so-

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cial media and other online media is needed. Whilst food promotion on TV has been a dominant research concern of consumer behavioral researchers and the effects of TV advertisement exposure have widely been explored, other media devices have been less in the research focus. Given that 75 % of the EU 27 households have Internet access, online marketing has become a new form to engage new consumers, particularly children and teenagers that spend an increasing amount of time surfing the web. Based on qualitative methodology, current online marketing strategies (internet, social media and other devices) from elven large food and soft drink brands targeting children are analyzed, mainly by looking at the corporate websites. Implications for policy are drawn.

Session 5.28. Situation, Quality and Support of School Catering in different countries of Europe

School meals in Germany, results of a nationwide study

Ulrike Arens-Azevedo, Hamburg University of Applied Sciences

The aim of the nationwide study was to map the current situation of school meals in Germany from the perspective of different groups in order to draw conclusions about the quality of offer and circumstances and to derive recommendations for the future.

Evaluated were questionnaires from 12,566 pupils of 15 federal states, from 212 municipalities, responsible for 5,018 schools, and from 3,530 school principals. In addition 760 menu plans were analyzed according to the quality standard of the German Nutrition Society.

Community authorities fund the lunchrooms and furniture, the kitchens and regular energy and water consumption. While service-level-agreements often exist (44.2%), a quality control is rarely held (27.7%). The quality standard of the German Nutrition Society is frequently part of the contract with the caterer (50.3%), but certification is normally not required.

The majority of schools (60%) received their food by the catering system of hot hold meals. Concerning the ordering and payment processes, the duration of breaks or the places for lunch a wide variety is typical. The demand for school meals is not as frequent as desired and depends on the age of children: in primary schools in media 50 % of students are eating their lunches, in secondary schools only in media 30 %.

At primary level students rated the meals as satisfactory to very good, slightly worse in the media at secondary level. The hit lists include pasta, pizza, pancakes and french fries, to what is not liked in particular spinach, soup, fish and potatoes. The students evaluate the background noises and the comfort of the lunch rooms particular negative. Pupils rarely (21.2 %) are involved in processes of menu planning. In open answers they expressed a lot of different wishes and suggestions for improvement of school meals, serving areas and dining rooms.

Nutrition recommendations and results of the School Health Promotion study in Finland

Marja Mikkola, Laurea University of Applied Sciences,Vanha maantie 9, 02650 Espoo, Finland

In Finland the National Nutrition Council has given nutrition recommendations for school meals in 2008 and the recommendations for student meals served in student cafeterias at universities and universities of applied sciences in 2011 by the Social Insurance Institution and the National Nutrition Council. Pre-primary and basic education are provided free of charge for all. The municipalities are responsible for monitoring and evaluating school meals. Pupils attending school must be provided with a properly organized,supervised, balanced meal free of charge every school day. The role of school meals is a pedagogical tool to teach good nutrition and eating habits. A school lunch should equate to about one third of a child's daily food intake. Afternoon snacks are served in about 30% of Finnish schools. Special attention is paid to the taste and temperature of food. Special diets are observed and supervised individually. The School Health Promotion (SHP) study monitors the health and well-being of Finnish 14–20-year-old adolescents. The aim of the SHP study is to strengthen the planning and evaluation of health promotion activities at school, municipal and national levels. The study reaches 80% of the age group in comprehensive schools and 70% in upper secondary schools. The study is carried out nationwide every second year. The number of overweight adolescents has not increased. The school meals food has keeped their position, only 10% of the pupils visits seldom a lunch room. Third of the comprehensive school pupils and half of the students of upper secondary schools and of vocational colleges consider the school food of good quality. Only about a third of the pupils eat all the parts of the meal. The boys omit the salad, the girls the milk. At school they eat also other things than just school food. The eating of sweets has diminished, the soft drinks not. The eating of the school food is also in the connection to the regular eating habits. The ones which eat the school food eat more often breakfast and also dinner with the family.

Mechanisms of weight management: Energy absorption

David Baer, PhD, US Department of Agriculture, Beltsville Human Nutrition Research Center. Beltsville, MD, USA

Introduction. Nuts are a nutrient-rich food that significantly contributes to intake of several key nutrients. Nuts are also energy-dense, and some consumers have avoided nuts as a strategy to avoid undesirable weight gain. However, results from many studies have failed to show a positive relationship between nut consumption and weight gain. In fact, consumers of nuts often have lower BMI than nonconsumers, and in clinical trials, individuals consuming nuts lose the same or more weight than nonconsumers. Moreover, calculating the metabolizable energy of nuts (using Atwater factors) overestimates the metabolizable energy content by as much as 30%. This large error

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is associated with the fact that food structure and food processing substantially affects the metabolizable energy value of tree nuts.

Objective. To evaluate factors that influence the metabolizable energy value tree nuts and the impact of energy absorption from tree nuts on weight management.

Conclusions: Among the plant-based food, tree nuts are energy-dense foods. However, their metabolizable energy value is lower than predicted from Atwater factors presumably because of a fundamental plant structure, the cell wall.

Session 5.3. Food safety and risk perception

Phytochemicals with mutagenic and carcinogenic potential in food and

Alfonso Lampen, Federal Institute for Risk Assessment, Berlin, Germany

Plant derived food is a significant part of the diet and in general associated with health advantages. However, in some cases potential hazards of phytochemicals are of concern when the exposition is high e.g. by the intake of food supplements. The mechanisms of potential toxic phytochemicals are very different. Examples are the furocoumarins in parsnip which are phototoxic, or St. John´s Wort which interacts with xenobiotic metabolizing enzymes, coumarin in cakes which is liver toxic or cyanogenic glycosides in manioc which inhibit the cell respiration. Some phytochemical such as isoflavones may act as hormones and induce cancer cell growth by estrogenic mediated mechanism of transformed breast cells.

There are also some phytochemicals with mutagenic and carcinogenic potentials such as safrol, methyleugenol, estragol, or pyrrolizidine alkaloids (PAs). The latter phytochemicals have been recently detected as contaminats in relevant amounts in tea, salads, honey, or food supplements; PA are a large group of natural toxins produced by plants, several of which are known to be highly hepatotoxic and have been showed to be carcinogenic in laboratory animals. The PAs require metabolic activation to exert their genotoxicity and tumorigenicity. The genotoxicity of PAs includes DNA binding, DNA-DNA and DNA-protein cross linking. PAs have been also shown to be clastogenic and mutagenic. In regard to assess the risk of PA the MOE (margin of exposure) approach is the method of choice. A new strategy to set up signal values or limit values for the food control for such genotoxic phytochemicals in food according to the MOE approach may be an important action of risk management. Furthermore, in regard to risk perception there are a new strategies necessary to communicate potential risks of such natural genotoxic phytochemicals because it is not possible to avoid them completely.

Safety assessment of botanicals and botanical preparations – EFSA Scientific Committee's toolkit

Bernard Bottex, European Food Safety Authority (EFSA), Parma, Italy

As compared to other food products, the safety assessment of botanicals and botanical preparations is complicated by a number of specific issues including the heterogeneity and variability of chemical compositions, claimed tradition of use in conditions often difficult to determine, widespread presence of naturally-occurring toxic substances, few data available on occurrence and consumption.

Safety assessment of botanicals and botanical preparations has been on EFSA's agenda since its inception. The competence of EFSA in this sector has been growing over time and the need to assess botanicals and botanical preparations has been increasingly embedded in current and upcoming legislation, e.g. feed additives, health claims, fortified foods and novel foods.

Following support expressed by European Member States' Competent Authorities sitting in its Advisory Forum, EFSA mandated its Scientific Committee to produce guidance for the safety assessment of botanicals and botanical preparations, and to develop a compendium (hazard database) of substances, naturally present in botanicals, of possible concern for human health. The Scientific Committee reviewed also the possible use of the Qualified Presumption of Safety approach for concluding on the safety of a plant preparation without the need for further testing. The resulting opinion provides an overview of the methodological approaches for assessing the different types of substances present in a given botanical preparation, making use of the data available and considering as well history of use.

Risk perception of carcinogenic phytochemicals in Food: Why the population does not want to hear about natural phytotoxins in Food

Marina Marinovich and Corrado L. Galli, DiSFeB, Toxicology and risk assessment Unit, University of Milan, Italy

The food may be the vector of contaminants, pesticide residues, additives, as many toxic natural components. Though the formers, unlike the latters, are monitored, measured and evaluated under restricted european regulations, the consumers consider them to be in principle a threat to their health. This mindless assessment is largely supported by the common belief that natural is equivalent to healthy, safe, and that there is a difference between chemical compounds synthesized by man and those synthesized by nature, and it is reinforced by the traditional use of some foodstuff.

Although these approaches are scientifically not sustainable, as always the truth lies somewhere in between. The research of the last twenty years has identified a multitude of natural chemicals with very toxic potential. Several studies have identified in herbs marker substances with genotoxic and carcinogenic activities on in vitro models and also in animal studies. However, assessing the risk, in spite of just the intrinsic property of causing harm (hazard), it is easy to prove that the quantities present in the foodstuff, lead to a reassuring risk characterization, since often the scientific evidences suggest that the potential genotoxicity/carcinogenicity vanishes when the risk analysis considers the food as a whole rather than a sum of the single ingredient activity.

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Different considerations should be made when the analysis is focused on supplements, because in this case the potential toxic ingredient may be concentrated in the product, the intake can be more frequent, and, other ingredients present in food that would counteract toxicity can be lost. In this regard we are therefore it will be discussed case studies based on the European Food Safety Authority (EFSA) and European Medicine Agency (EMA) guidance document for the safety assessment of botanicals and botanical preparations intended for use as food supplements or drugs.

Session 5.4. Sustainable Diet I: Global Challenges

Sustainable diet within sustainable food systems

Alexandre Meybeck, FAO

"A sustainable food system (SFS) delivers food security and nutrition for all in such a way that the economic, social and environmental bases to generate food security and nutrition for future generations are not compromised" (HLPE, 2014). By this definition, the global food system is clearly not sustainable. There are more than 2 billion malnourished, almost 800 million undernourished, more than one billion overweight and obese. The majority of the hungry and poor are food producers. Food production and consumption are among the main drivers of environmental degradation threatening its own resource base. According to FAO, global food demand is projected to increase by 60% towards 2050 from 2007, driven by changing consumption patterns and population growth. Unsustainable food consumption patterns are both a result and a driver of unsustainable food systems. Sustainable diets have been defined as "those diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations", combining two totally different perspectives: a nutrition perspective, focused on individuals, and a global sustainability perspective, in all its dimensions: environmental, economic and social. A case study using the Mediterranean diet has enabled to identify some methodological issues to be addressed when considering actual diets and their impacts. Dietary models can be assessed and compared with other types of diets and used as models against which to compare actual diets. Diets are conditioned by food systems; not in a single spatial homothetic relationship but rather as the result of interactions between consumers' attitude and lifestyle, food availability and accessibility, in the food system and with other systems.

Improving the sustainability of global meat and milk production

Professor Andrew Salter, Division of Nutritional Sciences, School of Biosciences, University of Nottingham, Sutton Bonington Campus, Loughborough, LE12 5RD, UK

Meat and milk represent energy-dense sources of high quality protein and essential micronutrients. While it is quite possible for humans to maintain good health on animal product- free diets, most individuals choose to be omnivorous. The last several decades have seen a marked increase in global consumption of meat and dairy products, specifically in emerging economies such as China. This demand has largely been met by improvements in farm animal breeding, nutrition and general husbandry practices. However, with the global population expected to increase by 2-3 billion by 2050, there is now growing concern over the use of large areas of arable land to grow crops for animal feed that could be used to directly produce food for human consumption. An increasing proportion of fresh water is used in animal production, both in feed production and by the animals themselves. Animal production, particularly ruminants, also significantly contributes to greenhouse gas production, and hence climate change.

A challenge for the coming decades is to find sustainable ways to meet the demand for animal products. Novel feed sources, which do not directly compete with human foods, need to be explored. The use of insects, both as animal feed and directly for human consumption, requires further consideration. Improved nutritional strategies to minimize pollution and greenhouse gas emissions are required. Conventional breeding, novel farming techniques, use of growth promoters and genetic manipulation are all likely to be further exploited, to varying extents, in different parts of the world. Overall consumption of meat and dairy products may be mitigated through the use of 'mimetics' derived from plant, fungal and algal sources. It is likely that a combination of such approaches will be required to meet future global demand for meat and dairy products.

Does globalization of agrifood systems provide sustainable nutrition?

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I spite of recent progress in the reduction of global hunger, malnutrition remains an issue of significant magnitude. Around 800 million people are undernourished in a calorie sense; an estimated 2 billion people suffer from micronutrient malnutrition; 1.5 billion people are overweight or obese. These three forms of nutritional problems are sometimes referred to as the "triple burden of malnutrition". They are responsible for large human and economic costs. Policies and interventions to address these problems should have high priority. In addition, it is important to understand how mega-trends affect the different forms of malnutrition. One such mega-trend, which is the focus of this paper, is the observed globalization of agrifood systems. Various facets of globalizing agrifood systems are reviewed, including trends in agricultural technology, changing consumer preferences and lifestyles, vertical integration of supply chains, the proliferation of food standards, as well as modernization and concentration in the food retail sector. The effects of these trends on the triple burden of malnutrition are analyzed through a summary of empirical studies carried out in different developing countries. Globalizing agrifood systems have significant impacts on nutrition, which can be both positive and negative. For instance, the rapid expansion of supermarkets in Africa seems to increase overnutrition in adults, while reducing

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undernutrition in children and adolescents. Impact pathways are explained. Modernizing food supply chains can also affect nutrition and dietary quality of rural farm households through changes in marketing opportunities, incomes, and gender roles. These findings suggest that impacts depend very much on the context. More research is needed to better understand the multi-faceted linkages between changing agrifood systems and nutrition. Such knowledge can help to guide policymaking in specific situations.

Session 5.5. Sustainable Diet II: Sustainable food consumption

The potential of food preservation to reduce food waste: the making of a food supply chain revolution

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Introduction; while we state it seems unthinkable to throw away nearly a third of the food we produce, we continue to overlook we are all very much part of this problem as consumers of meals. This has an impact on our view of what we think a sustainable meal is and our research shows food waste to be a universal function that can determine the sustainability of diets.

Objective; achieving sustainability in food systems depends on the efficiency of both culinary preparation and knowledge of foods. These are overlooked by the current food waste debate that is concerned with problems rather than solutions, using classic 'end-of-pipe' assessments to describe where and what food waste is. We aim to change this oversight.

Method/Design; working with food manufacturers has led us to understanding how consumers can reduce waste. The approach has the associated legacy of Clarence Birdseye who recognised that consumers should have 'less fuss, less smell and less waste' in preparing foods. The power of building-in sustainability messages with brands and food movements is still novel, under-utilised and our work shows the potential of doing this.

Results; we have chosen frozen food to demonstrate a model because our research shows the use of frozen foods resulted in 47% less waste.

Conclusions; this has created a step-change in how we consume foods with the #iFreeze movement working across different products and supply chains to augment behaviours associated with consuming the once ill-defined 'sustainable meal'.

Wholesome nutrition: an example for a sustainable diet

Dr. Karl von Koerber, Working Group on Sustainable Nutrition, Munich, Germany

Introduction: "Wholesome Nutrition" is a concept of sustainable nutrition that we developed in the working group of Prof. Claus Leitzmann at the University of Giessen in the 1980s. This concept gives an equal ranking to the health, ecologic, economic, social and cultural dimensions of nutrition. In 1992 at the UN-Conference of Environment and Development in Rio de Janeiro "sustainable development" embraced the dimensions "environment", "economy" and "society". In addition to these three "classical" dimensions of sustainability, we had included "health" as the fourth dimension because nutrition has far reaching effects on human health. The fifth dimension "culture" is now established in the sustainability discussion since the respective cultural background determines food habits. In 2005 the "New Nutrition Science Project", as an initiative of IUNS and the World Health Policy Forum, initiated a new direction in nutrition science: the biological focus has to be extended by an environmental and social focus.

Objectives: Presently mankind has to cope with huge global challenges: poverty and food insecurity in developing countries, uneven use of resources, climate change, insufficient access to clean water, soil degradation, loss of biodiversity etc. After analyzing the global studies of these topics in the different dimensions of sustainability, the objective is to identify opportunities for action to respond to the global challenges.

Results: The concept of "Sustainable Nutrition" analyses the food supply chain in all its stages from input-production, primary production over processing, distribution, preparation, and food consumption to waste disposal. The analysis results in the following seven principles:

(1) preference of plant products,
(2) organically produced foods,
(3) regional and seasonal products,
(4) preference of minimally processed foods,
(5) fair trade products,
(6) resource saving housekeeping and
(7) delicious meals.

Conclusions: The concept on "Sustainable Nutrition" is based on holistic thinking and has the potential to reduce some of the global challenges in the field of nutrition. Scientists, stakeholders, multipliers and consumers are called to include the dimensions of environment, economy, society and culture - additionally to the biological/health aspects.

Organic food consumers profiles from the large Nutrinet cohort follow-up in France

Emmanuelle Kesse-Guyot; Affiliation : Nutritional Epidemiologist, INRA, Sorbonne Paris Cité University. France

In developed countries, the expansion of the organic food market is growing concomitantly with an increase in concerns of consumers for food quality and safety.

However, little is known about the association between dietary characteristics and amount of organic food consumed.

One aim of the Bionutrinet project is to extensively describe organic food consumption profiles and to address whether an organic

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based diet is related to healthy dietary behaviors and better adherence to dietary guidelines and nutrient adequacy.

Conventional and organic food intakes, as well as the share of organic food in the diet were obtained using a specifically developed 264 items - organic food frequency questionnaire focusing on the past year among 28,245 adults (71% of women), participants of the NutriNet-Santé cohort study. All data were weighted using national census reports.

Weighted quintiles of the contribution of organic foods to the overall diet were computed. Diet quality was estimated using two scores reflecting adherence to dietary components of the Programme National Nutrition Santé-Guidelines (mPNNS-GS) and the probability of adequate nutrient intake (PANdiet). Relationships between levels of organic food consumption (defined as the contribution of organic foods in the whole diet) and dietary intakes and diet quality scores were assessed using multivariate linear regression.

The percentage of non-consumers of organic foods was 8.4% in women and 14.7% in men.

More than ¼ of organic food consumers reported eating at least 50% of vegetables, fruits and related products, from organic sources.

Organic foods contributed to 20% to the whole diet among women and 18% among ($p<0.0001$). When excluding the liquid products and the water in particular, corresponding proportions were 28% among women and 25% among men.

Overall, individuals with higher education level, never smoker, older subjects (i.e. above the median value equals to 48 years old) and vegetarians/vegans had higher intake of organic food (g/day) than their counterparts.

Intakes of plant foods (including vegetables, fruits, whole grain products and nuts) increased along with the contribution of organic foods in the diet while it was the reverse trend for milk, dairy products, cookies and soda. No relationship was found between sweet product consumption and levels of organic food consumption.

The diet quality scores increased from the first quintile (mPNNSGS: 7.89±0.02; PANDiet: 64.49±0.09) to heavy consumers (mPNNSGS 8.78±0.02; PANDiet: 69.26±0.09). However, regarding individual components of the mPNNS-GS, the percentages of individuals following the nutritional guidelines for added fat decreased along with the increase of the contribution of the organic foods (82.13% to 68.42%).

Our study provides new insights into the understanding of organic food as a determinant of dietary intake and sheds some light on the dietary profiles of intermediate organic food consumers who are probably the main stakeholders in the transition toward sustainable consumption.

Session 5.6. Food innovations

Novel food and health infrastructures in Europe

Krijn J. Poppe, Karin Zimmermann, Pieter van 't Veer on behalf of the EuroDISH consortium, Wageningen UR

Europe is facing major challenges in promoting health and reducing the disease burden of non-communicable diseases such as cardiovascular disease, cancer, and type 2 diabetes – related to food, nutrition and lifestyle. Through public health nutrition strategies with policy interventions, product reformulations, communication campaigns, etc. public and private stakeholders contribute to the promotion of a healthier lifestyle. Such actions have to be evidence-based and high quality research is vital.

Objectives and design

In the FP7 EuroDISH research project recommendations were developed on the needs for food and health research infrastructures. The work was organised around the 'DISH' model, the four key building blocks of food and health research:

- Determinants of dietary behaviour - finding out why we choose what we eat and drink
- Intake of foods and nutrients – assessing and evaluating how much we eat and drink
- Status and function of the body - using markers of body stores, biomolecular mechanisms, nutritional health
- Health and disease - assessing the links between nutrition and health outcomes (diseases, quality of life, ageing, fertility).

The project mapped existing research infrastructures and identified gaps, needs and governance issues. It integrated the findings and developed a conceptual design with a roadmap for implementation.

Results

There is a need for one European research infrastructure ('DISH-RI') that is specific for food in relation to nutrition and health and that overarches the DISH disciplines:

- Researchers need an overarching research infrastructure that fills important gaps and overcomes fragmentation to enable cutting edge research.
- Policy makers need more scientific insights on how to change the food environment and prevent further cost increases of diet related diseases.
- Food industry needs scientific insights to foster product innovation and strengthen its competitive position.
- Societal organisations and practice professionals need a solid evidence base for their strategies and advice.

Food bioactives and health claims

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Cardiovascular disease is the biggest cause of morbidity and mortality in Europe and is a major target of national programmes towards healthier diets and a driver of innovation in the food industry. There is a clear need and a substantial market opportunity for develop-ing new foods and beverages that have proven benefits for CV health. The potential for dietary bioactives to deliver beneficial effects in humans has already been established; e.g. polyunsaturated fatty acids and plant sterols have proven health benefits and several health claims have been approved by the European Food Safety Authority (EFSA).

Pre-clinical research with bioactive peptides and polyphenols reported over the past 20 years has demonstrated that they possess real potential in terms of exerting beneficial physiological effects on

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the CV system. Within the last 15 y, a substantial number of reports of significant improvements in biomarkers related to CV health following consumption of polyphenols and polyphenol-rich foods have been published[1]. There are numerous reports of clinically significant effects of consuming bioactive peptides on blood pressure in humans and a series of reports of strong bp-lowering effects in animal models of hypertension[2]. The accumulating evidence to support the notion that dietary polyphenols and bioactive peptides can beneficially affect CV health and reduce risk has been accompanied by significant investment in R&D by the food industry and SMEs to develop foods that benefit consumer health.

Despite numerous dossiers concerned with health claims for products containing polyphenols and peptides being submitted, only two have been given a favourable opinion by EFSA[3,4]. Numerous health claim dossiers concerned with bioactive peptides and polyphenols submitted to EFSA were rejected. The main objective of the BACCHUS project is to develop tools and resources that will facilitate the generation of robust and exploitable scientific evidence that can be used to support claims of a cause and effect relationship between consumption of bioactive peptides and polyphenols and beneficial physiological effects related to cardiovascular health in humans. This presentation will describe the main activities of the BACCHUS project which are focussed on overcoming the existing challenges to obtaining health claims for peptides and polyphenols and on generating scientific data to support future claims. The activities include fundamental research to understand the stability, metabolism and absorption of these bioactives from the gut, characterising plausible mechanisms underlying observed beneficial CV health effects, and randomised controlled trials in humans to demonstrate the health benefits.

This research was funded by the EU 7th Framework Programme (BACCHUS-312090) with additional support from the Biotechnology and Biological Sciences Research Council UK (Institute Strategic Programme Grant 'Food and Health' BB/J004545/1 to IFR).

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Consumer perceptions and use of plant food supplements: implications for communication and policy

Monique M Raats, Food, Consumer Behaviour and Health Research Centre; University of Surrey, United Kingdom

Botanical products are widely used across Europe and taken in many different forms (e.g. teas, juices, herbal medicinal products, plant food supplements (PFS). Findings from studies conducted in the context of the PlantLIBRA project will be presented including from a pan-European survey of 2359 adult PFS consumers from Finland, Germany, Italy, Romania, Spain and the United Kingdom. Survey data was integrated with focus group and interview data from PFS users, non-users and stakeholders. The Internet and friends and relatives were twice as likely to offer information to users as general practitioners. Users, non-users and stakeholders expressed the need for more accessible information on safety and effectiveness, and for clearer regulations on the status of PFS as food and/or medicine. Findings from a related experimental study examining the use of packaging cues to determine perceived risk and benefit of a PFS indicate that images on PFS labels can implicitly prime the formation of expectations regarding the function of a PFS product. These images can thus act as a source of suggestion, perhaps in some cases making consumers less aware of the real health benefits that the products offer. A final study exploring how consumers' judgements of benefits and risks are influenced by packaging found that consumers attend to different elements of the packaging in order to make judgements about product benefits and risk. Benefit judgements relate to the presence of plant name whereas risk judgements relate in part to the presence of a scientific warrant. Based on these findings, we propose that future PFS policies should focus on transparency as consumers tend to perceive PFS as safe, and as potentially effective for a number of health problems. Many consumers are not aware that PFS are food. There is a need for reliable, possibly Internet-based PFS information.

Session 5.8. Policy options for relevant sectors with implications for nutrition on addressing under- and over-nutrition

Nutrition the Nordic Way: Policy, Recommendations and Labelling for Counteracting Overweight and Obesity

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The five Nordic countries have a long tradition of close collaboration in the area of food, nutrition and health. This work includes the Nordic Nutrition Recommendations (last revised in 2012), the joint Nordic Action Plan on Health, Food and Physical activity (2006), a joint food labelling system (the Keyhole food symbol) since 2009, and ongoing efforts to evaluate policy measures designed to reduce the marketing pressure on children with respect to unhealthy foods and drinks. Furthermore, these food and nutrition specific measures are embedded within policies addressing the social determinants of health and a commitment to tackling health inequities. At the same time, there is also large variation within the Nordic region in terms of a number of overweight and obesity-related policies.

This presentation will offer a public health perspective on the Nordic model, presenting key policies and recommendations, and experiences gained in implementing these measures. Specifically, this presentation will draw on the experiences from the Nordic efforts to

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address social determinants related to food and nutrition and experiences related to the Keyhole food symbol designed to make it easier for the public to select healthy products. The symbol, which recently had its criteria revised, identifies food items within given food categories that meet specific criteria with respect to the content of added sugar, salt, fiber and the quality of the fat. Finally, efforts to address the marketing pressure of high salt, energy-dense, micronutrient-poor foods and beverages towards children will be shared.

In conclusion, recommendations for further research and policy efforts will be identified.

Addressing malnutrition through nutrition-sensitive agri-food policies in Europe and Central Asia region

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Introduction: despite the remarkable progress made over last decades in meeting the MDGs' 1c (Hunger target)3,4 by countries in Europe and Central Asia (EuCA) region, various forms of malnutrition still persist: in 48 out of 53 countries, the combined overweight and obesity prevalence in adult population exceeds 55% and obesity levels are over 20%. Child malnutrition continues to be a problem with stunting prevalence in children under five ranging across the region from 1.1 to 26.7% and wasting from 0.2 to 10.0%. Consensus and commitments to address malnutrition in all its forms are reflected in the endorsed i) Rome Declaration on Nutrition and ii) Framework for Action at the Second FAO/WHO International Conference (ICN2).

Objectives: provide an updated overview on malnutrition prevalence across EuCA sub-regions and countries, highlight country experiences in nutrition-sensitive food policy actions, and outline policy recommendations to effectively address various types of malnutrition.

Methods: analysis of databases, published papers and reports.

Conclusions: unhealthy diets account for over 30% of disease and disability burden and present the top risk factor of NCDs in EuCA countries. Significant levels of micronutrient deficiencies, overweight and obesity found in EuCA region, along with substantial variability between countries, age groups and gender indicate the need for a country specific approach to address malnutrition.

Effectively addressing the reduction in overweight and obesity should consider the approach of joint responsibility of individuals, national governments and private sector in the creation of healthy, well monitored and regulated food environments. Cross-sectoral collaboration within and across governments, private sector and civil society is necessary for strengthened nutrition governance and accountability.

A set of policy options focused on preventing malnutrition through advantages of food-based strategies and nutrition-sensitive agri-food systems, as long-term and sustainable solutions to eliminate malnutrition, are emphasized.

3 FAO, IFAD and WFP. 2015. The State of Food Insecurity in the World 2015. Meeting the 2015 international hunger targets: taking stock of uneven progress. Rome, FAO.

4 FAO REU. 2015. Regional Overview of Food Security in Europe and Central Asia: Focus on healthy and balanced nutrition.

Food and nutrition policy: future perceptions

Jo Jewell, World Health Organization Regional Office for Europe

The lecture will focus on the food and nutrition policy response to the global challenge of obesity and diet-related NCDs and look briefly at what polices will be needed. The speaker will focus on the existing and emerging evidence base around which types of policies are needed and are most likely to be effective at changing behaviour, improving the nutritional quality of diets at the population levels and addressing obesity. The lecture will look at the drivers of unhealthy diets and obesity, the different types of evidence available to inform policy, what we can learn from the evidence that currently exists (including lessons from real-world case studies), and will also discuss what future research might be needed. It will address some of the challenges and opportunities to policy development and implementation, including the need to target policies and ensure inequalities are a primary focus.

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ABSTRACTS LECTURES INDUSTRY SPONSORED PROGRAM

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Symposium: Mechanisms of weight management: from appetite regulation to energy absorption

(sponsored by: Almond Board of California)

Controlling the drive to eat: the impact of foods on the Satiety Cascade

John Blundell, Affiliation: Institute of Psychological Sciences, Faculty of Medicine and Health, University of Leeds, Leeds, LS2 9JT, UK

Self determined control over appetite is difficult and complex. The drive to eat is generated by the energy requirements of the body which determine meal size, frequency and total daily energy intake. This drive to eat is periodically suppressed by the consumption of foods in meals and snacks. The action of foods is exerted through an effect on satiation (which influences the size of a meal) and operates during eating, and on satiety which is reflected in the suppression of hunger and the inhibition of eating after a meal. Working together these two processes (satiation and satiety) temporarily suppress the demand to eat and influence the pattern of eating and the total energy ingested.

The way in which chosen foods influence satiation and satiety can be described by the Satiety Cascade which identifies cognitions (expectations, imaginations, beliefs), sensory (oral and gastric), hormonal and metabolic processes, and food composition (structural and nutritional) that influence satiation and/or satiety. Foods vary markedly in their capacity to act on these processes, and therefore on their power to adjust satiation and satiety through both homeostatic and hedonic mechanisms. The attributes of foods which have a prominent action on the Satiety Cascade include energy density, volume, fibre content, protein, glycemic index, oral processing time (rate of eating), palatability, taste and food texture. These attributes exert an impact on the overall 'satiating power' of foods. However, it should be recognized that when foods are eaten, their multiple attributes exert a collective action and the ultimate effect will arise from a combination of psychological and physiological mechanisms. The degree of energy expenditure (sedentariness or physical activity) modulates these mechanisms. In addition, people vary in their capacity to respond to different foods, and the signalling from different elements of the Satiety Cascade will vary in strength between individuals.

Symposium: Emerging insights in plant-based eating and health–focus on soy

(sponsored by: ALPRO FOUNDATION)

Dietary fatty acids and coronary heart disease: is replacing saturates by poly-unsaturates the key?

Bruce Griffin - Department of Nutritional Sciences, University of Surrey, United Kingdom

Introduction: The dietary guideline to limit the intake of saturated fatty acids (SFA) to reduce coronary heart disease (CHD) risk and mortality has relied heavily upon the serum cholesterol-raising effect of SFA relative to other macronutrients, and less on evidence for a direct relationship between SFA and CHD. The validity of replacing SFA with other macronutrients, including polyunsaturated fatty acids (PUFA), has now been called into question by the outcome of recent meta-analyses.

Objective: to critically appraise the evidence for the relationship between dietary SFA and CHD. Design: critical overview of the evidence to link dietary SFA with CHD, from observational and prospective cohort studies, randomized controlled trials, and meta-analyses of these studies.

Results: Data from individual studies and meta-analyses show a positive dose-response relationship between changes in serum LDL-cholesterol (-C) and iso-energetic exchange of dietary SFA with other fatty acids or carbohydrate, with PUFA being the most effective substitute for lowering LDL-C. There is also evidence from prospective and intervention studies that a lower intake of SFA, and replacement of SFA with PUFA, respectively, are associated with reduced CHD mortality, though this has not been found in recent meta-analyses.

Conclusions: Failure of meta-analyses to substantiate a link between dietary SFA and CHD mortality may be explained, in part, by variation in the nature of the substituting macronutrients, differential effects of individual SFA and SFA-rich foods on LDL-C, and limitations of meta-analyses to resolve these issues. Replacing dietary SFA with PUFA may not be the 'key' to the relationship between SFA and CHD, but represents an evidenced-based approach for reducing CHD risk by lowering serum LDL-C, that, to date, has not been invalidated by the outcome of meta-analyses.

Soya and Health: Emerging research areas

Mark Messina, PhD, MS

Soyfoods have been the subject of much investigation over the past 25 years largely because they are rich sources of isoflavones. Several hypotheses about the health effects of isoflavones and soya have emerged, that while researched to only a limited extent, are attracting interest. Three of these, which are discussed in this presentation, are the role of adolescent soya intake in reducing breast cancer risk, the anti-depressant effects of isoflavones and the role of isoflavones in reducing wrinkles.

Epidemiologic studies show that adult soya intake is associated with a one-third reduction in breast cancer risk. However, clinical studies show soya does not affect markers of breast cancer risk. Furthermore, among vegetarians, whose chosen dietary pattern was likely adopted during adulthood, soy intake is not protective against breast cancer. Conversely, rodent studies show that exposure to isoflavones early in life reduces the development of chemically-induced mammary cancer.

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These observations are consistent with the epidemiology data showing adolescent intake is associated with marked reductions in breast cancer risk.

The predominate estrogen receptor (ER) in the skin is ERβ, the receptor that isoflavones preferentially bind to and activate. Preliminary clinical studies show intervention products containing isoflavones reduce wrinkles. In the largest study, a mixture of isoflavones and other bioactives resulted in a 10% reduction in wrinkles as a result of an increase in collagen synthesis. Of the bioactives in this mixture, only isoflavones have been shown to increase collagen synthesis.

Finally, a recently published clinical study found that isoflavones were as efficacious as sertraline and fluoxetine in reducing symptoms of depression in depressed patients and that the benefits were greater in response to the combination of isoflavones and sertraline than to the individual treatments. These results concur with those of large Italian study which found isoflavones reduced symptoms of depression in postmenopausal women.

Soya and use in breast cancer: the controversy is over

Dr Pamela J. Magee, Northern Ireland Centre for Food & Health, University of Ulster, Coleraine, Northern Ireland, BT52 1SA.

The association between soya consumption and risk of breast cancer incidence and recurrence has been extensively investigated in recent years, with much focus on soya isoflavones (genistein, daidzein and glycitein). These compounds are similar in structure to oestrogen and are classified as selective oestrogen receptor modulators (SERMs). The lower rates of breast cancer incidence in Asian countries such as China and Japan, in comparison to Western populations, have been attributed to soyafood/isoflavone consumption. Indeed meta-analyses of epidemiological studies indicate that soya consumption is associated with a modest reduction (~20-30%) in breast cancer risk in Asian women, with a much greater reduction in risk observed in women that consume soya during childhood and adolescence.

Animal studies in which genistein stimulated oestrogen-sensitive breast cancer cell growth have raised concern over the safety of soya consumption for breast cancer patients, however rodents metabolise isoflavones differently than humans, thus the relevance of these findings is questionable. Epidemiological studies in breast cancer survivors demonstrate that consuming soya foods, at levels comparable to those in Asian populations, does not adversely affect breast cancer mortality or recurrence, regardless of oestrogen receptor or menopausal status. In a pooled analysis of 9514 US and Chinese breast cancer survivors with a median follow-up period of 7.4 years, post-diagnosis intake of ≥10 mg isoflavones per day was associated with a significant reduction (25%) in risk of recurrence and had no effect on breast cancer-specific mortality. Furthermore soya consumption does not appear to interfere with tamoxifen or anastrozole therapy.

Current epidemiological evidence indicates that moderate soya consumption is safe for breast cancer survivors, a view that has been advocated by several organisations including the American Institute for Cancer Research and the World Cancer Research Fund.

Keywords: soya, isoflavones, breast cancer, breast cancer survivors

Symposium: The impact of maternal nutrition on the offspring development

(sponsored by: BAYER CONSUMER CARE AG)

Nutritional needs during pregnancy - keeping in mind the priorities

Zyriax BC, Preventive Medicine, University Heart Center, University Medical Center Hamburg-Eppendorf

Dietary habits and lifestyle before and throughout pregnancy plays a primary role in conception, course of pregnancy and long-term health of mother and child. However, more than one third of the women are characterized by an elevated pre-pregnancy BMI and the majority of pregnant women do not comply with current weight gain recommendations. Self-monitoring of weight development and additional lifestyle counseling seem to be effective in terms of preventing excessive gestational weight gain and weight retention. Current data indicate that energy and nutrient intake in women of childbearing age and throughout pregnancy is at least in part inadequate. During pregnancy the need for certain vitamins and minerals increases more than the energy requirement. Thus, pregnant women should pay attention to the quality of their diet by choosing nutrient-dense food, e.g. fruits and vegetables, whole grains, lean meat, and low fat dairy products. However, without individual counseling changes in dietary habits remain limited. Notwithstanding the above, even a well-balanced diet does not cover the need for certain nutrients such as folate and iodine. Additionally, low consumption of oily fish leads to an inadequate intake of omega-3 fatty-acids and less exposure to sunlight or the use of sun protection products contribute to low plasma levels of vitamin D. Based on German data two thirds of pregnant women reported an iron intake of less than half of the recommended daily amount. Suboptimal intake of various nutrients is also reported from other European countries. Therefore, advice as to an appropriate use of supplements based on individual needs should be part of a personal dietary counseling, which cannot replace encouragement with regard to a healthy diet, though. This approach takes into account that pregnancy provides a unique opportunity for dietary and behavioral changes due to the motivation of the mother-to-be.

Impact of early nutrition on neurodevelopment

Cristina Campoy, Md, PhD, Department of Paediatrics. School of Medicine. EURISTIKOS Excellence Centre for Paediatric Research. University of Granada. Spain

Brain development in fetal life and early infancy is critical to determine lifelong performance in various neuropsychological domains and behaviour. It has been observed that the last trimester of pregnancy is un-arguably the most important period of neuronal determination, synaptogenesis and dendritic arborization. Thus, differences in

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the intrauterine environment (including mothers' nutritional status), at different stages of fetal life, may substantially determine long term neurodevelopment and brain structure and function. Furthermore, it has been shown that prevalent metabolic pathologies such as overweight, obesity, and gestational diabetes in pregnant women are increasing risk factors that may adversely affect long-term brain development in their offspring. The idea that the mothers' metabolic status and their diet could have an influence on long-term mental performance, has major implications for public health practice and policy development, and for our understanding of human biology, as well as for food product development, economic progress, and future wealth creation. Different results from NUTRIMENTHE EU Project (www.nutrimenthe.eu) demonstrated that poor maternal thyroid function or iodine deficiency during pregnancy, are important risk factors for children's brain development. The results have also shown that children born to mothers who did not use folic acid supplements during the first trimester of their pregnancy had a higher risk for brain growth impairment and total behaviour problems at 18 and 36 months. In addition, folate supplementation during pregnancy improves children's ability to solve response conflicts, giving better attention abilities. It has been confirmed that seafood intake during pregnancy higher than 340 g/week determine higher mean scores on Verbal Comprehension, Working Memory and Speed Processing in the offspring at 8 years. Regarding LC-PUFAs, an important finding has been that FADS1 and FADS2 gene polymorphisms are an important factor determining maternal n-6 and n-3 fatty acid levels and fetal supply during pregnancy, and so, determining long-lasting effects. On the other hand, offspring to mothers with metabolic pathologies differ in their neurodevelopmental profile and evolution. Children born to mothers with pre-gestational obesity had a temporary accelerated development of cognition and language, followed by a rapid deceleration until 18 months of age, particularly of language scores; however, further confirmative studies to explore possible placental and neurodevelopmental mechanisms involved are needed. The understanding of the mechanisms associating early nutrition and later health of the brain developmental outcomes may have an enormous preventive potential, given the major public health implications, including opportunities for an improvement of cognition and an effective primary prevention of childhood and adult behaviour and mental diseases. In addition, successful promotion activities for better early nutrition will therefore be highly cost-effective.

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The role of maternal nutrition in programming of chronic disease in her offspring

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The metabolic and nutritional environment in which a fetus grows and develops can account for up to 80% of variations in birth weight and body composition. This is important as it can not only determine immediate viability but also impact on long-term metabolic health and well-being. A major challenge to contemporary women is increased fat mass as obesity is associated with increased risk to a range of complications in pregnancy as well as preterm birth and increased incidence of large for gestational age infants.

The precise nutritional requirements through pregnancy are not well-defined and a number of intervention studies are currently examining whether dietary intake can be improved in obese women. One of the most widely adopted nutritional interventions is for folic acid in the prevention of neural tube defects. The extent to which the requirements for both folate and other essential vitamins and minerals may change through gestation and be reset by current diet and body mass remains to be established. At the same time maternal food preferences can change through gestation especially in early pregnancy when nausea and vomiting are not uncommon. However, the extent to which the daily intake of nutritional supplements can be consumed and tolerated by the mother, especially in later pregnancy remains a key challenge in this area. Food intake normally increases during lactation when there is the potential to supplement the mothers diet with nutrients that could be passed onto her offspring via the milk. These could thus modulate body composition of the infant as well as improving metabolism in the mother as lactation represents an ideal time for the mother to lose weight.

Apart from direct inheritance and the effects of a shared environment, maternal health and eating habits and diet affect offspring health by developmental programming. Suboptimal maternal nutrition (i.e. either a reduction or an increase above requirements) or other insults experienced by the developing fetus can induce significant changes such as in adipose tissue and brain development, energy homeostasis and the structure of vital organs. These can produce long lasting adaptations that influence later energy balance and increase the susceptibility of that individual to obesity and the components of the metabolic syndrome.

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Metabolic benefits of Palatinose™ are related to gut hormone induced metabolic responses

Andreas F. H. Pfeiffer, Charité Berlin and DIfE Potsdam, Germany

Excessive sugar intake exacerbates the risk of type 2 diabetes (T2DM) and non- alcoholic fatty liver disease (NAFLD). Palatinose™, is a 1,6-linked glucose-fructose dimer which improved glucose homeostasis and insulin sensitivity and prevented NAFLD compared to 1,2-linked sucrose in mice (1). The prevention of insulin resistance and of NAFLD were closely linked to the stimulation of the incretin hormone Glucose-dependent Insulinotropic Peptide (GIP) as shown in GIP-receptor knock out mice. In humans, treatment with GIP in doses which mimic the postprandial state increased adipose tissue inflammation by acting on GIP receptors located in fat cells and macrophages (2) We compared effects of these sugars on GIP and glucagon-like peptide-1 (GLP-1) secretion in prediabetic and diabetic participants and observed beneficial metabolic effects of Palatinose™ in humans.

We therefore propose that Palatinose™ increases postprandial insulin sensitivity and hepatic insulin extraction by altering incretin responses in humans and rodents. Since Palatinose™ is completely resorbed, these data demonstrate that neither glucose nor fructose themselves are detrimental but rather the metabolic and hormonal context due to the large GIP-incretin responses to sucrose. Our data explain an incretin mediated metabolic mechanisms of low glycemic index foods.

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The role of low glycemic diets on physiological and metabolic outcomes

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Diet plays an important role in our lives. It plays an even more significant role in diabetes and obesity. Carbohydrates rich diets are the principal source of energy and protein for nearly half the world's population. The Asian region has the unenviable reputation as being the epicenter for diabetes and related chronic diseases. It is estimated that diabetes and impaired glucose tolerance incidence rates will increase by up to 60% by 2025 compared with 2007 levels.

Numerous cereals and tubers are rich in carbohydrates and high glycemic index. Food Chemists have typically categorized dietary carbohydrates into simple sugars and complex carbohydrates on the basis of their degree of polymerization. However, the effect of Carbohydrate on health may be better categorized according to their physiological effects, notably their ability to raise blood glucose. Carbohydrate foods that increase blood glucose rapidly are called High Glycemic index foods. This concept is now defined as the Glycemic Index (GI). Using Experimental and clinical intervention studies, the presentation will highlight how carbohydrate rich foods can be manipulated to minimize glucose response in the human body. The presentation will also focus on how the Asian phenotype coupled with the consumption of high GI diets is precipitating the growing burden of diabetes and obesity. Scientists, clinicians, food manufacturers and consumers would gain great benefit by understanding and selecting low GI foods in their battle to reduce the risk of developing type 2 diabetes and obesity.

How prebiotic fibres can work in gut microbiota, glucose metabolism and metabolic disorders

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Obesity is characterized by a cluster of metabolic disorders involved in the development of cardiometabolic diseases (i.e., insulin resistance, diabetes, hepatic steatosis, inflammation).

We and others have shown that bacteria that reside in our gut are dialoguing with host cells and thereby contribute to the regulation of energy, glucose and lipid homeostasis. Changes in the gut microbiota composition and or the activity of specific microbes may be obtained by using specific dietary compounds such as prebiotics.

We have contributed to the demonstration that prebiotics such as oligofructose and/or inulin can modulate host metabolism. Over the last 15 years, different mechanisms have been proven in both pre-clinical and clinical studies. Their potential relevance in the management of obesity and related metabolic disturbances will be evaluated.

Among the mechanisms, the production of bioactive compounds (including short-chain fatty acids or lipid metabolites), which interact with host cellular targets to control energy metabolism and immunity have been found. Prebiotic-induced change in the gut microbiota increases gut peptides involved in appetite regulation, glucose metabolism, energy homeostasis and gut barrier function (e.g., GLP-1, PYY, or GLP-2). Other mechanisms such as metabolic endotoxemia, changes in gut barrier function (e.g., antimicrobial peptides production, mucus layer thickness, immune system) or altered endocannabinoid system tone will be discussed.

Finally, the role of prebiotics on Akkermansia muciniphila, a key bacteria playing a major role upon obesity, diabetes and inflammation, will be discussed in both mice and humans approaches.

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Evaluation of Drinks Contribution to Energy Intake in Summer and Winter

Olga Malisova1, Vassiliki Bountziouka1, Antonis Zampelas1,2 and Maria Kapsokefalou1

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Except water, drinks, apart from hydrating, they also provide nutrients and energy. The aim of the present study was to investigate the contribution of drinks to total energy intake in summer and winter. Data were obtained using the Water Balance Questionnaire (WBQ) from a sample of the general population in Athens, Greece (n = 984). 473 individuals (42 ± 18 years of age) were recruited in the summer and 511 (38 ± 20 years) in the winter stratified by sex and age. The WBQ embeds a semi-quantitative food frequency questionnaire of 58 foods and the Short International Physical Activity Questionnaire. Data were analyzed for the contribution of drinks to total energy intake. In the winter months, total energy intake was 2082 ± 892 kcal/day; energy intake from drinks was 479 ± 286 kcal/day and energy expenditure 1860 ± 390 kcal/day. In the summer months, total energy intake was 1890 ± 894 kcal/day, energy intake from drinks 492 ± 499 kcal/day and energy expenditure 1830 ± 491 kcal/day. Energy intake from drinks in summer was higher than in winter ($p < 0.001$) and in men higher than in women in both seasons ($p < 0.001$ in summer, $p = 0.02$ in winter). Coffee, coffee drinks, milk, chocolate milk and alcoholic drinks contributed approximately 75% of energy from drinks. Fruit juice and sugar-sweetened drinks, including soft drinks and fruit juice based drinks, were consumed less frequently contributing up to 25% of drink energy intake. Drinks contribute approximately 1/4 of total energy intake depending on the energy content of the drink and frequency of consumption. Coffee, dairy and alcoholic drinks were the main energy contributors.

Exercise and Energy Balance: When expectations meet regulation.

Éric Doucet, PhD,School of Human Kinetics, University of Ottawa, Canada

Introduction: Diet and exercise are at the cornerstone of interventions aimed at improving body weight control. However, changes in body weight in response to exercise interventions are often much less than anticipated.

Objectives: To provide an overview of the short and long-term effects of structured exercise on energy intake, expenditure and body weight.

Methods: Review of the literature.

Results: The effects of exercise on energy balance and consequently on body energy stores are often mitigated by concomitant changes in energy intake and energy expenditure. Recent systematic reviews report that although compensation to exercise induced energy expenditure is only partial at first; it seems to gravitate around 100% for longer interventions. Similarly, more detailed interventions have shown that structured exercise interventions often produce decreases in non-structured physical activity energy expenditure. On the other side of the energy balance, exercise has been shown to produce short-lived anorectic effects. Nonetheless, as demonstrated by Jean Mayer more than 60 years ago, increased exercise energy expenditure produces parallel adjustments in caloric intake in both animals and humans alike, so that body energy stores remain relatively stable over time. These adjustments in energy intake likely occur through a combination of changes in appetite and food hedonics, that in the end interact to protect energy stores from being depleted.

Conclusions: Although the regular practice of exercise produces a wide-array of positive health outcomes, available literature seems to support that its effects on energy stores are likely counterbalanced by important changes in feeding responses as well as a decrease in non-structured physical activity.

Symposium: Relationship between food and beverage intake and physical activity: an overview

(sponsored by: COCA COLA COMPANY)

Brown adipose tissue and exercise: Beyond energy balance

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The adipose tissue comprises the white (WAT) and brown adipose tissues (BAT), the first one storages energy as triacylglycerols and its excess produces metabolic dysfunction and obesity; and the second, which its presence in adult humans was discovered in 2007, dissipates energy as heat through the mitochondrial uncoupling protein-1 (UCP-1) that stimulates the thermogenesis. Recently, a new kind of adipocytes called BRITE (BRown-like adipocytes in whITE adipose tissue) or beige adipocytes have has been identified within WAT; these cells arise from the same origin as white adipocytes, but they also share characteristics with those of brown adipocytes as the expression of UCP-1. Targeting an increase in energy expenditure and a reduction in energy intake are the unavoidable ways of combating obesity. However, all anti-obesity drugs currently approved in most developed countries produce severe side effects, and the treatments are difficult comply with. As BAT dissipates energy, due to its ability to oxidize glucose and lipids, recruitment and activation of BAT might be a therapeutic target for treating metabolic disorders such as obesity and type 2 diabetes. BAT is stimulated by the sympathetic nervous system (SNS); however, there are some novel BAT activators, some of them myokines, which act independently of the SNS, such as cardiac natriuretic peptides, irisin, interleukin-6, β-aminoisobutyric acid and fibroblast growth factor 21, that could influence BAT metabolism. Recently, we have postulated that exercise might activate and recruit human BAT through activation of SNS, heart and skeletal muscle. Thus, exercise could induce browning of the WAT and activate BAT,

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which in turn would results in increased thermogenesis and energy expenditure with concomitant loss of fat mass. We are currently carrying out a study (ACTIBATE) to evaluate the effect of long-term exercise training (24 weeks) on BAT activity and quantity in young overweight and obese adults.

Cheese and metabolic diseases

Arne Astrup, Department of Nutrition, Exercise and Sports, University of Copenhagen, Denmark.

Introduction: Current recommendations to reduce the intake of saturated fat to prevent cardiovascular disease (CVD) are seriously questioned by meta-analyses of both observational studies and randomized controlled trials showing no adverse effect of saturated fat. However, observational studies find robust inverse associations between intake of dairy and obesity, type 2 diabetes and CVD, and fermented dairy may play a special protective role.

Objective: Our aim was to elucidate mechanisms by which the cheese food matrix influences the cardio-metabolic response to saturated fat.

Results: In a series of studies we found that calcium in cheese interferes with fat digestion and absorption in the intestine, and fecal fat excretion is enhanced (~ 1,000 mg Ca increases fecal fat excretion by 4-5 grams/d). In controlled feeding studies in pigs and humans we have shown that feeding a high-fat diet enriched with dairy calcium minerals as compared with a diet with a similar saturated fat content markedly lowers the increase plasma total cholesterol and LDL-cholesterol, but not HDL-cholesterol. In the human study, total cholesterol and LDL-cholesterol concentrations were 6% ($P<0{\cdot}002$) and 9% ($P<0{\cdot}03$) lower after the dairy minerals compared with the control period. By enrichment of milk with calcium to mimic the content of cheese we could show that the high calcium contents of cheese is the predominant factor for these effects. The LDL-cholesterol lowering effect correlated with the increase in fecal fat excretion. These short-term studies indicate that the addition of milk minerals to a high-fat diet attenuates the increase in total cholesterol and LDL-cholesterol concentrations, without affecting HDL-cholesterol concentration.

Conclusion: Although dairy today is know not to increase CVD, cheese seems to exert a cardio-protective effect, and the mechanism seems to be in the matrix, where the high calcium content play an important role. Cheese should be recommended as an essential part of a heart-healthy diet.

Symposium: Regular Fat Dairy Foods in Nutrition and Health: The Latest Insight

(sponsored by: Various (inter)national Dairy Organizations)

Saturated fat and cardiovascular risk

Benoît Lamarche, Jean-Philippe Drouin-Chartier, Patrick Couture, Institute of Nutrition and Functional Foods, Laval University, Québec City, Canada.

Research over the last decades has provided insightful but sometime discordant information as to the role of dairy foods in health. Because high-fat dairy products contribute significantly to dietary fat and saturated fatty acids (SFA) intake, and because SFA are so strongly believed to be involved in the etiology of cardiovascular disease (CVD), many guidelines advocate consumption of low-fat dairy products as opposed to products with higher fat content. Yet, the association between SFA and the risk of CVD remains highly controversial. Meta-analysis of data from early intervention studies has suggested that replacement of dietary SFA by PUFA (mostly linoleic acid) reduces the risk for CVD. On the other hand, meta-analyses of population studies have failed to find an association between dietary SFA intake and the risk of CVD. A systematic review of evidence from epidemiological studies indicated that intake of total dairy, low-fat dairy, cheese and fermented dairy is associated with a reduced risk of stroke. Consumption of total dairy, low-fat dairy and milk specifically may be associated with a lower risk of hypertension. A large clinical trial on dairy intake and clinical outcomes such as CVD is highly unlikely in the future. In that context, interpretation of the association between dietary SFA from various dairy foods and health will always rely on indirect evidence from epidemiological data as well as from a thorough understanding of their impact on many cardiometabolic risk factors, not just LDL-C and blood pressure. We argue that focus on low-fat dairy products in current guidelines to limit dietary SFA intake is not justified by current evidence.

Nutritional interest of saturated fatty acid, the specific case of dairy fat.

Philippe Legrand, INRA-Agrocampus, Rennes, France.

Dietary saturated fatty acids (SFA) are usually associated with negative consequences for human health because of their negative impact on atherosclerosis biomarkers. However, experimental results on the relationship between doses, physiological effects, specificities and functions of individual saturated fatty acids are conflicting. Distinction among SFA has been made, the subgroup of lauric, myristic and palmitic acids considered the ones being atherogenic in case of excess. Moreover, recent research clearly reports that SFA have important and specific biological roles in the cell like protein acylation (N-myristoylation, S-palmitoylation). If we consider now the epidemiological approaches, recents meta-analysis and cohort studies all report the absence of any link between SFA and cardiovascular risk, which completely reverses the old dogma on deleterious effects of saturated fat. As a consequence, a new balanced view is needed in term of potential nutritional benefits of SFA, and subsequently a reassessment of the current nutritional dietary recommendations, as recently done in France with the ANSES opinion.

More specifically, dairy fat appears protective for some aspects of metabolic syndrome and type II diabetes, suggesting that the richness and variety of fatty acid including short , middle chain, minor fatty acids like trans-palmitoleic acid, and conjugated fatty acids, induce specific and protective functions.

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Regular fat dairy products and diabetes type 2: the role of dietary fats and their food sources

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Introduction: Dietary fats could affect glucose metabolism and obesity development, and may thereby have a crucial role type 2 diabetes (T2D) etiology. Studies indicate that replacing saturated fats with unsaturated might be favorable in T2D prevention, and that plant foods might be a better choice than animal foods. Nevertheless, epidemiological studies suggest dairy foods to be protective.

Objectives: In order to clarify the role of dietary fat in T2D development, we examined dietary fat, and its food sources classified according to fat type and fat content.

Method/Design: The study included 26,930 individuals (61% women), 45-74 years, from the Malmö Diet and Cancer cohort. Dietary data were collected with a modified diet history method. During 14 years follow-up, 2,860 incident T2D cases were identified.

Results: Total intake of high-fat dairy products (regular-fat alternatives) was inversely associated with incident T2D (HR for highest (median=8 portions/day) vs. lowest (median=1 portion/day) quintile: 0.77; 95% CI: 0.68, 0.87; P-trend<0.001). Most robust inverse associations were seen for intakes of cream and high-fat fermented milk (P-trends<0.01), and for cheese in women (P-trend=0.02). High intake of low-fat dairy products was associated with increased risk, but this association disappeared when low- and high-fat dairy were mutually adjusted (P-trend=0.18). Both high intakes of high-fat (P-trend=0.04) and low-fat (P-trend<0.001) meat were associated with increased risk. Finally, we did not observe significant association between total dietary fat content and T2D (P-trend=0.24), but intakes of saturated fatty acids with 4 to 10 carbons, lauric (C12:0) and myristic acid (C14:0) were associated with decreased risk (P-trends<0.01).

Conclusions: The decreased risk of T2D at high intake of high-fat dairy products, but not of low-fat dairy products, suggests that dairy fat partly could have contributed to previously observed protective associations between dairy intake and T2D. Meat intake was associated with increased risk independently of fat content.

Symposium: Beyond Nutritionism: Insights from sociology, economics and food choice analysis to elicit dietary changes

(sponsored by: Danone Nutricia Research)

Analysis of food choice dynamics to improve nutrition and health

Esteban Carmuega, CESNI, Center of Studies on Infant Nutrition Buenos Aires Argentina.

Argentinean population experiences a low calcium and dairies ingestion. Upcoming dietary guidelines recommend 3 servings of dairies a day, while available data show that 68% of adults do not reach a consumption of 2 servings daily. Food surveys available in the country show that calcium intake decreases with age at 5 year-old as a consequence of a reduction in the amount of dairy servings consumed. This reduction results in a high proportion of individuals with calcium intakes below recommendations (26% of preschoolers, 66% of children at school age, 69% of adolescents, 68% of adults and 74% of elderly population).

Data from a CESNI study show that the drop in calcium consumption starts at school age and is driven by a reduction in milk consumption at breakfast and mid-afternoon snack.

A tool was developed to determine the substitutability of different foods and beverages as a function of amount, frequency and moment of consumption, aiming at improving diet quality. When this tool is run on adult women population, it comes out that it is feasible to increase dairies' consumption by replacing 20.7% of the infusions, 16.3% of bakeries and pastries, and 0.4% of beverages at breakfast; 22.3% of the infusions, 16.4% of bakeries and pastries, and 1.5% of beverages at mid-afternoon snacking; and 4.7% of the infusions, 3.3% of bakeries and 3.2% of beverages between meals.

If the substitution is performed on adult women population to replace a yogurt low in sugar and fat and fortified in calcium by infusions, bakeries and pastries, it shows up that the consumption of free sugars and fat decreases in 10% while calcium intake doubles and the intake prevalence below EAR shifts from 64% to 11%.

This tool applied on representative samples of the population may be useful to provide a realistic scenario of the potential changes of the dietetic pattern as a consequence of educational interventions.

Using economic modeling to assess the impact of food policies on nutrition and health

Louis-Georges Soler, INRA-Aliss, France

In the last decade, economic modeling has been widely used to assess nutritional policies. Indeed, most actions aiming at changing consumers behaviors may affect market mechanisms. For instance, information campaigns or advertising regulation may modify the de-

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mand of healthy vs. unhealthy products and then their prices, which can finally affect the consumers' intakes. Taxing some products may induce substitutions between and within food categories by consumers, or influence firms' strategies in prices or product quality, which must be taken into account for a full assessment of this type of policy. The first part of the communication will be devoted to a review of this field of research dealing with ex ante and ex post evaluation of nutritional policies.

More recently, a new step has been initiated through the matching of economic and epidemiological models. The goal is to go beyond the assessment of nutritional policies in terms of food and nutrient intakes and estimate the health benefits induced by these policies. In the second part of the communication, we will give an example of these new approaches whose final goal is to conduct benefit-cost analyses of nutritional policies.

This example deals with the impacts of the adoption of nutritional recommendations by consumers. The effect of consumers' compliance with nutritional recommendations is uncertain because of potentially complex substitutions. To lift this uncertainty, we designed a model of consumer behaviour under rationing. Dietary adjustments are derived from information on consumer preferences, consumption levels, and nutritional contents of foods. Simulations are conducted to estimate how consumers would modify their diets to respond to various nutritional recommendations, and these adjustments are translated into health outcomes through an epidemiological model. This allows for the ex-ante comparison of the efficiency, equity and health effects of nutritional recommendations.

Symposium: Can snacking be satisfying and also positively healthy?

(sponsored by: DANONE)

Positive contribution of healthy snacking to daily energy and nutrient intake

Angelo Tremblay, Department of Kinesiology, Laval University, Quebec, Canada

Snacking is a practice that has the potential to improve physical and cognitive performance via an optimal supply of nutrients. Healthy snacking can also improve the regulation of some metabolic processes, e.g. glycemic stability, that influence appetite control. Some studies showed that snacks are associated to increased intakes of vitamins and minerals. Conversely, snacks mainly composed of high fat - high sugar - high energy dense foods reduce diet quality and can induce overfeeding. This excess energy intake may even be accentuated when snacks are taken in a context of mindless consumption such as watching television. Postprandial fullness and satiety are influenced by a variety of factors including the texture and macronutrient content of food: firmer food structure as well as protein and carbohydrate rich food being more effective. Numerous studies have investigated the impact of snacking on appetite control and they generally demonstrated that hunger is decreased at the subsequent meal after snack ingestion. However, it has not been shown that this hunger - reducing effect necessarily results in a global negative energy balance. Our research experience reveals that a yogurt snack containing a high relative content of whey protein can produce a "negative calorie effect", i.e. a decrease in subsequent energy intake that exceeds the energy content of the yogurt. When these observations are globally considered with the preoccupation to favorably influence body weight stability, one may reasonably deduce that snacking can promote beneficial or detrimental effects on energy balance depending on its composition. This is consistent with the fact that available literature does not provide evidence of clear relationship between snacking and overweight. In conclusion, snacking might represent a practice that positively contributes to appetite control provided that it focusses on healthy foods.

Appetite in Context: Key Constructs and their Situational Determinants

Jason Haltford, Robinson, United Kingdom.

Across the day eating behaviour (at and between meals) is controlled by a complex array of signals that stimulate, sustain, terminate and then inhibit further consumption. The episodic flux of these signals, along with the tonic demand driven by energy storage and metabolism, are ultimately driven by biological need. In understanding appetite control it is import to recognise key concepts. Hunger is the drive to consume, eliciting and sustaining a behavioural response (eating) to a biological need. Hunger is physiologically regulated but also has a strong habit and situational context. Wanting is the hedonic motivation to consume a specific food, manifesting explicitly is the desire to consume a specific food (conscious cognitive element) and implicitly through incentive salience, a motivation for immediate action (unconscious urge). Cravings, which generally focus on specific foods or tastes ('something sweet'), are an important manifestation of wanting associated with caloric restriction. Liking is the sensory pleasure elicited by contact with food, which contributes to the hedonic motivation to consume (i.e. wanting). It relates to the intrinsic hedonic quality of food and the pleasing sensory experience (palatability) during consumption.

Eating behaviour, and subjective experience of appetite, is also shaped by the external environment. If that environment promotes excessive consumption, individual efforts to control their eating behaviour can become compromised. Appetite regulation appears easily overwhelmed by environmental cues to over-consume and these ubiquitous in the modern day environment. There are a number of drivers of consumption related to specifically to food. Sensory signals, such as smell, taste and texture of food alongside cognitive factors, such as expectation of palatability or satiation based on previous experiences, are important in both triggering (cephalic phase) and terminating consumption. Palatability exerts strong influence on meal size and eating rating delaying satiation and even physical feelings of fullness within a meal. Food variety, choice and in particular, portion size is an important determinate of intake during snacks and main meals. Social and situational factors also appear to be particularly important. Both environmental distractors and eating style of others directly influence the individual during eating occasions. Likewise, social norms shape

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the size of snacks and meals that individuals consume. Moreover, an emerging interpretation of key external influences on meal size (e.g. social influence, portion size) is that they guide food intake by providing consumers with normative information about what constitutes an appropriate amount to eat. To conclude appetite expression is readily influence, and occasionally over whelms by sensory, social and situational factors. This necessitates an understanding of appetite beyond biological regulation.

Encouraging healthy snacking in children

Luis Alberto Moreno Aznar, Prof. Public Healthof Zaragoza, Spain

Snacking can be defined as any food eaten outside the main meals (breakfast, lunch and dinner). Snacking is often perceived as having negative effects on health; however, at least structured snacking occasions (mid-morning and mid-afternoon snacks), may be beneficial for hunger management, facilitating the adjustment of energy intake to requirements. In terms of eating habits, an adequate number of meal occasions is a key determinant of healthy dietary patterns along the day and is associated with a reduced risk of different conditions such as obesity. It is recommended children should consume at least the three main meals, and two snacks, one in the mid-morning and one in the mid-afternoon. In children, snacking seems to have increased in the recent years; however, we cannot establish clear conclusions on the issue, as there is no an agreed definition of snacking. A variety of approaches have been used in the literature to define/classify snacking. These approaches include nutrient profiling, time of food consumption, food clusters, meal frequency, self-designation by consumers and also hybrid definitions. The majority of the recommendations focus on the choice of snacks rather than frequency of consumption. Healthy food options should be promoted for snacking; however, in Europe, pre-schoolers are frequently engaged in unhealthy energy balance related behaviours, including unhealthy snacking. These unhealthy behaviours are potential risk factors for developing obesity. In obesity prevention programmes developed for pre-school and school age children, healthy snacking has been identified as one of the most important energy balance related behaviours to be targeted. The ideal composition of snack meals to be recommended remains to be agreed; however, it should include water and 2 or 3 items chosen among fruits, milk or dairy products, and cereal based products.

Symposium: Targeted approach in nutrition to address risk factors in metabolic syndrome

(sponsored by: DSM)

Nutrition to reset the metabolic syndrome: How does it work

Andreas F.H. Pfeiffer, Dept. Endocrinology, Diabetes & Nutrition, Charité University Medical School Berlin and German Instute of Human Nutrition, Potsdam, Germany

The metabolic syndrome describes the coincidence of overweight or obesity with disturbances of lipid and sugar metabolism and hypertension. Subclinical inflammation and fatty liver are further components typically associated with this condition. Weight loss is a highly effective treatment to improve most components of the metabolic syndrome but is not successfully achieved in the longer term in Western societies. Therefore, nutrients improving metabolism without significant weight loss may represent an alternative strategy. This may be achieved by targeting nutrient sensors such as hormonal systems, inflammatory receptors and nutrient sensitive transcription factors. Among the hormonal systems, incretins are realistic targets due to their differential location in the gut. The GIP-system appears to trigger increased inflammation and fatty liver in overweight or obese subjects. Nutrients which bypass the GIP-releasing K-cells in the upper intestine represent a suitable strategy which can be achieved with alpha-glucosidase inhibitors or slowly cleaved sugars such as isomaltulose. This strategy may additionally increase the release of advantageous incretins such as GLP-1 or PYY. This strategy has been used successfully in humans and was shown to improve lipid metabolism in longer term trials. Moreover, significant effects on hepatic glucose production were shown in type 2 diabetic humans. The low Glycemic Index (GI) concept appears to involve some components of incretin modulation but is also affected by gastric emptying and therefore appears to involve several mechanisms. However, low GI foods reduced inflammation in several studies by unknown mechanisms which are unrelated to lipid metabolism. Among the nutrient sensitive transcription factors the Carbohydrate Response Element Binding Protein, ChREBP, is a hepatic and adipose tissue target of specific fatty acids which inhibit its activity. ChREBP plays a prominent role in the development and maintenance of fatty liver in humans. Its inhibition should allow significant improvements of hepatic metabolism. In fact, a beneficial effect was reported in a human trial. Another target of significant interest is the innate immune system which is activated by free fatty acids in particular the TLR4 receptor possibly in combination with fetuin-A as a bridging molecule. These effects were demonstrated in mice, while the effects in humans still await further investigation. Benefits of polyunsaturated fatty acids were observed in numerous human trials and shown to reduce cardiovascular disease in exchange for saturated fats. Long chain n3-fatty acids elicit powerful TLR-4 inhibitory effects in mice which may be helpful in inflammatory conditions in humans but need to be defined in more detail. Although obesity and energy balance are closely linked most pathologies nutritional approaches are powerful components to modify the metabolic syndrome and the disease risks associated with it beyond or in addition to improvements of energy balance.

Prevention and treatment of hypertension through a novel targeted strategy

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The benefit of treating hypertension, which affects1 billion individuals globally, in terms of decreasing stroke mortality in particular is well established yet despite major advances in the management of hypertension poor control rates are reported in up to 40% of treated adults. Further treatment (and prevention) strategies are thus an urgent priority. Convincing evidence supports an association between hypertension and a common C677T polymorphism in the gene encoding the folate-metabolising enzyme, methylenetetrahydrofolate reductase (MTHFR). Riboflavin (vitamin B2) in the form of FAD acts as a cofactor for MTHFR and molecular studies have indicated that the decreased activity associated with the variant enzyme appears to result from an increased propensity to dissociate from FAD. We previously reported that low-dose riboflavin can stabilise MTHFR activity in vivo in individuals homozygous for the polymorphism (TT genotype). We later reported that blood pressure was highly responsive to riboflavin in hypertensive adults with the TT genotype (with and without overt CVD) independent of the number and type of antihypertensive drugs taken. Most recently we investigated the role of the TT genotype on blood pressure throughout adulthood in a representative sample of Irish adults (n=5,200). Our data indicate that adults with the TT genotype are at risk of hypertension at an earlier age compared to those without the polymorphism and that an optimal riboflavin status may protect against the onset of hypertension in this genetically at risk group, who represent from 3 to 32% pf populations worldwide. Although poor riboflavin status, based on dietary intake data, is not generally considered a problem in developed countries biomarker evidence is emerging to suggest that suboptimal riboflavin status may be more prevalent than generally reported. Further studies are needed to investigate riboflavin status in different populations and the role of this gene-nutrient interaction in blood pressure.

Role of nutrition in non-alcoholic fatty liver disease

Szabolcs Peter, Peter Weber, DSM Nutritional Products, Kaiseraugst, Switzerland

Fatty liver is a global and unresolved public health issue, which encompass a wide spectrum of liver tissue injury, ranging from steatosis to steatohepatitis, fibrosis and cirrhosis. We differentiate alcoholic fatty liver disease caused by heavy alcohol consumption from non-alcoholic fatty liver disease (NAFLD) which is the result of ectopic fat accumulation in the liver. NAFLD patients may develop non-alcoholic steatohepatitis (NASH) which is a progression of steatosis to liver cell injury and inflammation in addition to excessive fat accumulation. About 15-20% of NASH patients will even develop liver cirrhosis, which is a considerable risk factor for hepatocellular carcinoma, cardiovascular and liver death. During the past decade NAFLD has become the most common cause of chronic liver disease in Western countries and is predicted to become also the most frequent indication for liver transplantation by 2030. There is emerging evidence that NAFLD affects extra-hepatic organs and regulatory pathways in a complex interplay which may increase the risk of type 2 diabetes mellitus, cardiovascular and chronic kidney diseases. Furthermore, NAFLD is frequently associated with obesity, dyslipidaemia, insulin resistance and type 2 diabetes mellitus. Its prevalence can reach 86% in obese persons, but it can also be observed in 16% to 20% of normal weight individuals. With advancing age biochemical and histological changes in subjects with fatty liver are reported to be more severe. So far no drug treatment has been established for patients with fatty liver disease. However, nutrition is considered as an important element in reducing the risk to develop NAFLD as well as impacting on established NAFLD and NASH. Besides general dietary interventions such as normalizing caloric intakes to reduce overweight and the respective metabolic consequences there is in addition encouraging data that particular micronutrients such as vitamin E can beneficially impact the course of fatty liver disease. Vitamin E has been shown in several randomized clinical trials (400-800 IU vitamin E/day) to improve biochemical, pathophysiological and histological status of NAFLD/NASH patients. Concerning the underlying mechanism of action, vitamin E, an essential antioxidant and a powerful peroxyl radical scavenger, might reduce oxidative stress along with consequent cellular injury and chronic inflammation. In conclusion, there is encouraging evidence that micronutrients such as vitamin E can benefit patients with NAFLD/NASH which is of particular value as there is no drug treatment established yet.

Targeting plasma and liver triglycerides

Philip C. Calder, Faculty of Medicine, University of Southampton, Southampton, United Kingdom

Triacylglycerols (aka triglycerides; TGs) are complex lipids comprising 3 fatty acids esterified onto a glycerol backbone. TGs are the main form in which fatty acids are found in the diet, stored in adipose tissue, and carried in the bloodstream. Circulating TGs are carried mainly as components

of one of two lipoproteins, chylomicrons and very-low-density lipoproteins (VLDLs). Chylomicrons carry TGs of dietary origin and are produced by enterocytes; hence their concentration increases in the first few hours of the post-prandial period, the extent of the increase being partly determined by the fat content of the meal. Chylomicron clearance is promoted by insulin release and subsequent up-regulation of lipoprotein lipase in adipose tissue, where the fatty acids are stored as TG. The resulting TG-poor chylomicron remnant is cleared by the liver. VLDLs carry TGs of hepatic origin; VLDL clearance is also mediated by lipoprotein lipase. Exactly where this happens is dependent upon physiological state. TG removal from VLDLs results in production of intermediate and then cholesterol-rich low-density lipoproteins which are cleared by the liver. The fasting TG concentration (mainly VLDL) in healthy young adults is typically between 0.5 and 1 mmol/l. This concentration is elevated with ageing, obesity and type-2 diabetes. Obese subjects and type-2 diabetics show elevated TG responses to a meal, consistent with insulin resistance reducing chylomicron TG clearance. Both elevated fasting TG concentration and an elevated post-prandial TG response are considered to increase risk of cardiovascular disease. Because glucose can be converted into fatty acids in the liver and these fatty acids can be released into the circulation as VLDL TG, a high carbohydrate diet can result in an elevated fasting TG concentration and paradoxically fasting TGs may be lower on a high fat diet. Hepatic accumulation of TGs can occur due to a high flux of fatty acids to the liver as occurs in insulin resistant states or to high hepatic de novo fatty acid synthesis from carbohydrate. Ultimately such hepatic TG accumulation can become harmful

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(fatty liver disease) and the progression to a more pathological state is accelerated by hepatic oxidative stress and inflammation. Nutritional strategies can be used to control both fasting and post-prandial TG concentrations and recent studies have also demonstrated effects on liver fat. The most promising strategy is the use of long chain omega-3 PUFAs derived from fatty fish (EPA and DHA). EPA and DHA are present in fish oil and fish liver oil supplements, in some algal oils and in concentrated pharmaceutical forms. Chronic administration of EPA+DHA is able to lower fasting TG concentration; this effect is well described and is dose-dependent with 2 to 4 g of EPA+DHA per day lowering fasting TG by as much as 30%. Some pharmaceutical preparations of EPA+DHA are licensed for use in TG lowering. The exact mechanism for TG lowering is not clear but it seems to involve enhanced portioning of hepatic fatty acids towards beta-oxidation and away from TG synthesis and incorporation into VLDL. Chronic administration of EPA+DHA has been shown in some studies to lower the post-prandial TG response to a high fat meal, perhaps reflecting increased insulin sensitivity of adipose tissue. EPA and DHA are also anti-inflammatory. Through effects on fatty acid and TG metabolism, insulin sensitivity and inflammation EPA and DHA may lower the risk, progression and severity of non-alcoholic fatty liver disease (NAFLD) and they may also be a therapeutic option for this condition. A recent study demonstrated that 3.6 g of EPA+DHA daily for 18 months could lower liver fat in patients with NAFLD. The effects were ascribed to DHA, a conclusion supported in part by another recent study with DHA in children with NAFLD also demonstrating a reduction in liver fat. These studies indicate the promise for omega-3 PUFAs in prevention and treatment of fatty liver disease.

Symposium: Hydration and its importance for daily life and health

(Sponsored by: European Federation of Bottled Waters(EFBW))

Fluid intake of adults in Europe: are we optimally hydrated?

Isabelle Guelinckx, Danone Nutricia Research. Palaiseau. France.

Recent research has demonstrated that a low fluid intake in the short term can impair cognitive function (1). In the long term a low fluid intake has been associated with an increased risk of the development of chronic disease (2), whereas a high water intake seems to have a potential protective effect on the kidney (3). However the relevance of this research for the general population is seldom pointed out since few food surveys report on total water intake (water from food moisture and fluids) or fluid intake (drinking water and beverages). Even fewer studies actually assess with biomarkers such as urine osmolality the hydration status in a sample representative of the general population. Consequently the proportion of individuals meeting the dietary reference intake of total water intake is rarely identified, let alone the proportion of individuals being optimally hydration. An inadequate water intake is nevertheless a concern as reported by recent publications: in 6 European countries the proportion of adult individuals at risk for an inadequate intake ranged from 24% (Germany) to 71% (France)(4).

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Drinking water and kidney diseases

Dr. Ivan Tack, CHU Toulouse. Toulouse. France.

Water is the main component of human body. Maintenance of body water compartment distribution is critical for cell volume and function, nutritive and depurative actions of interstitial volume and adjustment of plasma volume, the main determinant of long term regulation of blood pressure.

Water turn-over is variable, as both fluid intake and output may vary tenfold. Thus, maintenance of water balance relies on: 1) osmodetection, 2) regulation of Arginine Vasopressin (AVP) secretion that in turn modulates urine volume, 3) finally, adjustment of beverage intake under the control of thirst. As the body is unable to store excess of water, the inability to save body water (by the kidney) or to replace it (by drinking) results in dehydration responsible for osmotic stress.

Whereas water homeostasis is highly efficient to protect us against acute dehydration, little is known about the impact of daily water-saving in case of chronic low fluid intake (i.e. in low drinkers). Such a situation does not result in dehydration, but leads to mild but prolonged stimulation of AVP secretion and reduction of urine volume.

Prolonged renal water saving increases the risk of renal stone disease and, in women, the risk to develop recurrent urinary tract infection. Recently, epidemiological studies have linked both low fluid intake and low urine volume to the risk of chronic kidney disease.

Prolonged antidiuresis resulting from increased plasma AVP concentration is common in humans. Since AVP is also a stress hormone, this raises the question of its long term impact. There is growing evidence for relationships between antidiuresis, AVP and the risk to develop type 2 diabetes or components of the metabolic syndrome.

Medical knowledge in this field is only emerging. However, proofs of concept are already sufficient to encourage people to drink at least enough water to meet published dietary reference values.

Impact of mild dehydration in daily life

Nathalie Pross, Biotrial. Didenheim. France.

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There is a growing body of studies dealing with the effects of dehydration, which is mostly induced in athletes and soldiers using heat and/or exercise. However, few studies examined the proper effects of dehydration in everyday life. Using restricting water intake to induce dehydration appears to be the most appropriate method to mimic a normal daily situation. In a first study, we measured the effects of a mild dehydration induced by water deprivation over a 24-h period on several mood and cognition parameters in healthy young women. The results showed that mood state and sensation were significantly affected by dehydration but not cognition. More precisely, the first deleterious effects of dehydration were observed very early on in this study (i.e.; in the morning after 12–16 hours of fluid deprivation). These results showed that in everyday life, many people may experience mood impairments due to dehydration (e.g., people going to work or to school without breakfast, or busy working people skipping lunch or forgetting to drink during a busy working day). These results conducted to another study aiming to examine the effects of mild changes in water balance during normal activities of daily living. Habitual high-volume (≥2L/d) and low-volume (<1.2L/d) drinkers were asked to respectively decrease and increase their daily water intake during 3 controlled intervention days during which mood and sensation assessments were repeated several times. The results suggest that an increase or decrease in habitual water intake have, respectively, an improving or worsening effect on mood and sensations depending upon an individual's habitual drinking habits. Thus, even subtle changes in habitual fluid intake led to significant changes in mood states and physiological sensations. These results should encourage adopting optimal drinking habits (i.e.; ≥2L/d) in order to improve mood state.

Symposium: What, When & Why: The Interplay of Food, Physical Activity & Sleep in Healthy

(sponsored by: GENERAL MILLS)

Sleeping and feeding: healthy and unhealthy interactions

Eve Van Cauter, Ph.D., Sleep, Metabolism and Health Center, The University of Chicago

During the past decades, sleep curtailment has become an endemic behavior in industrialized countries. This trend for shorter sleep has developed over the same time as the dramatic increase in the prevalence of obesity. Prospective epidemiologic studies in children and adults are consistent with the concept that insufficient sleep results in an increased risk of weight gain. Sleep curtailment is associated with a dysregulation of the neuroendocrine control of appetite, with a reduction of the satiety factor leptin, an increase in the hunger-promoting hormone ghrelin and an increase in daytime levels of endocannabinoids. Thus, sleep loss may alter the ability of leptin and ghrelin to accurately signal caloric need, acting in concert to produce an internal misperception of insufficient energy availability, as well as promote hedonic feeding. In recent studies, it was shown that the increased hunger and appetite induced by sleep restriction leads to increased energy intake in the presence of ad lib feeding, particularly under the form of snacks. Studies using whole room indirect calorimetry have shown that sleep restriction does increase energy need, but only modestly. By comparison, the increased hunger and appetite reported by sleep-deprived subjects and their increased energy intake in the presence of ad lib feeding appear to exceed the energy demands of extended wakefulness under sedentary conditions. Moreover sleep-deprived individuals studies under controlled environmental conditions decrease their level of physical activity. There is recent evidence that extending sleep in adults who are habitual short sleepers due to voluntary bedtime curtailment may decrease appetite and desire for sweet and salty foods and facilitate adherence to and efficacy of a weight loss diet. Taken together, the current evidence suggests that chronic partial sleep curtailment, a novel lifestyle behavior that has developed with the advent of the 24-h society may be involved in the obesity epidemic.

What, when, and how much: eating patterns and their role in body weight control

France Bellisle, Centre de Recherche en Nutrition Humaine d'Ile de France Université Paris

Energy intake is undisputedly one critical factor allowing the maintenance of a healthy body weight. In order to understand and possibly control total energy intake, it is important to look at the various eating events during a typical day. Although traditional eating patterns, with relatively regular daily meals, still exist in many developed societies, snacking is reported in most people once or several times a day. The number of daily meals and snacks and their distribution over the waking hours are potentially important factors affecting total intake and weight outcomes. The recent "obesity epidemic" has been attributed to a growing trend for snacking. The present review will look at the accumulated evidence examining how energy ingested at various times of day, under meal or snack circumstances, differentially affects energy/nutrient intake and body weight control. Does eating more often affect energy intake favorably or adversely? Does energy consumed in the early hours allow a better or worse management of total daily intake? What aspects of the eating pattern will ultimately facilitate or counter weight management? How can we positively influence the "how much" from what we know at the present time about the "what" and the "when"?

We will never manage the obesity epidemic unless we develop a better understanding of energy balance

Steven N. Blair, P.E.D., Arnold School of Public Health, University of South Carolina

It is indisputable that obesity rates have been increasing in most countries around the world over the past few decades. The causes of

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this epidemic are complex and are not well understood. It is clear that persistent weight gain over time is caused by individuals being in positive caloric balance, consuming more calories than they burn on too many days. Therefore the obesity epidemic is due to too many people being in positive caloric balance, where their energy intake exceeds their energy expenditure. Although positive energy balance can be caused by increases in intake, decreases in expenditure, or a combination of the two; most of the attention in the scientific and lay press focuses on the intake side of the equation. This imbalance in attention to the energy expenditure side of energy balance and a major focus on the intake side is unlikely to produce policies, strategies, and tactics that will be effective in reducing the obesity epidemic. This lecture will include information on both sides of the energy balance equation and I will discuss current flawed strategies and make suggestions for new directions.

Symposium: Nutrient Profiling

(sponsored by: IGLO FOODS GROUP)

Nutrient Profiling: A tool to drive innovation

Ms Julie Watson, RNutr. Head of Nutrition, Iglo Foods Group Ltd

Nutrient profiling is "the science of classifying or ranking foods according to their nutritional composition for reasons related to preventing disease and promoting health". Nutrient profiling has been used for a variety of different purposes including the control of nutrition and health claims on foods and increasingly as a tool to control marketing of foods high in those nutrients of public health concern, to children.

It provides a mechanism to differentiate between foods that are more likely to be part of a healthy diet from those that are less likely to be. Although Nutrient profiling is a tool to categorize foods, not diets, it has been recognised by WHO as one tool that can be used through policy to improve the overall nutritional quality of diets.

For these reasons Iglo saw Nutrient Profiling as a mechanism to stimulate product design, identify opportunities to optimise the nutrient content of existing products and ultimately make it easier for consumers to access products that can be part of a healthy, balanced diet.

This talk will describe how the Iglo Nutrient Profiling Tool was chosen, its implementation, role in product innovation and recipe optimisation through product examples.

WHO Regional Office for Europe nutrient profile model (2015)

Nutrient profiling latest view: different schemes and applications

Mike Rayner, British Heart Foundation Centre on Population Approaches for Non-Communicable Disease Prevention, University of Oxford

Introduction: Nutrient profiling is defined by the World Health Organization as 'The science of classifying or ranking foods according to their nutritional composition for reasons related to preventing disease and promoting health'. Nutrient profile models are necessary (if only implicitly) for public health inventions which require distinguishing between the healthiness of individual foods as opposed to diets.

Objectives: The aim of this presentation will be to review different nutrient profile models and their applications.

Methods and results: A recent systematic review of existing models identified 119 different models, 54 which met minimum quality criteria. Models differ considerably in their design i.e. in their required inputs such as the particular nutrients for which compositional data are required, the number and types of food categories employed, and whether serving sizes are taken into account or not. Models also differ in their outputs: e.g. whether these are classifications or scores. Models have been developed for a range of different applications: food labelling, restrictions on food marketing, fiscal policies in relation to food and health, etc. Comparisons between models show that different models classify or rank foods in different ways even for the same application. Few models have been subject to testing for their validity.

Conclusions: As yet there is no gold standard method for comparing the outputs of nutrient profile models. There needs to be more research into the validity of nutrient profile models – particularly with respect to their predictive validity - i.e. whether or not consumers of foods that are classified or ranked as healthy under nutrient profile models have better health outcomes or not.

Nutrient profiling systems: potential contribution to primary prevention

Chantal Julia 1Université Paris 13, Equipe de Recherche en Epidémiologie Nutritionnelle (EREN), Centre de Recherche en Epidémiologie et Statistiques, Inserm (U1153), Inra (U1125), Cnam, COMUE Sorbonne Paris Cité, F-93017 Bobigny, France. 2 Département de Santé Publique, Hôpital Avicenne (AP-HP), F-93017 Bobigny, France

Nutrient profiling systems have been proposed for multiple applications: advertising regulations, taxing schemes and nutrition labelling. French public health authorities are considering the implementation of a five-category front-of-pack labelling system (5-colour nutrition label, 5-CNL) based on a nutrient profiling system, the Food Standards Agency nutrient profiling system (FSA score). The FSA score was shown to adequately characterize the nutritional quality of foods in the French context, and could serve as a basis for a 5-category labelling system, provided some adaptations of the algorithm to French nutritional recommendations were performed.

Beyond the classification of foods, studies were conducted to assess the capacity of the FSA score to characterize the nutritional quality of an individual's diet. An individual dietary index, the FSA-NPS DI was developed using the FSA score of the foods consumed and validated against food consumption, dietary intakes and biomarkers of nutritional status in two French cohort studies: the NutriNet-Santé and the SU.VI.MAX studies. The FSA-NPS DI is computed using arithmetic energy-weighted means of the FSA score of the foods consumed. Higher FSA-NPS DI therefore reflects lower nutritional quality of the foods consumed. Higher FSA-NPS DI was associated with higher consumption of snacking foods, and lower consumption of fruits, vegetables, fish. At the biological level, higher FSA-NPS DI was associated with lower levels of antioxidant vitamins.

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The FSA-NPS DI was used to investigate the prospective association between the nutritional quality of the foods consumed and metabolic syndrome, cancer and weight gain. In the SU.VI.MAX study, higher FSA-NPS DI at baseline was associated with higher risk of overall cancer onset, higher risk of metabolic syndrome onset and higher weight gain.

These results tend to show the potential interest of using the FSA score as a basis for public health policies, such as the 5-CNL labelling system.

Symposium: New Findings on Nuts and Health

(sponsored by: INTERNATIONAL NUT AND DRIED FRUIT COUNCIL (INC))

Nuts and Cardiometabolic Health

Prof. Jordi Salas-Salvadó, Human Nutrition Unit, Hospital Universitari de Sant Joan de Reus, Faculty of Medicine and Health Sciences, IISPV (Institut d'Investigació Sanitària Pere Virgili), Department of Biochemistry and Biotechnology, Universitat Rovira i Virgili, Reus, Spain. CIBERobn (Centro de Investigación Biomédica en Red Fisiopatología de la Obesidad y Nutrición), Institute of Health Carlos III, Madrid, Spain

lt is well established that nut consumption is associated with several health benefits on cardiovascular risk factors and cardiovascular disease. These benefits are mainly attributed to its high contain in many bioactive compounds. Scientific evidence supports that nut consumption is inversely related with the prevalence and incidence of the metabolic syndrome (MetS) and some of its components. Nuts reduce the postprandial glycemic response; however, long-term trials of nuts on insulin resistance and glycemic control in diabetic individuals are inconsistent. Epidemiologic studies have shown that nuts may lower the risk of diabetes incidence in women. An inverse association with body mass index and general obesity has been also been suggested. Nuts could have a protective effect on blood pressure and endothelial function but further studies should confirm these results. lt has been shown that nuts have a cholesterol-lowering effect, but the relation between nuts and hypertriglyceridemia and high-density lipoprotein cholesterol is unclear. An inverse association was found between the frequency of nut consumption and the prevalence and the incidence of MetS in epidemiologic studies. Several trials have evaluated the effect of nuts on subjects with MetS and found that they may have benefits in some components. The results of the PREDIMED Study, a multicenter randomized nutrition trial for the primary prevention of cardiovascular disease in 7,447 participants at high cardiovascular risk, have demonstrated that nut consumption could be beneficial for MetS management. Compared with those participants randomized to a low-fat control diet, those in a Mediterranean diet enriched with nuts had a higher reversion of MetS and hyperglycemia component of the MetS after a median of 5.0 years of follow-up. Diabetic participants were more likely to reverse MetS. The protective effects on metabolism could be explained by the modulation of inflammation and oxidation. Further trials are required to clarify the role of nuts in MetS prevention and treatment.

Nuts and Digestion

Giuseppina Mandalari, University of Messina (Italy), Institute of Food Research (UK).

We refer to bioaccessibility as the proportion of a nutrient or phytochemical compound 'released' from a complex food matrix during digestion and, therefore, potentially becoming available for absorption in the gastrointestinal (GI) tract. We have demonstrated that most of the lipid retained in masticated almonds is not immediately bioaccessible and remains not available for absorption during the early stages of digestion. The aim of the present study was to assess lipid bioaccessibility of two almond meals with different degree of encapsulation: muffins containing almond flour, classified as high lipid bioaccessibility meals due to the low proportion of intact cell walls, and muffins containing almond particles, classified as low bioaccessibility meals due to the high proportion of intact cell walls. Human mastication was combined with an in vitro model of digestion consisting of a dynamic gastric model (DGM), followed by a simulated duodenal digestion phase. The DGM provides a realistic and predictive simulation of the physical and chemical processing of the human stomach and accurately mimics the transit time and the luminal environment within the human stomach. We have also demonstrated the effect of food matrix on the release of nutrients and phytochemicals from natural raw and roasted pistachios.

Tree Nuts and the Gut: Supporting a Healthy

Volker Mai, University of Florida.

Modifying microbiota towards a 'beneficial' composition is a promising approach for improving intestinal as well as overall health. Natural fibers and phytochemicals that reach the proximal colon, such as those present in almonds and other tree nuts, provide substrates for the maintenance of healthy and diverse microbiota. We have previously shown that adding almonds to the typical American Diet modifies fecal microbiota towards a potentially beneficial composition. However, correlations between increased consumption of almonds, gut microbiota and markers of immune function and overall health have to date not been investigated in a randomized trial. We performed a prospective, randomized, crossover study in 28 adults and one of their children (3 to 6 y). Adults consumed 1.5 ounces and children 0.5 ounces of almonds, as whole almonds or almond butter, daily for 21 days. Stool, blood and saliva samples were collected before and after each intervention to measure changes in the microbiota, sIgA, antioxidant status and inflammatory cytokines. Daily and weekly questionnaires were collected to assess gastrointestinal (GI) function (gas, bloating, number of stools, etc.) and quality of life including perceived stress. While adherence to the intervention was high we observed no changes in GI function or perceived stress in either children or adults. Almond intake was associated with a significant increase in self-reported Healthy Eating Index score ($p<0.001$). Almond intake did not distort overall microbiota diversity at the phylum or family level but

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did affect specific taxa. Although children consumed fewer almond servings/day than adults they exhibited stronger microbiota changes. Our study suggests that the amount of almonds provided over the short study period was insufficient to affect markers of GI function or quality of life, but especially in children resulted in detectable changes in bacterial taxa, some with potential beneficial characteristics.

Long-term Nut Consumption and Cognitive Function with Aging

Francine Grodstein, ScD, Brigham and Women's Hospital, Boston, MA, USA

Background: With the aging of the population, identifying strategies for maintaining cognitive function at older ages is critical. Nuts contain many "healthy" fats (eg, monounsaturated) and are low in saturated fats. Short-term randomized trials have shown that nut intake decreases total cholesterol and LDL cholesterol, and in observational epidemiologic studies, nuts have been associated with reduced risk of cardiovascular disease and type 2 diabetes. Because all these vascular factors have been related to cognition, we investigated the relation of nut intake to cognitive decline in older adults.

Methods: The Health Professionals Follow-up Study began in 1986, with 51,529 men, age 40-75 years. Participants continue to complete mailed questionnaires, with detailed dietary information, including nut consumption. In 2014, we sent email invitations to 7,166 men with email addresses, to complete a self-administered, online, cognitive test battery. The battery includes 4 neuropsychologic tests, designed to assess processing speed, attention, learning and memory. In total, 1,587 men (mean age 70 years, SD=5.4 years) completed the battery. In this group, we used linear regression models to estimate the relation of nut consumption (reported in 2010) to cognitive function, controlling for a wide array of potential confounding factors.

Results: When we averaged together scores across all the cognitive tests to calculate a global composite cognitive score, we found a statistically significant trend of increasingly better cognition with increasing intake of nuts (p-trend=0.02). In particular, for men eating >2 servings of nuts per week, we found a mean difference of 0.15 standard units on the composite score, versus men eating nuts less than once per month (p=0.01); this mean difference of 0.15 on the composite score is equivalent to the difference we found between men 5 years apart in age – that is, higher consumption of nuts appeared to delay cognitive aging by 5 years. Generally consistent findings were observed for composite scores of processing speed/attention and learning/memory.

Conclusions: There was a strong relation between higher consumption of nuts and better cognitive function in older men. This observation is supported by similar findings in several observational, epidemiologic studies of women and men, and merits greater focus in additional research.

Symposium: Sweetness: the science behind sweet taste preference, effect on appetite, weight management and quality of diet

(sponsored by: International Sweeteners Association (ISA))

Appetite for sweetness and energy intake: sugars and low-calorie sweeteners in consumer's diet

France Bellisle, Epidémiologie Nutritionnelle, University of Paris 13, France

Sweetness is a strong psychobiological stimulus for many animal species. Human newborns display an innate acceptance of sweet substances and children express a strong preference for sweet foods and beverages. The appetite for sweetness decreases during growth, however, a phenomenon observed in humans as well as other species. Human adults typically vary in their preferred intensity of sweetness in a broad range of foods and beverages.

The strong attractiveness of sweet tasting foods and beverages has inspired the notion that they may contribute excessively to the daily energy intake and induce overeating and weight gain. Sugars bring 4 kcal per gram. Their consumption in foods and particularly in beverages can represent a large proportion of the total daily energy intake, much above the presently recommended limit of 10%. In order to allow consumers to enjoy sweetness in foods and beverages without the energy of added sugar, low- or no-energy sweeteners have been developed. These substances have various chemo-physical structures but share a very high sweetening power compared to sugars, so that they can be used in minute amounts to confer the desired level of sweetness to foods and drinks while contributing very little or no energy at all to the final product. Following early reports that these substances might actually increase appetite, later observational and experimental studies showed that the use of low-energy sweeteners could potentially decrease energy consumption and improve weight control. Recent studies in children and adults suggest that the use of low energy sweeteners satiate the taste for sweetness and actually decrease, rather than increase the intake of sugar-containing products.

Effects of low-energy sweeteners consumption on appetite and weight control

Peter J. Rogers, School of Experimental Psychology, University of Bristol, Bristol, UK

The extent to which low-energy sweeteners (LES) consumption might benefit weight management depends on their effects on appetite

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control. By reducing dietary energy density, LES consumed in place of sugars ought to reduce total energy intake provided that the 'saving' in energy consumed is not fully compensated for by increased energy intake elsewhere in the diet. Short-term 'preload test-meal' studies in humans confirm less than full compensation for sugar consumed in foods and beverages. It is possible, however, that other effects of LES consumption might outweigh this saving. It has been suggested that LES consumption may increase energy intake, for example, by increasing desire for sweet food consumption, and by confusing the relationship between sweetness and food energy content. Overall, though, the evidence favours a net benefit of LES consumption. Two sets of findings, in particular, are important. First, randomised controlled trials (RCTs) show consistently a relative reduction in body weight for consumption of LES- versus sugar-sweetened beverages (SSBs). Outcomes were similar for trials in which the products (LES beverages or SSBs) were added to the diet and trials in which LES beverages replaced equivalent SSBs in frequent consumers of SSBs. Second, in preload test-meal studies LES do not acutely increase energy intake compared with water, and in RCTs LES beverages reduce body weight compared with water. The various results summarised above are based on a recent systematic review and meta-analyses (Rogers, Hogenkamp, de Graaf, Higgs, Lluch, Ness, Penfold, Perry, Putz, Yeomans & Mela, International Journal of Obesity, in press), from which we concluded that 'We found a considerable weight of evidence in favour of consumption of LES in place of sugar as helpful in reducing relative energy intake and bodyweight, with no evidence from the many acute and sustained intervention studies in humans that LES increase energy intake.'

Low-calorie sweetened beverages and diet quality (sugar, micronutrients and foods)

Sigrid Gibson, Sig-Nurture Ltd. Guildford, Surrey, GU1 2TF, UK.

Low calorie sweetened beverages (LCB), like plain water, tea and coffee, satisfy thirst with minimal caloric load. Their impact on energy intake when substituted for sugar-sweetened beverages (SSB) has been vigorously researched. By comparison, data on diet quality (nutrient intake and food choices) is more limited. There is some evidence that people who use low calorie sweetened foods and beverages tend to have more health-conscious diets and lifestyles than non-users. Observational studies suggest that consumers of low calorie beverages have lower intakes of carbohydrate (lower sugars), higher intake of protein and higher scores on healthy eating indices, but not all studies are consistent. Randomized trials such as CHOICE suggest that replacing SSB with LCB does not lead to an increased consumption of sweet foods compared to replacement with water. This presentation will explore some of the possible reasons for discrepancies between studies and present data from a new analysis of UK data comparing food and nutrient intakes in adults who consumed different types of soft drinks: LCB, SSB, both types (BB), or none (NC). LCB consumers had similar intakes of free sugars to NC, but NC had a lower fluid intake than other groups. NC and LCB consumers ate more fruit, vegetables and fish than SSB or BB consumers, but the same amount, or less, of sugary foods (biscuits, cakes, confectionery, puddings, jam and sugar). In summary, LCB consumption does not appear to compromise micronutrient intakes and may be a marker of a healthier lifestyle. However, the benefits of LCB depend on how people use them, and their food and lifestyle choices will be the main driver of diet quality, energy intake and body weight.

Symposium: Slow-release carbohydrates: Growing evidence on metabolic responses and public health

(sponsored by: Mondelez International)

Interest of reducing post-prandial glycemic response in prevention of metabolic diseases

Edith J.M. Feskens, Division of Human Nutrition, Wageningen University, Wageningen, The Netherlands

In daily practice clinical investigations regarding lipids or glucose asked patients to be fasting. However, for most of the day people are not in the fasting state but fed, and hence in some sort of postprandial stage.

In the diabetes field this has been recognized since long, and oral glucose tolerance tests have been introduced and used to detect the presence of diabetes using a combination of elevated fasting or 2-hr glucose levels (after 75 g of glucose load). We generally use this in population based surveys.

When considering diabetes patients it is generally acknowledged that the Hba1c level is generally a good predictor of subsequent cardiovascular complications. However, Hba1c is determined by both fasting (FPG) and postprandial glucose (PG) levels. Elevated fasting levels are generally due to hepatic glucose production, while postprandial levels are mainly affected by reduced glucose uptake in tissues like muscle, and can be elevated before overt diabetes is present. This is of special relevance with regard of the prevention of cardiometabolic disease.

So far the DECODE (Diabetes Epidemiology: Collaborative analysis Of Diagnostic criteria in Europe) study is the most comprehensive study in this field. It includes data from 19 European cohorts on 12,566 men and 10,874 women who were free from diabetes at baseline. The results showed that individuals with normoglycemia, whose 2hPG did not return to the FPG levels during a standard 75 g 2-h oral glucose tolerance test (OGTT) had a higher risk for mortality from CVD and all-cause than individuals whose 2hPG returned to their FPG levels or below them. This indicates that 2hr glucose levels are better predictors of cardiometabolic disease than fasting levels, and suggest that reducing these may especially useful for prevention. Data will be discussed further in the light of potential sex differences and results from additional studies.

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Clinical evidence on the physiological effects of slow-release carbohydrates from cereal foods

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The quality of carbohydrates in food has been studied for years, with particular attention being paid to the structure of starch in processed food products. The technology and cooking methods applied to cereal products result in various degrees of starch digestion from rapidly to slowly digested carbohydrates. Numerous studies have compared the physiological effects of starch-based products and showed a correlation between the in vitro digestibility of starch and the postprandial plasma glucose and insulin responses. Investigation of postprandial metabolism of food starch fractions is generally based upon the monitoring of postprandial changes in circulating plasma glucose and insulin concentrations over a 2-hour period. This approach makes it possible to calculate the glycemic and insulinemic indexes of foods. However, these peripheral postprandial markers provide only a partial reflection of the absorption kinetics of starch-derived glucose and give no indications about its absorption kinetics. Although moderate postprandial glucose response may indicate a slow appearance of ingested carbohydrates and slow tissue uptake, this response also results from rapid appearance of ingested carbohydrates and rapid uptake by tissue. In the latter case, insulin secretion is enhanced in relation to glycemic response. It is thus necessary to describe metabolic response to carbohydrate ingestion rather than simply the glycemic profile resulting from the difference between incoming and outgoing glucose flow rates whether exogenous from the food or endogenous from the organism. In order to study the kinetics of absorption of carbohydrate rich foods, the double-isotope labeling method is generally used. This method makes it possible to measure the rates of appearance in plasma of exogenous glucose from the test food only. The results of the type of carbohydrate on glucose bioavailability and its metabolic impact will be reviewed.

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Slowly Digestible Starch: definition, sources and recognized interest on glycemic response

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Based on WHO recommendations, starch represents the largest component of our daily energy intake (40% to 50%). During food manufacturing, heat, moisture and pressure modify dramatically the digestibility of starch in processed foods. From its native state (in raw ingredients) which is usually slowly digested, these process parameters may convert the slow fraction into rapid fraction of starch.

The rate and extent of starch digestion can be measured in vitro using a method developed by Englyst et al. (Englyst et al., 1996) that classifies starch into three major fractions: rapidly digestible starch (RDS), slowly digestible starch (SDS) and resistant starch (RS). This method has been validated by a ring test in 6 different laboratories to determine its uncertainty. As food process can modulate the digestibility of starch, its control can prevent SDS loss by limiting the starch gelatinization extent (Englyst et al., 2003; Zhang and Hamaker, 2009). In the literature, SDS content of starchy foods varies from 0 g/100g for puffed wheat to 23 g/100g for plain biscuits. Moreover, within a single food category, the range in SDS content can be wide, as the process influences starch digestibility in the finished product dramatically.

There is a health interest of preserving starch in its native slowly digestible form. Several studies compared the physiological effects of starch-based products and showed a strong correlation between in vitro digestibility of starch and postprandial plasma glucose and insulin responses (Englyst et al., 1996; Englyst et al., 2003; Meynier et al., 2015). Indeed, highest SDS rich foods induce the lowest glycemic and insulinemic responses, which are involved in metabolic disease prevention.

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Symposium: Beyond the BMI - BioelectricalImpedance Analysis in the assessment ofbody composition

(sponsored by: SECA GmbH)

Beyond Fat Mass - future perspectives for the use of BIA in epidemiological studies

Anja Bosy-Westphal1, 1 Institute of Nutritional Medicine, Hohenheim-University, Stuttgart, Germany

Fat mass (FM) is the most widely used information on body composition in epidemiological studies. Although FM adjusted for height (FM index = FMI) is superior to fat mass adjusted for weight (%FM), information on body adiposity plays a minor role with respect to disease risk prediction in epidemiological studies. Modern tetrapolar impedance devices also provide information on regional fat distribution (i.e. trunk vs. extremity fat mass) and regional relationship between fat and lean mass that could contribute to improved phenotyping for cardiometabolic risk.

Mathematical modeling of a normal lean mass based on age, gender, fat mass and height can be used in the absence of risk-defined cut-offs to identify skeletal muscle mass depletion. This definition can be applied to identify different clinical phenotypes like cachexia, sarcopenia or sarcopenic obesity. In addition, the information on regional lean mass could improve the prediction of frailty and impaired functional capacity.

Finally, bioelectrical impedance vector analysis (BIVA) provides an insight on tissue quality (i.e. hydration and cellularity) and avoids assumptions required for quantitative body composition outcomes like muscle and fat mass. BIVA is a two-dimensional concept of body composition analysis that can be divided into information on phase angle and vector length. Both parameters should be normalized or stratified by BMI, age and gender and can then be used together in order to improve disease risk that accompanies tissue catabolism and fluid shifts e.g. caused by inflammation.

Beyond the BMI - still a good index of obesity?

Manfred J.Müller, Christian-Albrechts-Universität zu Kiel, Institut für Humanernährung und Lebensmittelkunde, Kiel, Germany

BMI is widely used for routine characterization of the weight status in either epidemiology or clinical nutrition. It is a stature-independent mass of body weight and refers to children, adolescents, adults and the elderly. BMI is a suitable surrogate measure of total body fat. BMI is used to categorize subjects into 'underweight' (<18.5 kg/m2), 'normal weight' (>18.5 and <25.0 kg/m2) 'overweight' (>25 kg/m2) and/or 'obese' (>30 kg/m2) (3). These cut offs are based on statistical analysis and refer to Caucasian, African and Hispanic populations, whereas lower cut offs have been proposed for Asian populations. The different categories refer to U-shaped (with increased risks at both ends) or J-shaped associations (increased risk at one end only) between BMI and either cardio-metabolic risks or mortality. In non-Asian populations the lowest risk BMI category is between 22.0 and 24.9 kg/m2 with a 30% increase in mortality above that range. Accounting for smoking, preexisting disease, or early mortality has little effect on BMI at minimal mortality. In 2000, experts involved in a WHO consultation had already concluded that „BMI can be used to estimate the prevalence of obesity within a population and the risks associated with it, but does not, however, account for the wide variation in the nature of obesity between different individuals and populations" (1). Thus, BMI has some value (i.e. as a crude estimate of cardio-metabolic risk or to pragmatically decide whom to treat and whom not to treat), but it is an inappropriate means to characterize the obese phenotype and specific disease risks. By contrast, in epidemiological, clinical and etiological research on obesity, measurements of body composition taking into account (i) sound models of body weight regulation and (ii) body composition-health risk associations have to replace the BMI.

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Acknowledgement: Funded by a grant of the German Ministry of Education and Research (BMBF 01EA1336).

Symposium: Exploring the "cutting edge": a closer look into ingredients that maintain taste and cut calories

(Sponsored by Tate & Lyle)

Low calorie sweeteners in weight loss: Friend or foe?

John L Sievenpiper, MD, PhD, FRCPC, Department of Nutritional Sciences, Faculty of Medicine University of Toronto; Division of Endocrinology & Metabolism, Li Ka Shing Knowledge Institute, and Toronto 3D Knowledge Synthesis & Clinical Trials Unit, St. Michael's Hospital, Toronto, ON, Canada

Obesity and diabetes represent two of the most important unmet prevention challenges. Sugars have been singled out as one of the prime culprits in these epidemics, and leading health authorities such as the World Health Organization recommend reductions in free or added sugars. Low calorie sweeteners provide a potentially important means for displacing excess calories from free sugars in the diet. There is, however, a concern about the use of low calorie sweeteners based largely on evidence from prospective cohort studies, showing that the intake of low calorie sweetened beverages are associated with an increased risk of obesity and diabetes. Reverse causality cannot be ruled out in this relationship, as people who are already overweight and at

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risk for diabetes may be higher consumers of low calorie sweeteners. Higher quality evidence from systematic reviews and meta-analyses of randomized trials show significant weight loss when low calorie sweeteners displace calories from sugars (especially, sugar-sweetened beverages) for up to 18 months. Well-powered, individual randomized controlled trials have also shown advantages of this approach for cardiometabolic risk factors for up to 6 months. Taken together, these data argue against a role of low calorie sweeteners in the promotion obesity and diabetes and make a compelling argument for benefit. To address the uncertainties, there remains a need for larger, longer, high-quality trials.

Using sweeteners and fibers as effective tools for calorie reduction

Mary Quinlan, MSc, Manager, Sweetener Technology Development, Tate & Lyle

As consumer demand for healthier food and beverage options increases, food producers are responding to this growing demand by developing reduced-calorie products. However, the development of reduced- calorie food and beverages presents many challenges to food development. For example, sucrose and other nutritive sugars provide more than just sweetness to food and beverage products; they contribute to the overall taste, texture, appearance and stability of the products. Consequently, when sugar levels are reduced to create lower-calorie products, it is critical that these other functionalities are also compensated for. While high potency sweeteners can provide sweetness, they generally need to be used in combination with other ingredients to ensure product characteristics and quality are maintained. To ensure that consumers can have the great tasting, reduced-calorie options they desire, innovative solutions to food reformulation are needed.

This presentation will provide insight into innovative reduced-calorie food formulations that are optimized for taste and acceptability by the use of non-nutritive sweeteners and added fibres as replacements for added sugar and energy rich ingredients.

Symposium: The role of diet and lifestyle as foundation in the management of dyslipidemia

(sponsored by: UNILEVER & BASF)

Nutritional needs during pregnancy - keeping in mind the priorities

Zyriax BC, Preventive Medicine, University Heart Center, University Medical Center Hamburg-Eppendorf, Germany

Cardiovascular disease is the leading cause of death worldwide and an important morbidity in ageing societies. Evidence that dyslipidemia plays a key role in the development of atherosclerosis is overwhelming. Cross-sectional studies like the Germany Health Interview and Examination Survey for Adults (DEGS1) indicate that the majority of adults have unfavorable lipid values that may be ameliorated for their own benefit. However, half of the affected individuals is not even aware of the problem. Lifestyle modifications have been proven to be able to improve lipid values. As to LDL, cholesterol absorption from the gut, synthesis and re-uptake from the plasma can be modulated. Additionally, the link of triglycerides and HDL-cholesterol can be used to improve a dyslipidemic lipid profile. According to current guidelines like that of the European Atherosclerosis Society and the European Society of Cardiology effective measures include the replacement of saturated and trans fat with mono- and polyunsaturated fat, the increase of dietary fiber, and omega-3 fatty acids and the intake of phytosterol enriched foods. Additionally weight loss in overweight or obese patients, regular physical activity and smoking cession are recommended. Lifestyle intervention should also include behavioral treatment to increase motivation and long-term adherence. Yet, the impact of lifestyle modification goes far beyond improving dyslipidemia, but pertains also to blood pressure, regulation of the glucose metabolism and effects that are not even reflected by conventional risk factors. These multiple effects of lifestyle and nutrition explain the large differences in cardiovascular risk between populations and within populations. Thus, lifestyle and nutrition is the essential basis to prevent heart disease, which may be amended by specific measures.

The science behind the cholesterol-lowering effect of phytosterols

J. Plat, PhD, Maastricht University, Department of Human Biology and Movement Sciences

Plant sterols/stanols inhibit fractional intestinal cholesterol absorption, which translates in significant LDL-C effects up to 12%. Target populations for these products are described in the recent EAS consensus paper. The mechanism underlying the inhibited intestinal cholesterol absorption is not known, however interference with processes like micellar cholesterol incorporation, intestinal sterol transporter expression, sterol esterification within enterocytes, and trans intestinal cholesterol excretion (TICE) are considered. LDL-C lowering effects are independent of background diets and the use of cholesterol-lowering drugs. Regarding the shifting interest from individual nutrients towards effects of dietary patterns, it is relevant that plant sterol enriched products significantly contributed to the effect of a healthy dietary portfolio diet. The recent IMPROVE-IT trial clearly showed that lowering serum LDL-C via inhibiting intestinal cholesterol absorption through ezetimibe effectively lowered the number of new CVD events. This supports the use of dietary interventions that lower serum LDL-C concentrations via comparable mechanisms. However, direct evidence supporting a reduction in CVD endpoints has not been shown for plant sterols or stanols. Studies measuring endothelial function as surrogate are the most progressed. So far, 7 studies investigated the effect of plant sterols/stanols on FMD of which 6 showed non-significant changes in the positive direction. Since studies with ezetimibe monotherapy show no correlations between changes in serum LDL-C and FMD, the question is whether interventions that lower LDL-C translate into changes in FMD at all. A possible advan-

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tage of plant sterol/stanol enriched foods over ezetimibe -a typical single-target drug- is that these dietary compounds act on multiple targets, since they not only lower serum LDL-C concentrations, but also lower serum TAG concentrations in subjects with elevated serum TAG concentrations. In addition, they might influence the functioning of our immune system via a changed activity of the regulatory T-cells. This combination of effects makes these compounds highly attractive to decrease CVD risk.

Small steps towards a healthy diet and lifestyle can make a big difference – behaviour change in practice

Michaela Nuttall, CVD Co-ordinator, Public Health Bromley, London.

What makes people change?

There is much evidence about what can help people to live a longer, healthier and happier life resulting in improved cardiovascular outcomes. However, getting that evidence into practice where people make and maintain positive behavior change is a never ending challenge. It is everyone's responsibility to meet that challenge.

Small steps at all levels can collectively have a bigger overall impact on chronic disease and cardiovascular health. Starting with national public health initiatives, such as NHS Health Checks and Change for Life in the United Kingdom to the joint Nordic Keyhole initiative in Norway, Sweden and Denmark. Then, all health care professionals must acknowledge that they too are pivotal in encouraging healthy lifestyle behaviors, making every contact count. Brief interventions; a change in language and communication can improve a person's perception of real and potential risks and problems associated risk factors and lifestyle. Thus nudging and motivating people towards positive behavior change. Then, at the center of is the person, they truly do need to want, believe and be ready to change. This is seen across the different recognised health belief and behavior change models

People are also consumers often with a 'buy now pay later' later attitude, they need to see and feel results of current behaviors and potential benefits of behavior change now rather than focus on long-term benefits, this is reflected in the various ways of communicating cardiovascular risk; absolute risk Vs relative risk Vs Heart Age. Alongside this evolving attitude is the fast developing technologies; phones, computers and social media are underutilized and yet have huge potential to help people make those small steps.

Symposium: Wild Blueberries and Human Health

(sponsored by: Wild Blueberry Association of North America)

Effects of wild blueberry (poly)phenols on vascular function in healthy individuals

Ana Rodriguez-Mateos, Division of Cardiology, Pulmonology, and Vascular Medicine, Medical Faculty, University Düsseldorf, 40225, Düsseldorf, Germany.

Recent epidemiological and human intervention studies suggest that berry consumption may have cardiovascular health benefits (Rodriguez-Mateos et al 2014). Wild blueberries are rich sources of potential bioactive compounds such as (poly)phenols, fiber, minerals and vitamins. To date, very few clinical trials have been conducted investigating the effect of blueberrry consumption on clinically relevant biomarkers of cardiovascular disease (CVD) risk, such as blood pressure, endothelial function, arterial stiffness and blood lipids (Rodriguez-Mateos et al 2014). We have recently shown that wild blueberrry (poly)phenols can improve endothelial function in healthy individuals in an intake and time-dependence manner (Rodriguez-Mateos et al 2013,2014a). In a double-blind randomized controlled trial, endothelial function, measured as flow-mediated dilation (FMD), significantly increased after 1,2 and 6 hours post-consumption of a blueberry drink in comparison with a control drink. The maximal effect on FMD occur after the consumption of the equivalent to 240 grams of wild blueberries, but even the smallest amount tested, the equivalent to 100 grams of wild blueberries, had a significant effect on FMD. Plasma levels of blueberry (poly)phenol metabolites correlated with the vascular effects, suggesting that (poly)phenols may be the compounds responsible for the observed effects. We are currently investigating whether chronic consumption of wild blueberries can improve vascular function, when given daily at dietary achievable amounts. Our findings suggest that wild blueberries can improve vascular function in healthy men, and regular consumption may help to prevent the progression of CVD and atherosclerosis.

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Effects of wild blueberry supplementation on memory and executive function in 8-10 year old children

Claire M. Williams, Adrian R. Whyte, Katie Barfoot & Gabrielle May, School of Psychology & Clinical Language Sciences, University of Reading, Earley Gate, Reading, UK

It is widely accepted that diet has an influence on the cognitive capabilities and development of children. To date, research has focused primarily on the effects of the maternal diet during pregnancy on cog-

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nitive outcomes for the child, and the effects of eating occasions (such as breakfast) and different carbohydrate load on subsequent mental performance. Few studies have investigated the effects of specific micro- or macronutrients on cognitive performance in school aged children. In recent years, evidence from human intervention studies has shown that consumption of flavonoids is associated with cognitive benefits (Lamport et al. 2012). Specifically, our laboratory has shown that foods rich in flavanol (such as cocoa and tea) and anthocyanins (such as blueberry) are capable of promoting cognitive improvements in both animal and adult human studies (Rendeiro et al. 2012). These effects on cognition, if translated to children and adolescents, would be of clear practical and theoretical importance in an academic context.

To address this, work from our laboratory has shown improvements in cognitive performance of school-aged children who have been supplemented with anthocyanins from blueberries (Whyte & Williams 2014). Furthermore, using a double-blind cross-over dose and time course study, we have shown that supplementation with wild blueberries (WB) can similarly boost memory and attention processes in 7-10 year old children. Here, children consumed either a placebo (vehicle), low- or high-dose WB drink and performed a battery of cognitive tests at a number of time-points throughout the day. Notably, the consumption of the WB drinks was associated with significant improvements in both executive function and short-term memory at 3-6 hours post-consumption, compared to the placebo drink matched for sugars and vitamin C levels. Further clinical trials are investigating the effects of WB supplementation on the development of language and literacy skills in typically developing children and children with language and literacy difficulties.

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Human health functionality of blueberry anthocyanins

Wilhelmina Kalt, Agriculture and Agri-Food Canada, 32 Main St. Kentville Nova Scotia, CANADA B4N 1J5

'Blueberries' denote several Vaccinium species that are rich in anthocyanin pigments. These highly palatable berries have attracted significant scientific and commercial attention owing to their possible health and nutritional benefits. Since compositional differences exist among blueberry phenotypes it is notable that 'Wild Blueberries' (V. angustifolium) include a vast mixture of berry phenotypes, while a commercial pack of cultivated blueberries (V. corymbosum) will include one of many blueberry varieties developed by conventional plant breeding.

Early research pointed to the significant in vitro antioxidant activity of blueberry extracts as a probable basis for their health functionality. Detracting from this notion however is the poor absorption of their abundant anthocyanin antioxidants, meaning that the anthocyanin concentration in vivo would be too low to directly mitigate oxidative stress in the body.

Subsequent lines of research have shown that blueberry health effects and specifically anthocyanin effects are complex and diverse. Mechanistic studies on anthocyanins suggest that their beneficial effects in anti-inflammation, gluco-regulation, vaso-modulation and cytokine modulation are at least partially responsible for blueberry health benefits.

Areas of human health and disease where blueberries have found to be beneficial include cardio-protection, neuro-protection, visual function, and in conditions involving chronic inflammation and aging.

Human clinical research to explore more fully the benefits of blueberries and their anthocyanins is hampered by the limited number of clinical models and samples available as well as complications related to human anthocyanin bioavailability.

However a growing body of epidemiological evidence demonstrates that anthocyanin health benefits exist, and are detectable in highly variable and well-nourished human populations.

This short presentation will review the current evidence for blueberry health benefits with a focus on the properties and benefits of their anthocyanins.

(Endnotes)

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SUBMITTED ABSTRACTS FOR POSTERS AND ORAL PRESENTATIONS

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TOPIC 1 - Food and nutrient intake, dietary patterns, dietary guidelines

149/10. Determination of Eating Taboos during Pregnancy by Elderly Women at Maungani Village, Vhembe District of Limpopo Province

Author(s): Tshifhiwa Cynthia Mandiwana; V. Masiagwala.

Affiliation: *Nutritionist. University of Venda. South Africa.*

Introduction: Cultural practices influence eating pattern generally and socially or religious beliefs may also impose specific restriction on food choice during pregnancyin most parts of Africa. A woman's nutrient needs during pregnancy exceed RDAs for non-pregnant adult women. However, eating taboos during pregnancy is a concern because it results in negative outcome for both the mother and the infant (e.g. malnutrition).

Objectives: To determine the type of restricted foods during pregnancy and cultural beliefs of elderly women on eating taboos during pregnancy.

Method / Design: Descriptive and qualitative Study design was used. Thirty-six (36) elderly women who were 60 years and above participate in the study. Snowballing design was used to recruit participants. Data was collected using an interview schedule guide and the language used was Tshivenda. The information was collected using tape recorder and notebook for validity. Data was transcribed and translated from Tshivenda to English, and then grouped into themes.

Results: Varieties of foods are restricted during pregnancy, with a belief to produce negative effects to both the mother and the baby. The time of food restriction differ with the period of pregnancy, while reducing the amount of food consumed during the later months of pregnancy. There are also foods that are recommended during pregnancy, however the intake of such foods should be reduced to make it easier during delivery. Indigenous fruits and vegetables were reported to be recommended throughout pregnancy by all groups. Pregnant women who follow eating taboos deliver small baby with shrinkage skin. Mothers who give birth to babies with some of the consequences are believed to have not followed the eating taboos.

Conclusions: Dietary intakes during pregnancy are influenced by cultural beliefs. As most of the eating taboos are traditionally based, culture oriented and sensitive, a careful approach of health education of all reproductive women is to be planned for without hurting their cultural feelings.

Keywords: (maximum 5): Culture, eating taboos, pregnancy, elderly women &dietary intake.

149/13. Micronutrient intake adequacy in children, adults and elderly in Greece: the role of age, sex, socio-economic status and food habits

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Affiliation: *(1) Associate Professor. Department of Nutrition and Dietetics, Harokopio University of Athens. Greece; (2) Post- Doctoral Researcher. Department of Nutrition and Dietetics. Harokopio University of Athens. Greece; (3) Research Associate. Department of Nutrition and Dietetics. Harokopio University of Athens. Greece; (4) Nutrition Scientist. FrieslandCampina. Amersfoort. the Netherlands.*

Introduction: One of the challenges for public health nutrition policy in Europe is to control excess caloric intake and poor diet quality in the population.

Objectives: To report the prevalence of inadequate dietary intakes of 16 micronutrients by schoolchildren, adults and elderly women in Greece and further explore the role of sex, socio-economic status (SES) and meeting food intake recommendations.

Method / Design: Dietary, demographic and SES data from three studies conducted in Greece (i.e. on 9-13y boys/girls; 40-60y men/women; 50-75y women) were used. The individual foods consumed by study participants were grouped into six core-food groups based on the ChooseMyPlate.gov guidelines. Study participants with inadequate micronutrient intakes were identified using the EAR cut-point method.

Results: Regarding micronutrient intakes by age group, the highest prevalence rates (i.e above 75%) of inadequate intakes were recorded for vitamin E in all ages, for folate in 40-60y women, for calcium and magnesium in 50-75y women ($P<0.05$). Regarding SES differences, the prevalence of inadequate calcium and vitamin C intakes were also found to be higher among children and 50-75y women of lower SES ($P<0.05$) compared to their higher SES counterparts. Regarding adherence to food intake recommendations, the percentages of inadequate micronutrient intakes were significantly lower in study participants from all age -groups meeting the daily recommended intake of core food groups ($P<0.05$). Remarkably, the prevalence of inadequate vitamin D intake was 100% in both sexes, all age and SES groups and whether study participants were meeting food intake recommendations.

Conclusions: The current findings could provide guidance to public health policy makers in Greece and Europe for updating current food and nutrient intake recommendations to tackle nutrient intake inadequacies in different population subgroups.

Keywords: (maximum 5): food and micronutrients intake; children; adults; socio-economic status; adequacy

149/18. Frequency of consuming basic food groups in patients of health centre ``Novi Sad``

Author(s): (1) Tatjana Egić; (2) Olgica Jukić-Neatnica.

Affiliation: *(1) Doctor of Medicine - Specialist in General Practice*

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and Nutrition, Health Care Centre "Novi Sad", Serbia; (2) Doctor of Medicine - Specialist in Internal Medicine and Nutrition, Health Care Centre "Novi Sad", Novi Sad, Serbia.

Introduction: Chronic non-communicable diseases mostly represent causes of mortality both in the world and in the Republic of Serbia. An unhealthy diet is one of the major risk factors for chronic non-communicable diseases.

Objectives: Determine the frequency of consumption of certain food group in adult patients in primary care.

Method / Design: A retrospective analysis of data on the frequency of consumption of certain food groups registered in the electronic health record adult patients of Health centre ``Novi Sad``.

Results: The data have been analyzed from electronic health record of 8815 patients from 18 to 92 years of which 5654 (64,14%) are females and 3161 (35,86%) are males. The average age participants was 48,63 (SD 14,13) years. Everyday 45,72% (51,63% man and 48,23% women) of respondents consumes white bread. Vegetables are consumed daily by 81,68% (76,88% men and 84,36% women), fruits by 73,33% (66,06% men and 77,4% women) of respondents. Milk and dairy products are consumed daily by 75,27% (77,16% women and 71,88% men). Meat and delicatessen are consumed daily by 60,82% (69,12% men and 56,17% women) of respondents. More times a week, fish is used by 16,50% (17,15% males and 16,13% females) of respondents. Eggs are, everyday, consumed 8,05% of respondents 8,12% men and 8,01% women. For food preparation 54,90% of respondents (55,47% women and 53,91% men) use sunflower oil, 13,02% seam (13,86% men and 12,56% women), and combination of sunflower oil and seam 24,03% (24,96% men and 23,51% women) of respondents. Olive oil is used only 7,60% of respondents (7,99% women and 6,90% men).

Conclusions: The daily diet does not respect the recommendations about healthy nutrition , therefore it is necessary to carry out continued education of the population about the importance and the principles of healthy nutrition.

Keywords: (maximum 5): Risk factors,dietary patterns

149/27. Evaluation of caloric, vitamin D, vitamin E and folic acid from intake food to normal and overweight/obese patients

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Introduction: According to International Association for the Study of Obesity there are 1.5 billion adults in the world that have weight problems. A normal weight is hard to reach and to maintain for these patients and a hypocaloric diet can induce deficiencies of vitamins and minerals.

Objectives: To document the nutritional content of food intake to overweight and obese people for changing dietary habits for acquiring the normal weight

Method / Design: 119 overweight and obese patients and 33 normalweight patients were recruited from a clinic of nutrition. We measured resting metabolic rate (RMR) with an indirect calorimeter and compared to total caloric intake. Using a 7-day weighed food self records we assessed the calories, vitamin d, vitamin e and folic acid from intake food.

Results: Obese patients had a significantly higher RMR than normal weight patients (p=0.0001). There wasn't a significant difference regarding total food intake compare to RMR between the two groups: 72.73% of normal weight patients and 63.87% of overweight and obese patients eat more calories than RMR. Considering a lower intake below 90% of dietary reference intake, both samples had inadeqvate intake of vitamin D, E and folic acid

Conclusions: None of the patients of our groups had a balance intake of vitamins and mineral. We need to pay more attention to diet composition thus to assure the recommended daily intake for vitamins and minerals.

Keywords: (maximum 5): vitamins , folic acid, obese, calories

149/28. Choosing the nutritional intervention to overweight and obese patients

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Introduction: In the last 35 years, the prevalence of the obesity has doubled, becoming a major health problem.

Objectives: Our study aimed to evaluate the caloric intake, vitamins and minerals from food before a nutritional intervention to overweight and obese patients.

Method / Design: To a sample of 124 overweight and obese patients we evaluated the content of food before running a nutritional intervention program. We assessed the kilocalories, vitamins and

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minerals from food using a 7-day weighed food self-records. We also measured calories of resting metabolic rate (RMR) after eight hours of fasting with an indirect calorimeter and percent of body fat using a body composition analyzer.

Results: We found that overweight and obese patients had an excessive intake of sodium, iron and selenium. The subjects had an inadequate intake of D and E vitamins (less than 90% of recommended daily intake) and A, B1, B2, B3, B5, B6, B12 and C vitamins (more than 110% of recommended daily intake). Considering a normal percent of body fat (PBF) for women between 20 and 30 and for men between 15 and 20, the mean value of PBF was significant higher in women than men ($p < 0.00001$). Also women have significantly more often values of abdominal circumference over normal than men. 63.87% of the patients eat more calories than RMR. Considering a normal measured RMR between 85 and 115 % from estimated RMR using formulas, we found that 62.29 % have a normal metabolism and only 32.79 % have a slow one.

Conclusions: Even that there was a hypercaloric diet, the overweight and obese patient had imbalance intake of vitamins and mineral before nutritional intervention. We need to pay more attention to food quality and quantity during low caloric diet, thus to assure the recommended daily intake for vitamins and minerals.

Keywords: (maximum 5): obese, vitamins, minerals,

149/31. Iron and magnesium absorption and bone state in rats as affected by feeding probiotic foods

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Introduction: Previously we studied the therapeutic effect of milk yoghurt and soy- yoghurt containing bifidobacteria with regard to their effect on the bioavailability of Ca, P, and Zn and femoral bone mineralization in rats.

Objectives: This study was designed to further explore their therapeutic effects on Fe and Mg absorption and tibial bone mineralization in rats.

Method / Design: Eight groups of rats were fed basal diet, cow milk, probiotic-free or probiotic–containing milk yoghurts (Bifidobacterium lactis Bb-12 or Bifidobacterium longium Bb-46), soymilk and soy-yoghurts containing only the above mentioned probiotics for 45 days. Their body weight gain, food efficiency, cecum pH, total carboxylic acids and bifidobacterial count, serum Fe and Mg content, Mg and Fe apparent absorption %, tibial bone density and breaking force were determined.

Results: There was no significant ($p<0.05$) differences in the total body weight, body weight gain and food efficiency between probiotic diets group and the control group. Rat's cecum pH values were significantly ($p<0.05$) decreased, while rat's cecum total carboxylic acids and bifidobacterial count were significantly ($p<0.05$) increased in rats fed probiotic diets compared to control group. Non-significant ($p<0.05$) increment was observed in Mg and Fe apparent absorption % upon feeding all experimental diets as compared with that for control group. There was a significant ($p<0.05$) increase in tibial bone density and tibial breaking force of rats fed diets containing Bifidobacterium Bb-12, Bb-46 as compared with that of the control group. Moreover probiotic milk yoghurt were the most effective than probiotic soy-yoghurt.

Conclusions: The results shows that non-significant increment in Fe and Mg apparent absorbance% after 45 days. This study suggest that intake of probiotic milk and soy- yoghurt may be useful in enhancing bone properties. Additional research is still needed to explore the effect of these studied probiotic products on Fe and Mg bioavailability.

Keywords: (maximum 5): Yoghurt, Soy-yoghurt, Mineral bioavailability, Probiotics, Tibia bone

149/34. The effect of socioeconomic status on dietary patterns in polish female. The Gebahealth study

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Introduction: Food consumption is influenced by many factors of socioeconomic status (SES). It is found that diet quality of people with low SES is worse than those with higher SES. Knowledge concerning associations between SES and Polish female dietary patterns (DPs) is limited.

Objectives: The aim of this study was to analyze the effect of SES on DPs in Polish girls and young women.

Method / Design: It was a cross-sectional study obtained in representative sample 1107 of Polish female aged 13-21 years. Initially, 2104 females were randomly selected from the PESEL database. The response rate was 52.6%. The SES was evaluated using four categorical variables: mother's education, father's education, self-declared economic status, description of household. Based on tertiles distribution of SES index, subjects were classified into three categories of SES. Three short validated food frequency questionnaires were used. The four DPs were identified by Principal Component Analysis: 'Traditional Polish' characterized by higher consumption of white bread, potatoes, meat and fat, 'Vegetables&fruit', 'Fast-food&sweets', 'Dairy&fats'. Multiple logistic regression analysis was used, and odds ratios (ORs) were calculated.

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Results: The ORs for upper tertile of 'Traditional Polish' DP in comparison to bottom tertile of the DP (OR=1.00) were: 0.28 (95%CI:0.19-0.40;p<0.0001) in female with high SES, 0.56 (95%CI:0.40-0.80; p<0.01) in female with average SES. The ORs for upper tertile of 'Vegetables&fruit' DP were: 2.08 (95%CI:1.47-2.96;p<0.0001) in female with high SES, 1.81 (95%CI:1.28-2.58;p<0.001) in female with average SES. The ORs for two other DPs ('Fast-food&sweets', 'Dairy&fats') were not significant (p>0.05).

Conclusions: Socioeconomic status of Polish girls and young women was strongly associated with their dietary patterns; high socioeconomic status was related to pro-healthy pattern characterized by vegetables` and fruit consumption; non-healthy pattern was characterized by consumption of white bread, potatoes, meat, and fat; non-healthy eating pattern was connected with low socioeconomic status.

Keywords: (maximum 5): socioeconomic status, parental education, dietary patterns, girls

149/35. The associations between dietary restrictions and two dietary patterns in polish female. The Gebahealth study

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Introduction: Girls and young women are often dieting and/or introducing dietary restrictions. The association between dietary restrictions and dietary patterns (DPs) of Polish female is weakly known.

Objectives: The aim of this study was to analyze the associations between dietary restrictions and two DPs in Polish girls and young women.

Method / Design: It was a cross-sectional study obtained in representative sample 1107 of Polish female aged 13-21 years. Initially, 2104 females were randomly selected from the PESEL database. The response rate was 52.6%. Three short validated food frequency questionnaires were used. The four DPs were identified by Principal Component Analysis. Two opposite DPs were chosen for analysis: 'Traditional Polish' and 'Vegetables&fruit'. Using dichotomous questions (answers: Yes/No) information regarding dietary restrictions in consumption of 9 food groups was collected. Adjusted odds ratios (ORs) were calculated.

Results: Any restrictions on food consumption was found in 30.5% of female. In female restricted any food consumption the OR for upper tertile of 'Traditional Polish' DP was 0.46 (95%CI:0.34-0.63;p<0.0001), and for upper tertile of 'Vegetables&fruit' DP was 1.54 (95%CI:1.13-2.10;p<0.01) in comparison to bottom tertile of each DPs (OR=1.00). The significant ORs for upper tertile of 'Traditional Polish' DP in comparison to bottom tertile were from 0.21 to 0.47 for restriction in consumption of cereals/potatoes, row fruit, row vegetables, meats, fats, fish, high-fat foods, sugar/sweets and dairy products. The significant ORs for upper tertile of 'Vegetables&fruit' DP in comparison to bottom tertile were from 1.42 to 3.05 for restriction in consumption of high-fat foods, sugar/sweets, fats, and cereals/potatoes.

Conclusions: Polish female with pro-healthy dietary pattern were more likely to introduce restriction in consumption of food containing sugar and fat, as well as foods containing starch. Female with traditional dietary pattern were less likely to introduce restriction in consumption of many food items, both healthy and non-healthy.

Keywords: (maximum 5): dietary restrictions, dietary patterns, PCA

149/37. The effect of attitudes towards health and food on female dietary patterns. THE GEBAHEALTH STUDY

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Introduction: Attitudes towards health and food influence food consumption. No relationship between attitudes towards health and food and dietary patterns (PDs) in Polish female is recognized.

Objectives: The aim of this study was to analyze the effect of attitudes towards health and food on DPs in Polish girls and young women.

Method / Design: It was a cross-sectional study obtained in representative sample 1107 of Polish female aged 13-21 years. Initially, 2104 female were randomly selected (PESEL database). The response rate was 52.6%. All data were adjusted for survey weights. Attitudes towards health and food were assessed using Health and Taste Attitude Scales (HTAS). Two subscales were analyzed: 'general health interest' and 'using food as reward'. Three short validated food frequency questionnaires regarding fiber intake, fat intake, and food intake variety were used. The four DPs were identified by Principal Component Analysis: 'Traditional Polish' characterized by higher consumption of white bread, potatoes, meat and fat, 'Vegetables&fruit', 'Fast-food&sweets', 'Dairy&fats'. Multiple logistic regression analysis was used and adjusted odds ratios (ORs) were calculated.

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Results: In female with positive attitude towards health, significant ORs for upper tertile in comparison to bottom tertile of each DPs (OR=1.00) were: 0.39 (95%CI:0.26-0.58;p<0.0001) for 'Traditional Polish', 5.23 (95%CI:3.17-8.63;p<0.0001) for 'Vegetables&fruit', 0.32 (95%CI:0.21-0.50;p<0.0001) for 'Fast-food&sweets'. In female with positive attitude towards 'using food as a reward', significant ORs for upper tertile of each of DPs were: 2.09 (95%CI:1.13-3.84;p<0.05) for 'Fast-food&sweets', 1.93 (95%CI:1.12-3.31;p<0.05) for 'Dairy&fats'.

Conclusions: In Polish female the positive attitude towards health was associated with pro-healthy dietary pattern characterized by vegetables and fruit consumption. Positive attitude towards using food as a reward was related to non-healthy dietary patterns characterized by consumption of sweets, fast foods, and dairy products in combination with fats. The attitude towards health and food may be used for predicting of food consumption and dietary patterns.

Keywords: (maximum 5): health, attitude, dietary patterns

149/38. Improving the organism antioxidant capacity during the 6-week targeted dietary intervention

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Introduction: The oxidative stress is a risk factor of many non-communicable diseases including cardiovascular diseases (CVD). Increasing diet oxygen radical antioxidant capacity is discussed as possible and promising intervention in lowering of oxidative stress and health improvement but no conclusion was found.

Objectives: The impact of the short-term dietary intervention to increase natural antioxidants supply and targeted to oxidative stress markers improvement in CVD patients was studied.

Method / Design: In total 48 patients with diagnosed CVD were included into the 6-weeks of dietary intervention. Patients received weekly one "snack bag" (incl. dried fruits, dark chocolate, strawberry, beetroot, carrot, tomato, apple-crisps, chokeberry–apple, tomato juices, red wine, spices, grated beetroot, walnuts, hazelnuts, olive oil, almonds) with high natural antioxidants supply measured by ORAC (oxygen radical antioxidant capacity, μmol Tx/day). Total ORAC of daily diet was increased during short-term dietary intervention by 80%. Oxidative stress markers oxLDL and Uric Acid (UA) concentration in serum before and after the dietary intervention were measured.

Results: Daily consumption of 20,810 μmol Tx/day under targeted dietary intervention resulted in significant decrease by 10% of oxLDL from 2.18μg/ml (95% CI:1.30-3.06) to 1.86μg/ml (95% CI:1.09-2.64) and significant increase of UA by 7% from 5.61mg/dl (CI:5.19-6.03) to 5.93mg/dl (CI:5.45-6.41). The higher and significant decrease of oxLDL was observed in subgroup with initial high oxLDL level (>=median,i.e. >=1.27μg/ml) by 13.9% from 3.67mg/dl (95%CI:2.18-5.16) to 3.10mg/dl (95%CI:1.77-4.43) in comparison to group with initial low oxLDL level (non-significant decrease by 6.0%).

Conclusions: The short-term dietary intervention in CVD patients resulted in favorable changes in markers of oxidative stress which were depended on initial level. The results allow to design the dietary intervention targeted on the increase of antioxidant capacity of daily diet which may be successful in decrease of oxidative stress level and cardiovascular diseases therapy.

Keywords: (maximum 5): Oxidative stress, diet, antioxidants, cardiovascular diseases

149/40. Nutritional status and quality of life of older persons in Ibadan, South-West Nigeria

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Introduction: Aging is a process that is associated with physiological changes that make the older persons vulnerable to malnutrition which could affect their quality of life (QoL).

Objectives: To examine the relationship between nutritional status and QoL of older persons in Ibadan, South-west, Nigeria

Method / Design: The descriptive cross-sectional study obtained information on the sociodemographic characteristics of 379 older persons using semi-structured interviewer-administered questionnaires. Dietary intakes and pattern were assessed using 24-hours dietary recall and qualitative FFQ respectively. WHOQOL-Bref questionnaire was used to evaluate QoL. Body mass index(BMI) was also determined. Data were summarized using descriptive statistics while Chi square test and Pearson correlation were used to evaluate relationship and association between variables at p<0.05 level of significance.

Results: Mean age of the males and females were 71.7(±9.1) and 68.8(±7.8) respectively, 57.8% were females, 49.2% of the females reported monthly income between 50-100 USD while 58.4% of the females have no formal education. Females had a higher BMI than the males(p<0.05). Intakes of fiber(97.6%), polyunsaturated fats(100.0%), calcium(100.0%), zinc(64.6%), phosphorous(73.2%), potassium(98.4%), folate(89.8%) and vitamin C(9.9%) were below recommendations in both genders. Fruits and vegetables(89.3%) as well as milk and milk products(85.2%) were not frequently consumed by both genders. The QoL score in social, environmental and psychological domains among males were higher than the females(p<0.05). No difference in the macro and micro-nutrient intakes of both genders(p>0.05). Overall QoL of the males was higher than in females(p<0.05). Gender, marital status and educational level have relationship with the overall QoL(p<0.05). No relationship exists between adequacy of intakes and QoL(p>0.05), however, a positive but weak association exits between BMI and QoL(r=0.04, p<0.05).

Conclusions: Macro and micro-nutrient intakes of the older persons did not meet recommendation and the overall quality of life score is above average.

Keywords: (maximum 5): OLDER PERSONS, NUTRITIONAL STATUS, DIETARY INTAKES, BODY MASS INDEX, QUALITY OF LIFE.

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149/41. Quality of meat products produced in Montenegro with a special attention to the content of salt

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Introduction: One of the leading factors of health risk is arterial hypertension where an excessive intake of salt plays a significant part. Meat and meat products make about 20.8% of the total intake of salt.

Recommendation of WHO is that adults need 5g of salt at the maximum to function normally.

Objectives: Purpose of this work is to analyse the quality of meat products produced in Montenegro with a special attention to the content of salt.

Method / Design: Material and methods

95 samples of different kinds of meat products produced in Montengro were taken for the analysis.

In all samples the content of water, salt and nitrites was analysed and a medium value was calculated.

The content of water was determined by method of dehydration; content of proteins by using Kjeldahl's method, nitrites by spectrophotometric method and salt by volumetric method.

Results: Results of the analysis show that the average content of water is highest in smoked products (67.8%), and the lowest in Njeguš's sausage (23.3%); the highest percentage of proteins is in Njeguš's sausage (30.0%), and the lowest is in tins (10.7%).

The highest percentage of salt is in Njeguš's prshut (8.4%) and the lowest is in tins (1.4%).

The highest concentration of nitrites was found in cooked sausages (46.8mg/kg).

Conclusions: All the analysed samples had satisfying parameters of quality. Although the content of salt in meat products is not limited by the existing legislative provisions in Montenegro, it can be concluded that individual products have a high percentage of salt (prshut about 8.4%; dry-cured neck 7.8%; and a dry-cured fillet 5.3%) which means that intake of only 100g of these products excells the recommended intake of salt and thus increases the health risk.

Keywords: (maximum 5): meat, quality, salt

149/43. The exercise greatly influences a bone mineral density than nutrition.

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Introduction: There were many unclear questions about bone mineral density (BMD). The aim of this study was to investigate the degree that nutrition and exercise influence BMD.

Objectives: We examined 280 female college students whose ages ranged from 19 to 22 years.

Method / Design: BMD was measured with ultrasonic method from heel bone. We searched an intake of the milk, the kind of sports in the high school days and exercise time by questionnaires. We researched them the same way in elementary school days, junior high school days and the college student days. We examined an association between these investigation items and BMD. Furthermore, we investigated the experience of the exercise, strength of the exercise and continuation of the exercise.

Results: A significant correlation was observed between body weight and BMD. The strongest correlation was observed in high school days about exercise time and the relations of the BMD ($r = 0.289$, $p < 0.01$). There was no significant difference between intake of the milk and BMD. About relations of strength of the exercise and BMD, high impact group became significantly high value in BMD for low impact group. We investigated the influence that continuation of the exercise gave to BMD. As a result, it was clear that BMD was high so that exercise experience was long.

Conclusions: We concluded that the exercise in the high school days influenced BMD most.

Keywords: (maximum 5): Bone Mineral Density, Exercise, Calcium

149/50. Nutrition status of secondary school students in Obafemi-Owode local Government, Ogun State, Nigeria

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Introduction: "Within any 24 hour period in the life of a teenager, eating may be a positive or a negative experience. It may involve a quick snack or a grazing process. During adolescent, they undergo profound biological, emotional, social and cognitive changes to reach adult maturity. They experience the physical transformation into young adulthood and must psychologically adjust to a new body, shape, size and psychological capacity. Adolescent needs energy and all nutrients significantly increase to support the rapid rate of growth and development. Although appetite and food intake increase, for adolescent psychosocial development often leads to the development of high-risk nutritional and non-nutritional supplements, adoption of fad diets, and excessive alcoholic consumption.

Objectives: To assess the nutritional status of secondary school students' in Obafemi-Owode local government area, Ogun State, Nigeria.

Method / Design: Data were collected on the demographic, socio-economics, anthropometric indices/measurement, dietary habit and food frequency pattern. The sample size was 243 students' ran-

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domly selected from selected secondary school. Data collected were analyzed using statistical package for social sciences (SPSS) program

Results: Their anthropometry showed that above half of them has normal Body Mass Index, 56.7% eat more than three times per day. The result also showed that the carbohydrates and iron intake of these students exceeded the recommended dietary allowance while the intake of micronutrients (Calcium) was extremely low.

Conclusions: This study showed that the nutritional status of the students were affected by the level of their parent education, particularly their parent income.

Keywords: (maximum 5): BMI, Dietary Habit, Socio – Economics Status, Nutritional Status

149/51. Does women declaration "I cut down sugar" really result in diet nutritional value?

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Introduction: In recent years it has been trend towards healthy lifestyle, especially among young women. A cutting down sugar becomes important part of it, due to direct association with reducing diet-related diseases risk. No knowledge is available whether declared cutting down sugar is associated with improving a diet nutritional value in young women.

Objectives: A comparison of diet nutritional value between two groups of young women, who declared cutting down sugar and do not cutting down it in their diet in any form.

Method / Design: A sample of 192 women aged 20-30y was divided into groups: 'non-Sugar' (n=76) and 'Sugar' (n=116) on the base at women declaration: 'I cut down sugar in my diet' and 'I don't cut down sugar in my diet', respectively. A 7-day food record was used to assess diet nutritional value. The comparison was made for 7 week days ('7days') and separately for 5 working ('5days') and 2 weekend days ('2days').

Results: 'Non-Sugar' women in comparison to 'Sugar' women consumed significantly less sugar (by 20% for '7days', 23% for '5days'; 11% for '2days) and MUFA (by 5% for '7days') and significantly more protein, animal protein, fibre, K, Ca, Fe, Zn, P, Mg, Cu, vitamin B2, B6, folic acid, B12, C, D, E, beta-carotene (by 10-47% for '7days'). The similar differences were found when nutritional value of '5days' or '2days' were compared, except SFA, retinol and vitamin A. No significant differences were shown between 'Non-Sugar' and 'Sugar' women in energy intake (for '7days'1620 and 1570 kcal/day, for '5days' 1499 and 1441 kcal/day, for '2days' 2011 and 1971 kcal/day, respectively).

Conclusions: Young women cutting down sugar improved diet nutritional value by decreasing of sucrose intake and increasing of vitamins and minerals intake although no impact on energy intake was shown.

Keywords: (maximum 5): sugar, nutritional value, self-declared consumption

149/54. Effect of low glycemic diet on body weight of alloxan-induced diabetes in Wistar rats

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Introduction: Health services have traditionally given advice to people with diabetes on the importance of diet in patient health and most appropriate composition of diet. Expert have also disagree on recommendations on patients eating substantial quantities of vegetables, legumes, fish, and whole grain foods, and also that fat intake should compose of high proportion of unsaturated fats and low proportion of saturated fats, and that the total energy intake should be adapted to the needs of the individual without considerations on the effect of these diet on the body weight of patients.

Objectives: The objective of the study assesses the effect of a low Glycemic diet on the body weight of alloxan induced wistar rats.

Method / Design: Cocoyam (Xanthosoma Sagotrifolium) was purposively selected among underutilized root crops in Nigeria because of its low Glycemic index, boiled, sundried to be incorporated into rat feeds and then study the effect on the weight of the rats. 70 male Wistar rats weighing between 120g-160g were purchased and kept in a specific pathogen free animal facility. The rats were acclimatized for one week to normal rat pellets and water prior to the commencement of the experiment, maintained under a 12 h light and dark cycle and at room temperature. The rats were divided into 2 groups (diabetic/non diabetic), Alloxan was injected intraperitoneally to 35 rats as the diabetic group at a dosage of 65 mg/kg body weight at fasting state and the dietary treatment commenced with the sun dried cocoyam incorporated in percentages (25%, 50%, 75% and 100%) and a diabetic control with just the normal rat pellet. The body weight of both diabetic and non diabetic rats was monitored over a period of two weeks (2) and recorded accordingly with respect to the blood glucose concentration of both groups.

Results: The result shows the diabetic groups gained 8.8% in their body weight compared with non diabetic group that gained 14 % grams over a period of 2 weeks while their blood glucose reduced 40%.

Conclusions: Despite positive influence of the diet on the blood sugar concentration of diabetic rat, this research has sufficiently demonstrated the effect of the diet on the body weight of diabetic patient as to contributing to weight gain while reducing the blood glucose. Guidelines on the management of weight must be reviewed when considering a dietary treatment of diabetes.

Keywords: (maximum 5): Glycemic index. Blood Glucose, Weight gain, cocoyam

149/60. Fiber intake in relation to body weight and sociodemographic status in polish population

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Introduction: Polish dietary guidance includes recommendations to increase intake of dietary fiber (DF).

Objectives: To assess the intake of DF in relation to body weight status and socio-demographic factors.

Method / Design: The study included 163 Polish adults recruited in the Food4Me study, a web-based randomised controlled trial on personalised nutrition conducted in seven European countries. Dietary, anthropometric and socio-demographic data was collected using a validated online server and food frequency questionnaire. DF intake was assessed at baseline and month 6.

Results: The average intake of DF in this subset was 28.11 g.day-1, which was in line with Polish recommendations (20- 40g.day-1). The only factor explaining differences in baseline DF intake was the place of residence. Residents of cities with more than 100 000 and up to 100 000, consumed significantly more fiber than participants living in villages up to 10 000 residents. At month 6 we observed that participants with normal body weight consumed significantly more fiber than those overweight or obese. Among participants receiving personalised dietary advice we observed an increase of DF.

Conclusions: Fiber intake was consistent with Polish recommendations. Although providing personalized dietary advice had a positive impact on increasing DF this was similar to those in the control group.

Keywords: (maximum 5): fiber, body weight, Food4Me

149/67. Eating attitude, lifestyle practices and dietary intakes of a university female undergraduates in southwestern Nigeria

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Introduction: Nutritional needs are greater during adolescence and there is increasing report of eating disorders among female adolescents which have been hypothesized to be as a result of westernization.

Objectives: To determine the eating attitude, lifestyle practices and dietary intakes of female undergraduate students of the University of Ibadan, Nigeria.

Method / Design: The descriptive cross-sectional study used a pretested self-administered questionnaire to obtain information from 376 randomly selected female undergraduates of the University of Ibadan. Eating attitude was evaluated using the EAT-26 questionnaire, lifestyle practice was assessed using the adapted health promoting lifestyle questionnaire (HPLP II) while 24-hour dietary recall and pretested food frequency questionnaire was used to assess the dietary intakes. Mean, frequencies and percentages were used to summarize the data while the relationship between variables were evaluated using Chi square at $p < 0.05$.

Results: Mean age was 20.1(±2.4)years, weight was 57.7(±9.2) kg and Body Mass Index(BMI) was 22.1(±3.4)kg/m2. Prevalence of abnormal eating attitude among the participants is 7.4% and 56.9% had poor lifestyle practices. Intakes of energy and protein were below recommended in 83.5% and 73.2% of the participants respectively. Also, 90.6%, 92.9%, 97.6%, 84.3% and 74.0% had inadequate intake of vitamin C, folate, calcium, zinc and iron respectively and all the food groups were infrequently consumed by the majority. Participants with normal eating attitude are significantly higher than those with abnormal eating attitude ($p<0.05$) while those who had poor lifestyle practices are significantly higher than those with good lifestyle practices ($p<0.05$). There is no significant relationship between eating attitude and BMI ($p>0.05$) however, significant relationship exist between eating attitude and lifestyle practices ($P<0.05$).

Conclusions: Prevalence of abnormal eating attitude and poor lifestyle practices among the participants is notable and intakes of both macro and micronutrients were below recommendations.

Keywords: (maximum 5): Eating attitude, Lifestyle practice, Female undergraduates, Dietary intakes, Nigeria

149/76. Dietary intake of essential fatty acids among Indonesian children

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Introduction: Polyunsaturated fatty acids (PUFA), particularly the essential fatty acids (EFA) alpha-linolenic acid (ALA) and linoleic acid (LA), are needed for healthy growth and development of children. They also play a role in prevention of cardiovascular disease later in life. World-wide children's PUFA intakes are below recommendations, and reliable intake data of EFA are often lacking.

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Objectives: The objective of this study was to investigate dietary intake and sources of EFA in Indonesian children.

Method / Design: Dietary intake data of 4-12 year old children (n=43,252) from the national Indonesian health and nutrition survey were used to estimate fatty acid intake. Missing data on individual fatty acids in the Indonesian food composition database were complemented through analyses of national representative food samples and imputation of data from the US nutrient database. The median and distribution of population fatty acid intakes was determined. Nutrient adequacy ratios were calculated as percentage of FAO/WHO intake recommendations. The percentage contribution of food groups to EFA intake across the study population was assessed.

Results: The median (10th;90th percentile) total fat intake of the children was 26.8 (11.9;40.0) percent of energy intake (%E); for fatty acids, intakes were 4.05 (1.91;7.16)%E for total PUFA, 3.36 (1.24;6.25)%E for LA, and 0.20 (0.07;0.65)%E for ALA. Median intake of PUFA was 68% and that of ALA 39% of the lower limit of FAO/WHO recommendations of 6%E and 0.5%E, respectively. Foods contributing most to EFA intake were oils, vegetables and legumes.

Conclusions: This study indicates that a majority of Indonesian children has intakes of PUFA and specifically ALA that are lower than recommended intake levels. Total fat and LA intakes may be suboptimal for a smaller yet considerable proportion of children. Public health initiatives should aim at aligning population fatty acid intakes with dietary recommendations.

Keywords: (maximum 5): essential fatty acids, dietary intake, children, Indonesia

149/78. The influence of a diet with green vegetables, beef and whole milk and butter on cholesterol/HDL ratio at children aged from 1 to 16 years.

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Introduction: In the past years, we were advising a dietary advice to children with medical complaints, without a medical solution. We saw significant clinical improvement in tiredness, subclinical hypothyroidism and bronchial hyper reactivity. The dietary advice comprises the eating of age appropriate portions of beef, green vegetables, whole milk and full-fat butter. All the other dietary habits remained unchanged.

Objectives: Will a shift from semi-skimmed dairy products to full fat products influence the lipid profile?

Method / Design: We conducted a retrospective case-control study in children aged 1 to 16 years. These children followed the dietary advice for complaints like tiredness, respiratory infections, subclinical hypothyroidism (intervention group) for 3 months. The control group consists of children with the same complaints, who did not get a dietary intervention. The lipid profile, BMI, and BMI-z-score were determined in both groups.

Results: In the intervention group, there was a statistical reduction of the cholesterol/HDL ratio (p<0,001) and non-HDL-cholesterol (p=0,038) after following the dietary advice for 3 months. There was also a statistical increase of the HDL-cholesterol (p=0,006) after following the dietary advice. In the intervention group, a significant shift towards normalization of cholesterol/HDL ratio (25%, p=0,003) and HDL-cholesterol (35,4%, p=0,003) occurred. The dietary advice had no effect on BMI and BMI-z-score. In the control group, there were no significant changes.

Conclusions: A change of diet towards green vegetables, beef, whole milk and full-fat butter has no adverse effect on the lipid profile, BMI and BMI-z-score in children. In fact under influence of the dietary advice a significant beneficial effect on the lipid profile occurred. The dietary advice can therefore be safely recommended. The assumption of the American Heart Association does not apply to our targeted group.

Keywords: (maximum 5): dietary advice, nutrients, children, lipid profile, cholesterol, dairy products

149/82. Selenium concentrations in fish from Turkish waters

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Introduction: Selenium is an essential micronutrient and an important component of numerous selenoproteins in humans. Selenoproteins are the constituents of antioxidant systems that may prevent humans from cardiac dieses or cancer. Fish is one of the main sources of selenium, which may protect humans from the toxic effects of mercury.

Objectives: Considering these positive health effects selenium concentrations in fish, caught from Turkish waters, were determined in this study. Selenium levels in edible portions of turbot, red mullet and whiting from Black Sea, tuna from Mediterranean Sea, shark and ray from Marmara Sea were measured. They are the main fish species exported from Turkey to Europe. Thus, determination of selenium concentrations in these species have a place in international scale.

Method / Design: Selenium concentrations were determined using Inductively Coupled Plasma–Mass Spectrometer (ICP–MS). The results obtained were analyzed by means of ANOVA, the statistical package SPSS 17.0 was used. The analyses were carried out in triplicate, and the significance level was chosen as 0.05. In order to validate the method for accuracy certified reference material (NIST-2976) was analyzed.

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Results: Selenium concentrations (mg/kg) ranged between 0.501-1.445 in ray, 0.947-7.226 in shark, 0.011-0.043 in whiting, 1.604-1.899 in red mullet, 0.488-2.978 in turbot, and 0.555-2.339 in tuna. The average concentrations (mg/kg) were 0.988±0.267 in ray, 1.764 ± 1.097 in shark, 0.020 ± 0.009 in whiting, 1.749 ± 0.083 in red mullet, 1.228 ± 0.699 in turbot, and 1.043 ± 0.331 in tuna.

Conclusions: The highest and lowest selenium concentrations were found in shark and whiting muscles ($p<0.05$), respectively. The mean concentrations of shark, red mullet, turbot, and tuna samples were above 1 mg/kg. As a result, edible portions of the main fish species exported from Turkey to Europe were found to be an important source of selenium.

Keywords: (maximum 5): Selenium, fish, micronutrient, seafood

149/86. Water intake from beverages among Croatian breastfeeding women

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Introduction: Water is the most abundant compound in humans and is essential for maintaining normal physical and cognitive performances. Despite evidence of importance of water for the general population's health, fluid intake estimates in breastfeeding women are lacking. Maintaining water balance can be challenging for this extremely vulnerable population. The quality of fluid intake, in addition to quantity, also needs to be assessed.

Objectives: The main aim of this study is to evaluate water intake provided by different types of beverages in a group of Croatian breastfeeding women in order to assess compliance with recommendations for total water intake. For the sake of comparison, water intakes of similarly aged non-breastfeeding postpartum women were estimated, too.

Method / Design: One hundred and fifty-nine adult women, aged 18 – 45, participated in the study and turned in complete data. Of these, 83 were full breastfeeding and 76 were non-breastfeeding. They were volunteers recruited in paediatric clinics 1 month ± 1 week postpartum via word-of-mouth. Data on total fluid intake were collected from two consecutive 24-hour dietary recalls.

Results: Mean water intake from beverages for breastfeeding and non-breastfeeding women was 1289.20 ml/day and 1197.20 ml/day, respectively, with 890.32 ml/day and 696.24 ml/day coming from drinking water, as a major water source. Breastfeeding group met only about 47.75% of recommendations for total water intake, while non-breastfeeding group met 59.86% of recommendations. When the two groups are compared, it can be seen that the second major contributor to the water intake of the breastfeeding women is milk (17.20%; $p<0.001$), while in the non-breastfeeding women this role is played by sugar-sweetened beverages (13.02%; $p<0.001$).

Conclusions: Croatian breastfeeding and non-breastfeeding women had inadequate water intake. Differences in the pattern of fluid consumption were observed according to breastfeeding status.

Keywords: (maximum 5): beverages, breastfeeding, Croatia, water intake

149/92. Dietary energy density in young children across Europe

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Introduction: Little is known about dietary energy density and BMI z-score in pre-school European children.

Objectives: To describe energy density (ED; kcal/g) of the diet among European children.

Method / Design: 8 551 children who participated in the IDEFICS (Identification and prevention of Dietary- and lifestyle-induced health EFfects In Children and infantS) baseline examination with plausible reported 24 h energy intakes were included. ED was calculated including solid foods (EDF). Dietary characteristics and BMI z-score of children aged 2 to <6 years and 6 to <10 years were compared between children with an overall EDF below the <25th percentile, between the 25th and 75th percentile as well as above the >75th percentile. Standardised regression coefficients were estimated to assess the association between dietary characteristics, BMI z-score and ED of the diet.

Results: Food density of the diet was higher in school children (1.94 kcal/g) compared to pre-schoolers (1.81 kcal/g) and similar for boys and girls. EDF was highest in Italy (2.29 kcal/g), lowest in Sweden (1.56 kcal/g). Children with low EDF diets consumed less energy but higher quantity of food than children with high EDF diets. Children with low EDF diets showed healthier food choices than peers with higher EDF diets: they consumed less cereal, sugar and fat but more protein, carbohydrates, dairy products, fruits and vegetables. In this sample, cross-sectional EDF were not associated with BMI z-score.

Conclusions: Health promotion strategies in children should proclaim lower ED diets by means of foods with high water and low

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fat content and mainly fruit and vegetable components. Reducing ED of the diet is a suitable strategy to reduce weight or maintain a healthy body weight without counting calories or fat grams. ED standards are useful; they do not depend on an individual's energy requirement.

Keywords: (maximum 5): Energy density, BMIz-score, 24-hours dietary recall, European children

149/100. Gestational dietary patterns and prepregnancy BMI in relation to the neonatal birth weight in a Polish prospective cohort

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Introduction: The gestational dietary patterns and prepregnancy BMI can affect the immediate and future health of a woman and her infant

Objectives: The aim of the study was to describe gestational dietary patterns and prepregnancy BMI in the relationships to the neonatal birth weight

Method / Design: Prospective cohort study composed of 1042 healthy pregnant women. A food frequency questionnaire administered at the 35th-36th gestational week was used to measure dietary intake during pregnancy. Gestational dietary patterns were defined by principal component analysis and described by multivariate analysis. Only live-born neonates from singleton pregnancies were qualified for the research. Maternal BMI was categorized as underweight, healthy weight and overweight.

Results: The analysed group had the highest share (62%) of women with proper pre-pregnancy BMI (18.5 - 24.9 kg/m2), 15% women with too low (BMI<18.5kg/m2), and 23% with too high (BMI>24,9 kg/m2). The analysis of the child birth weight found 67% eutrophic newborns, 18% of newborns were hypotrophic and 15% were hypertrophic. The highest share of hypotrophic newborns was born by women with the lowest BMI values and highest share of hypertrophic newborns by the highest BMI values. Two major patterns identified: „common Polish" and „healthy".

Conclusions: A relationship was found between neonatal birth weight and pre-pregnancy BMI. Women following the „common Polish" pattern had higher pre-pregnancy BMI and gave birth to heavier neonates

Keywords: (maximum 5): prepregnancy BMI, gestational dietary patterns, birth weight

149/109. The resting energy expenditure in elderly hemodialysis patients

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Introduction: Over half of hemodialysis (HD) patients are older than 65 years. Malnutrition is a powerful predictor of mortality of HD patients. Energy expenditure is one major contributor of malnutrition, and collecting the measurements is the first step for preventing malnutrition. However, less study focus on the energy expenditure of older HD patients.

Objectives: The resting energy expenditure (REE) and effect factors of elderly HD patients are collected and evaluated

Method / Design: Chronic HD patients were divided into elderly HD group (≥ 65 years) or younger HD group (< 65 years). 15 of health elderly participants without chronic kidney disease (CKD) were matched by gender and age for elderly HD patients. Subjects with abnormal range level of thyroid hormone, amputation, or malnutrition were excluded from study. This was a cross-sectional study, and all data were evaluated at the same week. REE (indirect calorimetry) and body composition (multi-frequency bioimpedance analysis) were measured after at least 4-hour fasting and finished the hemodialysis treatment (if they were HD patients).

Results: 107 of HD patients completed the study. Their mean age was 58.8 ± 8.9 years, and 55.1% (n = 59) were older than 65 years. The mean REE of all HD patients was 1064.4 ± 243.8 kcal. Older HD patients had significantly lower REE than younger HD patients (918.8 ± 228.2 kcal Vs. 1108.8 ± 232.0 kcal, respectively and p = 0.0005). Older HD patients had similar REE with the matched group (885.7 ± 199.3 kcal, p = 0.8). The significantly affect factors of REE included: body mass index, percentage of lean body mass, gender, and serum concentration of C-reactive protein were.

Conclusions: In this study, the REE of older HD patients without malnutrition risk is close to health elderly without CKD who matched by age and gender but lower than younger HD patients.

Keywords: (maximum 5): hemodialysis, elderly, energy requirement

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149/112. Adequate micronutrients intakes in pregnancy requires major changes in the quality of the diet

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Introduction: Maternal nutrition is critical to the health of both mother and offspring. Intakes of micronutrients such as iodine, calcium, iron, folate and vitamin D play an important role in preventing adverse pregnancy and birth outcomes, however there is a paucity of data on the nutritional adequacy of diets during pregnancy.

Objectives: Our objective was to identify to what extent pregnancy reduces the nutritional adequacy of the expecting mother's diet and if this nutritional gap can be resolved by simple quantitative or qualitative changes in the diet.

Method / Design: Using a comprehensive probabilistic approach, the PANDiet scoring system, we evaluated the observed nutritional adequacy of diets of French and American women of childbearing age (n=344 and n=563) participating in ENNS and NHANES and we simulated the changes in adequacy in all nutrients and the final overall PANDiet scores of women of childbearing age who would remain on their diet during pregnancy. Then, by either increasing the quantity of consumed foods or using snacks recommended during pregnancy, we simulated the effect of a 150-kcal increase in the energy intake of French women of childbearing age.

Results: Simulation of pregnancy in women of childbearing age lowered the probabilities of adequacy for the intake of some nutrients (8 out of 34 in France including folate, vitamin D and iodine, and 9 out of 30 in the US including folate), resulting in a decrease in the overall PANDiet score, which was similar in both countries. Simulated 150-kcal increases in energy intake, with an increase in the quantity of food consumed or using recommended snacks only partially corrected this decrease. Indeed, those snacks failed to address the decrease in adequacy related to some of critical micronutrients during pregnancy.

Conclusions: Pregnancy induces an important nutritional gap, which is not efficiently addressed with simple generic dietary advice.

Keywords: (maximum 5): Pregnancy, nutritional adequacy,micronutrients, dietary advice

149/115. The overall diet quality of obese pregnant women does not differ across regions in Europe

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Introduction: Up to 34% of women enter pregnancy as either overweight or obese. The maternal diet is a key modifiable factor associated with weight related adverse pregnancy outcomes, however less is known about the maternal diet across different European regions.

Objectives: To evaluate the overall diet quality of European obese pregnant women.

Method / Design: As part of the EU funded (FP7) DALI pilot project, pregnant women (pre-pregnancy BMI ≥ 29 kg/m²) were recruited before 20 weeks of gestation across nine European countries. Three-day dietary records were collected and processed in a standardized manner (n=101). A Diet Quality Index (DQI) score, consisting of a quality (making the optimal food quality score), diversity (degree of variation) and equilibrium (balance in food intakes) component, was calculated to determine the overall diet quality. The higher the DQI score, the better an individual complies with the dietary recommendations.

Results: The overall DQI score was 62% with quality being the weakest (29%) and diversity the strongest (93%) component. None of the DQI scores and component scores significantly differed between European countries (DALI-DQI P = 0.45, quality P = 0.54, diversity P = 0.66 and equilibrium P = 0.15). The quality and equilibrium scores of women with a BMI ≥ 40 kg/m² were significantly higher compared to respectively women with a BMI 35-39.99 kg/m² and women with a BMI 30-34.99 kg/m² (41 versus 21%, P = 0.03 and 38 versus 6%, P = 0.02).

Conclusions: The overall diet quality of obese pregnant women is far from optimal and is surprisingly similar across different regions in Europe.

Keywords: (maximum 5): dietary pattern, diet quality index, obese pregnant women, Europe

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149/126. Potential biological activities by grana padano and trentin grana in vitro digestates at different aging.

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Introduction: Nutrients and associated molecules besides their absorption can interact with intestinal cells and affect their functionality. The identification of this ability allow obtaining a health-centered nutrition. Food corresponding to these requirements are known as functional foods.

Objectives: To identify the biological potential of peptide mixtures derived from two of the most consumed Italian cheese Grana Padano (GP) and Trentin Grana (TG), in vitro digested at different ripening times (13 - 26 months).

Method / Design: Six cheese samples of Grana Padano (GP) and Trentin Grana (TN) at different aging were kindly provided by the Grana Padano Production Consortium. The samples were preliminary submitted to in vitro digestion. The supernatant obtained was collected and analyzed for protein and calcium determination. All experiments were performed in a 70% Caco2/ 30% HT-29 co-culture. MTT assay was used to measure cell viability. Measurement of the transepithelial electrical resistance (TEER) in co-culture was used to monitor the integrity of the cell layer after direct contact with cheese digestates. Video imaging experiments were performed to monitor cell calcium uptakes mediated by cheese digestates. Bone mineral matrix formation was assayed by Alizarin Red Staining in Saos2 osteoblast-like cells.

Results: Calcium content is high and similar in both cheese, while peptide level is affected by the use of lysozyme (GP). GP and TN digestates can affect cell viability only at the major tested doses and after 24h incubation. The cell permeability was not negatively modified by GP and TN digestates. Calcium uptake by cells was activated by GP and TN digestates even in absence of extracellular calcium ions. Bone mineral matrix formation was observed in Saos2 cells after treatment with GP and TN digestates.

Conclusions: GP and TN can be considered as potential functional food even if future studies are necessary to confirm it.

Keywords: (maximum 5): cheese, calcium, intestinal cells, permeability, bone cells.

149/162. Analysis of the nutrition of Czech infants and toddlers

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Introduction: Early life nutrition contributes to metabolic programming of human health

Objectives: To evaluate efficiency of currently applicable recommendations for early life nutrition based on intake of nutrients.

Method / Design: Healthy and born at term children aged 6 months up to 3 years from 4 Czech regions. The study was conducted in the winter of 2013/2014. Complete diet of the children was recorded for 3 days and other data regarding their nutrition was collected. Laboratory tests (complete blood count, plasma iron, feritin, urinary iodine) were made for infants. Vitamin D level test was added for toddlers. Statistic evaluation of the results was made based on intake values recommended by DACH.

Results: 823 children were included in the study. Groups - A: children aged 6-11 months, B: 12-17 months, C: 18-23 months, D:24-35 months. Energy intake was based on DACH recommendation for all groups. 10% of Group C (D) children had intake of proteins at 17.2% (16.3%) of energy intake; SAFA >17.5% (19.2%); PUFA<6.2% (5.2%). Average intake of NaCl was 2.35g (2.85g) for Groups C (D) respectively. Insufficient intake of vitamin D was found for 62% of Group D toddlers. Anaemia was found for 10.6% of Group A children; 36% of children had a low level of vitamin D. Low urinary iodine was found in Groups A (D) for 26.8% (23.2%) of children

Conclusions: The results show that the early nutrition guidelines should be further defined and monitored to avoid unnecessary shortcomings in intake of individual nutrients.

Keywords: (maximum 5): INTAKE OF NUTRIENTS, INFANTS, TODDLERS, NUTRITION GUIDELINES

149/172. Frequency of fruit and vegetables consumption among school-age children in Poland

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Introduction: Fruit and vegetables constitute a very important element of the healthy nutrition. In a child's diet there should be approximately 5 portions of fruit and vegetables each day. Studies show that the consumption of fruit and vegetables by children from different populations, including the Polish one, is unsatisfactory and it differs from the recommendations on the amounts and well as the frequency of the consumption of that group of products.

Objectives: Assessment of the differences in frequency of fruit and vegetable intake among girls and boys in primary and secondary schools in Poland.

Method / Design: The study was conducted in 2013 and covered the total of 3266 school-age children (1619 girls and 1647 boys) from 64 primary and secondary schools from all 16 regions in Poland.

Results: It was observed that girls more often than boys eat fruit. Older children from secondary schools, less likely eat fruit every day more than once a day in comparison to the younger elementary school students. Generally 62% of boys and 56% of girls in secondary schools do not eat fruit every day. Girls more often than boys eat vegetables. In secondary schools, study shows the reducing of the number of pupils eating vegetables every day more than once compared to primary schools. Up to 65% of boys and 58% of girls in secondary schools do not eat vegetables every day.

Conclusions: In Poland, fruit and vegetable intake by children is insufficient and consumption decreases with age. The growth of fruit and vegetable intake in children should be achieved via a number of activities undertaken simultaneously at schools and among parents.

Keywords: (maximum 5): children, vegetables and fruits intake, primary and secondary schools

149/180. Food form and processing impacts metabolizable energy (ME) value of almonds

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Introduction: Usually, the ME value of foods is calculated as the sum of the product of the food's macronutrient content and the Atwater general or specific factors. For whole pistachios, whole almonds, and walnut halves and pieces, this approach overestimates the ME value from approximately 5% to 20%. Little is known about how the physical form of nuts or their processing affects their ME content.

Objectives: To measure, in humans, the ME value of four forms of almonds when consumed as part of a complete diet.

Method / Design: A randomized clinical trial was conducted using 4 forms of almonds in a crossover design. The almond forms were 1) whole, 2) whole roasted, 3) chopped, and 4) butter. In addition, each participant (n=18) consumed a base diet without almonds. Each diet was consumed for 9 days and following that adaptation period, total fecal and urine collections were performed for a period 7 to 10 days. The gross energies of the diets, almonds, urine, and feces were measured by adiabatic bomb calorimetry. The ME value of the nuts was determined using the paired-diet approach.

Results: The energy value of whole almonds was greater than that of roasted whole almonds. There was no difference between roasted whole and chopped; however, both whole roasted and chopped had a significantly lower ME value compared to butter.

Conclusions: Atwater factors (general or specific) provide inaccurate estimates of ME for almonds whether they are consumed whole, whole roasted, or chopped, whereas they are accurate for butter. It is likely that estimates of macronutrient digestibility used to develop the Atwater general and specific factors are incorrect for nuts.

Keywords: (maximum 5): almonds, food processing, metabolizable energy, Atwater factors

149/184. Replacement of cow's milk by young-child-formula improves nutrient intakes of UK children: a simulation study

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Introduction: Young-child formulae (YCF) are fortified milk-based drinks intended for children from 1 year of age onwards. Research into the role of YCF in a young child's diet is limited and there is no consensual recommendation on the use of YCF

Objectives: In order to identify the nutritional benefits and risk potentially related to the consumption of YCF, we evaluated the theoretical nutritional impact of replacing current cow's milk intake by an YCF.

Method / Design: From the UK Diet and Nutrition Survey of Infants and Young Children (2011) whole cow's milk consumers, aged 12-18 months (n=591) were selected for simulation scenarios. In Scenario 1, we tested the replacement of all whole cow's milk (434ml/d ±187) by a matching volume of YCF, and in Scenario 2 all whole cow's milk was replaced by the on pack recommended daily intake of 300ml. Nutrient intakes before and after simulation scenarios were compared and evaluated against nutrient recommendations. All analyses were performed using Creme Food software.

Results: Intakes of protein and saturated fatty acids were significantly decreased in both scenarios, whereas essential fatty acids intakes were increased. The intake of total sugars was increased, but this increase was mainly due to an increase in intrinsic and milk sugars (73% of the increase). Calcium and sodium intakes were similar before and after simulation. The prevalence of nutrient inadequacy among the children before simulation was 95.2% for vitamin D and 53.8% for iron. After simulation, inadequacy decreased to 4.9% (Scenario 1)

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and 0% (Scenario 2) for vitamin D and to 2.7% (Scenario 1) and 1.1% (Scenario 2) for iron.

Conclusions: This simulation study suggests that the replacement of habitual cow's milk intake by a matching volume or 300ml of YCF leads to nutritional intakes more in line with recommendations in young children in the UK.

Keywords: (maximum 5): child; UK; nutrition; simulation; formula

149/185. Diet quality of UK children according to their consumption of young-child-formula and commercial infant food

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Introduction: The potential contribution that Young-Child-Formula (YCF) and Commercial Infant Food (CIF) make to a healthy diet of children aged 12 months and over remains unclear. Diet quality indexes are useful tools to provide an overall measure of the quality of the diet based on current nutrition knowledge.

Objectives: To adapt and validate a nutrient-based diet quality index (the PANDiet) for UK young children, and to determine the nutritional adequacy of the diets according to consumption of YCF and CIF. Secondary analysis was undertaken on 1152 young children aged 12-18 months from the UK Diet and Nutrition Survey of Infants and Young Children (DNSIYC, 2011).

Method / Design: Validity of the PANDiet was assessed by studying associations between the PANDiet and its components, energy intake, food intakes and child and maternal characteristics. Four groups of children were defined according to their intake of YCF and CIF: no consumption, consumption of YCF, consumption of CIF, consumption of YCF and CIF. Child and maternal characteristics, PANDiet scores and food intakes of these four groups were compared.

Results: The PANDiet was adapted to the UK based on 25 nutrients. The validation indicated that a lower score was linked with lower intakes of YCF, CIF, vegetables and fruits. Determinants of having a lower score were being older, having siblings and having a younger mother with a lower educational level. Compared to children consuming neither YCF nor CIF, the PANDiet scores were higher in children consuming CIF (+1.4), children consuming YCF (+7.2) and children consuming YCF and CIF (+7.8, all $P<0.001$).

Conclusions: The PANDiet is a valid indicator of the nutrient adequacy of the diet of UK young children. Consuming CIF was not found to be associated to a lower nutritional adequacy whereas consuming YCF was associated to a higher nutritional adequacy.

Keywords: (maximum 5): UK; child; Nutrition; Commercial infant foods; Young-Child-Formula; Food

149/186. Sampling and composition analysis of Finnish fish

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Introduction: Iodine intake is a hot topic in nutrition. In addition, information on sodium content is needed for the calculation of salt content. To evaluate intake of nutrients, there must be current information on ingredients of different food items. Finnish sea fish and freshwater fish are nationally important food items, but their food composition data originates from 80'ies.

Objectives: The aim of this study was to update information on the composition of the most consumed Finnish fish. Sampling was planned to give estimation on the effect of geographic area or farming.

Method / Design: Five different fish species (whitefish, vendace, pike, perch, and pikeperch) were analysed for main components (fat, moisture, protein, and ash), fatty acids, iodine and sodium. The samples were collected from the market during one season. Fish samples were pooled according to geographic areas, except whitefish which was pooled as farmed or wild. Fat content was analysed by solvent extraction, ash and moisture by gravimetric methods, protein by Kjeldahl principle, fatty acids as methyl esters by gas chromatography, sodium by capillary electrophoresis, and iodine by inductively coupled plasma mass spectrometry.

Results: Species and habitat had an effect to the composition. Iodine contents varied between 6.25 - 77.5 µg/100g and sodium contents between 15.2 – 56.0 mg/100g in all samples. Fish grown in the Baltic Sea had lower iodine content than freshwater fish. The effect of habitat on sodium and fatty acid content was species dependent.

Conclusions: Water environment has an effect to the nutrient content of fish species. Representative sampling of biological foods with highly variable parameters needs careful planning.

Keywords: (maximum 5): composition, fish, iodine, sodium

149/188. Nutriplanet: global mapping of nutritional and health situation of specific population groups within a country

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Introduction: Understanding the current health and nutritional status in a country is the first essential step in adapting regimes to each local context.

Objectives: To map local food consumption patterns and nutrient intakes in different population groups across the world and to evaluate its link to health outcomes.

Method / Design: We developed a methodology called 'NutriPlanet', to describe the nutritional and health situation of specific population groups (e.g. children, pregnant women, seniors) within a country. Over the last 10 years, the analysis has been implemented in 52 countries worldwide, 15 of which are European countries.

The analysis consists of two complementary approaches. Firstly, an extensive literature review covering all published and grey literature in the context of health and nutrition (e.g. nutritional deficiencies, breast-feeding practices, vaccination regimes) is performed. Secondly, this review is enriched by the opinions and experiences of different local experts from academia, hospitals and institutions.

All data are entered and categorized into the online NutriPl@net-database.

Results: Despite different eating habits across the world, nutritional challenges are surprisingly similar. Excessive intakes of saturated fat and sodium are common in all population groups, and main micronutrient deficiencies observed are iron and vitamin D. In Latin America and Asia, intakes of vitamin A, zinc and calcium are often inadequate as well. The nutrient imbalances found may lead to important health issues, such as anaemia and obesity, which are commonly found in countries worldwide.

Conclusions: In order to understand country-specific needs, it is crucial to gather information on the health and nutrition status of population groups within a country. This information is used to adapt regimes, such as product compositions, and develop education material specific to each locality. Moreover, the knowledge gaps found provide the impetus for the development of further studies including dietary surveys and nutritional status studies.

Keywords: (maximum 5): nutrition, health

149/195. Energy value of meals in kindergartens in Podgorica Nada Mališić1,Milena Đuričković1, Borko Bajić1, Ljiljana Jovićević2 [1]Institute of Public Health Montenegro, [2] Primary Health Care Center Bar e-mail-nada.malisic@ijzcg.me

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Introduction: Proper nutrition of children is basic prerequisites for health, disease prevention, normal growth and development. In order to meet these needs nutrition in kindergartens should be balanced in order to provide optimal energy intake.

Objectives: The aim of this paper is to examine whether the energy value of meals in kindergartens isadjusted to the needs of preschool children in capital Podgorica.

Method / Design: Samples were taken in kindergartens where meals are preparing, and in two central kitchens from which food is distributed in 10 other kindergartens. A total of 60 samples were taken, of whom 20 samples of breakfast, 20 samples of lunch and 20 samples of snacks.

In all samples content of macronutrients, minerals, water content, weight and energy values is examined. Since there are no national standards in this area, adequacy of the obtained values is performed according to recommendations of WHO and neighboring countries.

Results: Structure of meals shows that breakfast consisted mostly of grains products in combination with milk and dairy products. Lunch consisted mostly of vegetable and meat products as well as grain products. Snacks consisted mostly of fruit or biscuits.

Average content of macronutrients in all meals were 9.07% of protein, 11.57% of fat and 58.27% of carbohydrates, while mineral content was 2.38%. Average energy value of full-day meal was 381kcal (1596kJ). The average prevalence in the energy structure of meals was 11.76% of protein, 30.3% fat and for 58.18% of carbohydrates.

Conclusions: Energy value of the total meals in kindergartens is not in accordance with recommendations, which can cause various problems related to children's health.

It is necessary to adopt national legislation on food standards for pre-school children as soon as possible and to train staff and implement efforts on continuous improvement of nutrition in kindergartens.

Keywords: (maximum 5): Energy value, children, nutrition.

149/197. Development of a hydration index: assessing the potential of different beverages to affect hydration status.

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Introduction: The water content of ingested beverages enters the body water pool at a rate dictated by the rates of gastric emptying and intestinal absorption. Water is subsequently lost from the body by

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various routes, primarily urine in the absence of sweating. The post-ingestion diuretic response following prior hypohydration is influenced by several characteristics of the drink, including primarily volume, energy density, electrolyte content, and the presence of diuretic agents.

Objectives: This study investigated the effects of 13 different commonly-consumed drinks on urine output and fluid balance when ingested in a euhydrated state, with a view to establishing a Hydration Index (HI; i.e. volume of urine produced after drinking expressed relative to a standard treatment [still water]).

Method / Design: Each subject (n=72, euhydrated and fasted males) ingested 1 L of still water or one of three other commercially-available beverages over a period of 30 minutes. Urine output was then collected for the subsequent 4 h. HI was corrected for water content of drinks and was calculated as the amount of water retained at 2 h after ingestion, relative to that observed following ingestion of still water.

Results: Total urine masses (mean±SD) over 4 h were smaller than the still water control (1337±330 g) after oral rehydration solution (ORS, 1038±333 g, P=0.004), full-fat milk (1052±267 g, P=0.006) and skimmed milk (1049±334 g, P=0.005). Cumulative urine output at 4h after ingestion of cola, diet cola, tea, cold tea, coffee, lager, orange juice, sparkling water and a sports drink were not different from the response to water ingestion. The mean HI at 2 h was 1.53(0.74) for ORS, 1.32(0.51) for full-fat milk, and 1.44(0.54) for skimmed milk.

Conclusions: An HI may be a useful measure to identify the short-term hydration potential of different beverages when ingested in a euhydrated state.

Keywords: (maximum 5): fluid balance, dehydration, rehydration

149/203. Reproducibility of a web-based Food frequency Questionnaire for 14 years old Danish adolescents

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Introduction: Food frequency questionnaires (FFQ) are widely used in large-scale studies to assess dietary intake. Even among adults it can be a difficult cognitive task completing an FFQ, which requires accuracy in terms of memory and quantification of the amounts consumed among others. In order to detect possible associations between dietary intake in adolescence and later diseases it is crucial to clarify if the FFQ is valid by evaluating reproducibility as one aspect of validity.

Objectives: The aim of this study was to evaluate the reproducibility of a web-based FFQ with Danish adolescents within the Danish National Birth Cohort (DNBC).

Method / Design: Data for the present study were obtained from a nested case-control study within the DNBC. A total of 100 adolescents completed the FFQ at a clinic visit and were invited by hand out between November 2012 and March 2013 to complete a second FFQ at home four weeks after the FFQ1.

Results: 48 adolescents (60% girls) aged 13 to 15 years old completed the two FFQs. The proportion of adolescents correctly classified according to magnitude of food intake ranged from 45% (fish) to 77% (vegetables) whereas misclassification ranged from 0% (fruit, oils & dressing) to 15% (beverages). Overall, no significant differences were observed between food groups or nutrients in FFQ1 compared to FFQ2. Mean crude Spearman correlation for all food groups was 0.56 and mean intra-class correlation for all food groups was 0.61.

Conclusions: Adolescents aged 13-15 years old seemed capable of recalling overall dietary habits accurately however, had some difficulties in estimating frequency of consumption of regularly consumed food items. The reported level of reproducibility was acceptable and is important when assessing diet among adolescents to facilitate development of instruments that can be used to accurately assess adolescent diet.

Keywords: (maximum 5): reproducibility, web-based FFQ, dietary assessment, adolescents

149/204. Vitamin D intake-status relationship among Danes aged 4-60 years during winter

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Introduction: Ensuring optimal vitamin D status is important to human health, and since 25-hydroxyvitamin D (25(OH)D) concentrations reflect oral intake and skin production it is used as combined biomarker for exposure. During winter time skin production of vitamin D is limited at high latitudes, and oral intake becomes essential. The sources of intake include supplements, fortified food and non-fortified food (e.g. fish). It is uncertain how much vitamin D is needed to maintain an optimal year-round vitamin D status.

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Objectives: The objective of the present study was to investigate the relationship between oral intake and 25(OH)D measured in 692 children and adults in late winter in Denmark (56°N) taking into account the initial 25(OH)D concentrations (measured 6 months before at summer time), age, gender and BMI.

Method / Design: The 25(OH)D concentration was measured by liquid chromatography tandem mass spectrometry. The oral intake of supplements was assessed by a self-administered web-based questionnaire and the oral dietary intake was measured by a semi-quantitative food frequency questionnaire.

Results: The median oral intake was 6.2 (2.8, 11.1) µg/day and mean 25(OH)D concentration was 52 (39.1, 73.1) nmol/l. The vitamin D intake-status relationship was best fitted in a log2 non-linear model. An intake of 5 µg/day was needed to maintain 25(OH)D concentrations above 50 nmol/l for 50% of the population, and 39 µg/day was needed to maintain 95% of the population above 50 nmol/l.

Conclusions: The major finding of the present study was that the relationship between oral vitamin D intake and 25(OH)D was best fitted by a log2 non-linear curve, and that this relationship was modified by gender and initial 25(OH)D concentrations.

Keywords: (maximum 5): Vitamin D, status, intake, children, adults

149/213. EsKiMo II – The nutrition module in a health survey among children and adolescents in Germany

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Introduction: Within the "German Health Interview and Examination Survey for Children and Adolescents" (KiGGS), the "Eating Study as a KiGGS Module" (EsKiMo) was conducted in 2006. After almost 10 years, EsKiMo II will be realized in the second wave of KiGGS (2014-2016).

Objectives: Aim of EsKiMo II is an actual assessment of the dietary behaviour of children and adolescents aged 6-17 years living in Germany.

Method / Design: EsKiMo II will be conducted among 2,600 participants from KiGGS Wave 2 between June 2015 and May 2017 by the Robert Koch Institute. Data will be collected by trained staff in the 167 KiGGS sample points. Parents of children aged 6-11 years will be instructed at home to conduct weighted food records on three consecutive days and on one independent day some weeks later. Required materials, such as a scale and a picture book to determine the consumed amounts, will be provided. Adolescents aged 12-17 years will be interviewed face-to-face about their eating behaviour during the past four weeks using the dietary interview software for health examination studies (DISHES). In addition, a questionnaire to assess additional information will be given to all participants. Food items will be coded with the German Food Code and Nutrient Database (BLS 3.02).

Results: EsKiMo II will provide actual and representative information on the nutritional situation of the 6-17-year-olds in Germany. Changes in dietary behaviour can be described by comparison with EsKiMo I and risk groups with insufficient nutrient intake or unhealthy eating habits can be identified.

Conclusions: Results of EsKiMo II are relevant for decisions, measures and evaluations within nutrition, consumer and health policy.

Acknowledgements: The study is funded by the German Federal Ministry of Food and Agriculture through the Federal Office for Agriculture and Food.

Keywords: (maximum 5): Nutrition survey, food intake, children and adolescents

149/223. Correlation between bone and glucide metabolism depending on the nutritional status in diabetic patients

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Introduction: Diabetes mellitus and low-trauma fractures are major causes of morbidity and mortality worldwide.

Objectives: Evaluate the relationship between nutritional status, dairy calcium intake, serum levels of vitamin D, glycemic control and the onset of osteoporosis and/or bone fractures predisposition in T1DM and T2DM patients.

Method / Design: 1151 patients (350 men and 799 women) divided into three groups:

400 patients with T1DM of which 19 with osteoporosis (age 42,39±13.66 yo; BMI 23,88±3,28),

401 patients with T2DM of which 64 with osteoporosis (age 62.01±13.21 yo; BMI 30,25±8,83),

350 non-diabetic patients with osteoporosis (NDP) (age 64.59±10.45 yo; BMI 25,64±4,17).

In all subjects nutritional status, anthropometric, metabolic and glycemic control parameters, BMD (as T-score) at the lumbar spine (LS-BMD), femural neck (FN-BMD) and total femur (Ftot-BMD) were measured. Prevalence of bone fracture between the different group were determined

Results: Low vitamin D levels were found in both T1DM (16.38±2.74ng/mL) and T2DM (15.04±9.35ng/mL) as well as low daily calcium intake (634.84±159.97mg/day and 649.43±189.86mg/day, respectively).

About 89% of T1DM and 37,5% of T2DM had T-score≥-2,5; T1DM had also a FN-BMD (T-score:-2.373±0.68 vs -1.91±0.72; p=0.016) and Ftot-BMD (T-score: -2.368±0.79 vs -1.60±0.96; p=0.003) significantly

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lower than T2DM and a LS-BMD significantly lower compared to NDP (T-score:

-2.26±0.79 vs -2.91±0.86). Instead, T2DM had a LS-BMD, FN-BMD and Ftot-BMD significantly higher than NDP (p=0.0001, p=0.004, p=0.007).

We didn't found a positive correlation between BMD and HBA1c.

1% of TIDM, 3.2% of T2DM and 14.8% of NDP had vertebral fractures; 22.7%, 9.2% and 14% had non-vertebral fractures. T2DM had 38% reduction in risk of non-vertebral fractures (OR 0.62, 95%CI=0.39-0.98) compared with controls; instead, T1DM had an increased risk of non-vertebral fractures (OR 1.81, 95%CI 1.24-2.66).

Conclusions: T1D had an increased risk of fractures. Calcium intake and vitamin D resulted insufficient in all groups. HBA1c did not affect BMD or risk of fractures in all groups.

Keywords: (maximum 5): Diabetes, Osteoporosis, Fracture, Nutritional Status

149/255. Effect of dietary vitamin B6 on gene expression in skeletal muscle of rats

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Introduction: Recently, we have found that dietary supplemental vitamin B6 to a low vitamin B6 diet markedly increased carnosine and anserine, which are ergogenic and anti-oxidant factors, in skeletal muscles of rats. However, the role of vitamin B6 in the muscles is still unclear.

Objectives: To reveal the effect of dietary vitamin B6 on gene expressions of several myokines and Nrf2-regulated factors, which are induced by exercise, in skeletal muscle.

Method / Design: Rats were fed a diet containing 1, 7 (recommended dietary level) or 35 mg pyridoxine HCl/kg for 6 weeks. The gene expressions of myokines and the Nrf2-relating factors in gastrocnemius muscle were analyzed by Real-time PCR.

Results: Food intake and growth were unaffected by dietary treatment. The 7 mg B6/kg and 35 mg B6/kg diets significantly elevated the concentration of pyridoxal phosphate (PLP) in the gastrocnemius muscle compared to the 1 mg B6/kg diet. The expressions of myokines such as SPARC, IL8, IL7, RARRES1, LIF, IL6, ANGPTL4 and myonectin were significantly elevated in the 7 mg B6/kg diet group compared to the 1 mg B6/kg diet group ($P < 0.05$). However, intriguingly, the 35 mg B6/kg diet caused no significant elevations in the expression of such genes when compared to the 1 mg B6/kg diet. Similarly, compared to the 1 mg B6/kg diet, the gene expressions of Nrf2 and its regulated factors such as HO-1, GPX1 and SOD2 were also significantly elevated in the 7 mg B6/kg diet ($P < 0.05$), but not in the 35 mg B6/kg diet.

Conclusions: This study provided the first evidence that dietary vitamin B6 is a determinant of gene expressions of some myokines and Nrf2-regulated factors in skeletal muscle.

Keywords: (maximum 5): Vitamin B6, myokine, Nrf2, skeletal muscle, rats

149/264. Suboptimal iodine and vitamin D status in Norwegian women in pregnancy and postpartum

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Introduction: A maternal unbalanced diet may have long-lasting effects, not only for the mother, but also for the child. The diet of Norwegians has changed the last decades and the intake of meat, vegetables and fruit has increased while the intake of cereals and fish has been relative stable.

Objectives: To assess nutritional status of iodine and vitamin D in women from pregnancy to twelve months postpartum, and to assess relationship between nutritional status and adherence to the dietary guidelines.

Method / Design: Biological samples (blood and urine) and dietary habits (food frequency questionnaire) were collected in a longitudinal observational study of pregnant women at gestation week 28, and at three-, six- and twelve months postpartum (n=118).

Results: The iodine status was generally low, and only 42% had an adequate iodine status in pregnancy (urinary iodine concentration > 150 µg/L). Postpartum the iodine status was even lower, with only 25, 29 and 27% having an adequate status (urinary iodine concentration > 100 µg/L) after three, six and twelve months. All participants reported intake of dairy products, but the intake of fish was low compared to the recommendations. The vitamin D status measured as serum 25 hydroxy vitamin D were adequate for 68-77% of the participants, but only those using supplements had a vitamin D intake in accordance with the recommendations. The vitamin D level showed seasonal variation with lowest level during the winter months, and only 50% of the women had adequate levels (> 50 nmol/L) at 12 months postpartum.

Conclusions: The iodine status was suboptimal both during pregnancy and postpartum, while the vitamin D status was generally better, but suboptimal during the winter months. A better adherence to the dietary recommendation may have beneficial effect on iodine and vitamin D intake and status in pregnant and postpartum women.

Keywords: (maximum 5): iodine, vitamin D, seafood, pregnancy, suboptimal

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149/266. Vitamin B12 and vegan diet - quantitative analysis of everyday supply

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Introduction: Veganism is a growing trend in Germany. It is widely discussed in the media and restaurants and food retailers keep offering more plant based choices. Expert opinion differs on whether a vegan diet is beneficial or harmful to personal health. Some studies point to an inadequate supply of certain nutrients, especially vitamin B12 seems to be of concern.

Objectives: The survey was designed to establish how vegans handle vitamin B12 supply in everyday life. This includes taking appropriate measures such as taking supplements or having the vitamin B12 blood status checked.

Method / Design: An online survey with 479 adult Germans participants was conducted. Recruiting for the survey was via online social networks.

Results: Based on present scientific knowledge, vitamin B12 can not be sufficiently supplied with plant based foods and should therefore be supplemented. Dietary supplements and/or enriched foods seem to be necessary. Nearly all survey participants rate the importance of proper vitamin B12 supply as 'important' or 'very important'. 76% of participants use supplements mostly in form of pills or tooth paste. Enriched foods were used by 28% of participants. Half of the participants have had their vitamin B12 blood levels tested by their physician. No relation was found between the duration of the vegan diet and the consumption of supplements.

Conclusions: The survey indicates that participants are interested in sufficient supply with vitamin B12 and that the majority acts accordingly. How this behaviour influences the actual blood status has not been determined in this study. The frequency of vitamin B12 supplementation is therefore not necessarily related to an adequate supply. Because of the study design, the results may not be applicable for all German vegans. Studies which examine the relation between supplementation and blood status are needed.

Keywords: (maximum 5): vitamin B12, veganism, plant based diet, cobalamin, supplements

149/267. Implementation of a methodology to classify foods based on their degree of processing – first results

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Introduction: The consumption of industrially processed foods (convenience foods) and drink products may affect dietary patterns and health. No representative studies are available that confirm this trend. The literature doesn't provide any consistent definition of the term 'convenience foods'.

Objectives: To develop a consistent classification of foods based on their processing and to assess their association with dietary quality.

Method / Design: A classification of foods based on the extent and the purpose of the processing in food production was implemented. The classification assigned foodstuffs to three main groups: fresh foods, processed items and ultra-processed products. In detail, these were divided into: unprocessed foods, single culinary ingredients, processed and ultra-processed products; beverages and instant products were also considered in separate categories. A total of 17 'food groups of processing' were defined to divide food in terms of their processing. These categories were then applied to data from two large nutrition surveys on food intake among infants, children and adolescents in Germany (VELS, EsKiMo; n = 2,010).

Results: The foods and beverages consumed were each assigned to their most appropriate 'food group of processing'. The establishment of an Access-database allowed automatic assignment [1]. The average dietary intake among children between 1 and 12 years old was made up of 41.5 % (2777 kJ) of dietary energy from fresh foods, 16.5 % (1147 kJ) from processed products and 42.1 % (2762 kJ) from ultra-processed products.

Conclusions: This newly developed classification scheme offers the possibility to group foods in relation to their degree of processing. The system is suitable to investigate specific scientific questions (e.g. an evaluation of personal or population-based dietary patterns).

Keywords: (maximum 5): ultra-processed foods, convenience products, food consumption

149/268. Dietary determinants of one carbon metabolism and methylation capacity

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Introduction: One carbon metabolism (OCM) and especially hyper-homocysteinemia is related to pregnancy outcomes, cognitive dysfunction, cardiovascular disease, and metabolic syndrome. Several dietary components and foods, such as wholegrain and fish, have been suggested to be of importance for regulation of OCM.

Objectives: To investigate if intake of OCM components such as folate, vitamin B12, and B6, or wholegrain and fish are associated with plasma s-adenosyl-methionine (SAM), s-adenosyl-homocysteine (SAH), methylation capacity (SAM:SAH) and homocysteine (Hcy).

Method / Design: A cross-sectional study based on two dietary intervention studies from the 3G-center with a total of 118 participants. The subjects were apparently healthy, 20-65 years old, BMI 25-35 kg/m2 and at least one other feature of metabolic syndrome. Dietary intake was assessed by 4-day food diaries and associations with OCM were examined by linear regression models adjusted for age, gender and energy intake.

Results: No associations were found between folate or B12 intake and Hcy, SAM, SAH or SAM:SAH, but a tendency was seen for vitamin B6 and Hcy (P=0.09) and SAM:SAH (P=0.10). The SAM:SAH ratio was inversely associated with intake of carbohydrate (P<0.01), specifically sugar, and positively associated with fat (P=0.03). Intake of egg products was inversely associated with Hcy (P=0.01), whereas fish intake was associated with reduced Hcy (P=0.02) and higher SAM:SAH (P=0.03). The association between intake of fish and egg and Hcy and fish and SAM:SAH was still significant after adjusting for intake of vitamin B6, B12 and folate. Wholegrain intake and alkylresorcinol, a biomarker of wholegrain intake, were not associated with the OCM metabolites.

Conclusions: These results indicate a role of the relative intake of carbohydrate and fat in relation to OCM. Intake of fish and eggs also seems to affect OCM possibly because of their high content of choline and long-chain polyunsaturated fatty acid.

Keywords: (maximum 5): B vitamins, fish consumption, egg consumption, homocysteine, SAM:SAH ratio

149/269. Food intake of young Czech children: changes with age

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Introduction: Feeding behaviours formed in early childhood may have long term consequences for future health.

Objectives: Evaluation of food consumption of young children and its changes with age.

Method / Design: Cross-sectional study of a convenience sample of 832 healthy singletons aged 6-35 months from four regions of the Czech Republic divided into 4 age groups: 6-11, 12-17, 18-23, and 24-35 months. Weighed 3-day dietary records were used to assess food intake and additional information obtained through questionnaires. Collected data were descriptively analyzed.

Results: Continued breastfeeding rates at 1 year and 2 years were 38.0% and 7.41 % respectively. Almost all children got some foods from the 5 main food groups during the three recorded days. The mean milk consumption decreased with age from 391.3 to 154.3 ml/day/child that of dairy products increased from 33.2 to 56 g/day/child. The mean fruit consumption decreased with age from 124.3 to 97 g/day/child; the mean vegetables (excluding potatoes) consumption, increased only from 35.2 g to 43.4 g/day/child. Bananas, apples, potatoes and carrots highly predominated. Mean meat consumption increased with age from 19.4 to 28.5 g/day/child; chicken meat highly predominated. few Only few children consumed fish, eggs, and pulses. Only ¾ of children consumed cereal foods without added simple sugars; sweetened cereal foods predominated among cereal foods regardless of age.

Conclusions: Parents could benefit from more guidance about the timing of introduction of solids and about increasing desirable foods quantity and variety with age is needed.

Keywords: (maximum 5): Feeding patterns, infant, toddler, breastfeeding, complementary feeding

149/281. A cross-sectional study evaluating dietary habits among Norwegian adolescents by constructing a Healthy diet Score

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Introduction: Adolescence is a time when opportunities for changing dietary habits is rapidly increasing, and the foundation for healthy habits later in life is laid. Diet and lifestyle in early life stages can also influence development of noncommunicable diseases later in life. Therefore, it is important to have data on dietary habits for this age group, as a basis for targeted preventive- and health promoting work.

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Objectives: To describe and evaluate dietary habits of adolescents using a short food frequency questionnaire (FFQ), and to construct a healthy diet score (HDS) using two different methods to determine adherence to a healthy diet.

Method / Design: 474 adolescents (14-years) from eight different schools completed a FFQ containing questions about nine dietary- and physical activity indicators: consumption of fish, red meat, fruits, vegetables, bread, dairy, sweets, beverages and physical activity. Answers from each indicator was given 0 or 1 point using two different scoring-cutoffs; one evaluating adherence to national dietary guidelines and one using the participant median. Points for each indicator were added, and tertiles were used to categorize participants into unhealthy, medium healthy or healthy.

Results: There was a strong correlation between the HDS calculated by national dietary guidelines and by the median (r=0.75; P>0.001). 34% of the participants were categorized as unhealthy, 34.6% as medium- and 31.4% as healthy. A small but significant correlation was found between the HDS and socioeconomic status (r=0.18; P=0.001). There was a difference in distribution of healthiness between pupils from the eight different schools.

Conclusions: The HDS calculated by national dietary guidelines or the participant median is a valid tool for assessing the degree of adherence to a healthy diet among adolescents. Socioeconomic status is positively associated with healthier habits.

Keywords: (maximum 5): Adolescents, dietary habits, FFQ, healthy diet score

149/282. Vitamin D – A comparison of different immunoassays

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Introduction: Several studies demonstrate that Vitamin D deficiency is common in Denmark. However, vitamin D status is often assessed by automated immunoassays and the accuracy of such assays is questionable. Despite the well-known limitations regarding the reliability of commercially available assays, methodological issues are often not discussed when experts in nutrition or public health evaluate vitamin D status and required intake.

Objectives: The aim of this study was to compare three immunoassays routinely used for measurement of serum 25-hydroxy vitamin D (25(OH)D) in epidemiological studies as well as in clinical settings.

Method / Design: In 2010, serum levels of 25(OH)D for 3209 participants in the population-based Health2006-cohort of Danish adults were measured by the Vitamin D3 assay from Roche. From this cohort 138 samples were selected to cover a range of 25(OH)D from 10-194nmol/l. In 2014, these samples were re-analysed by use of the new Vitamin D Total assay from Roche and the Liaison Vitamin D Total immunoassay (DiaSorin).

Results: Serum 25(OH)D were on average 28.1nmol/l higher when measured by the Roche Vitamin D Total assay in 2014 than when measured by the former Roche Vitamin D3 assay in 2010.

In addition, measurements by the Roche Vitamin D Total assay (2014) were much higher than measurements by the Liaison assay – on average 32.3nmol/l. The average difference between the 2010 Roche Vitamin D3 and the Liaison assay was only 4.3nmol/l. Between assays differences on single sample measurements varied up to 180nmol/l.

Conclusions: Our results demonstrate that measures of serum 25(OH)D are highly dependent on the choice of assay and that different studies are not comparable if different assays are used. Also, it illustrates that methodological issues make it highly questionable to use specific cut-off values to define nutritional status - and even as an indicator for treatment – in individuals.

Keywords: (maximum 5): Vitamin D, Immunoassays

149/285. Clustering of unhealthy snacks, fruit juices and sweetened beverages by Polish adolescents

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Introduction: In recent years increasing consumption of unhealthy snacks and sweetened beverages is observed among Polish adolescents. Mutual association with regard to consumption of these foods is not well recognized.

Objectives: The aim of the study was to derive specific clusters which characterize consumption of salty or sweet snacks, fruit juices and sweetened beverages by Polish adolescents.

Method / Design: The study involved 195 adolescents (93 boys, 102 girls) aged 13-15, including 95 students from a regular junior high school and 100 students from a sporting junior high school. A 24-hour recall method was used to assess consumption of salty and sweet snacks, fruit juices (including nectars) and sweetened beverages (in g/day or ml/day). A Cluster Analysis (k-means method) was used to separate specific clusters.

Results: Two clusters were obtained: 'restraint' (132 students; 68% of the sample) and 'non-restraint' (63 students; 32%). 'Restraint' cluster in comparison to 'non-restraint' was represented by significantly

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more students from regular (54%) than sporting (46%) school as well as significantly more girls (64%) than boys (36%). 'Non-restraint' students when compared with 'restraint' consumed significantly more salty snacks (184.0 vs. 90.1 g/day), sweet snacks (119.3 vs. 48.6 g/day), fruit juices (512.5 vs. 238.2 ml/day) and sweetened beverages (576.3 vs. 151.2 ml/day). Similar relation was found when analysis was made separately among boys and girls.

Conclusions: 'Non-restraint' consumption of unhealthy snacks, fruit juices and sweetened beverages was associated with attending the sporting school and male gender, in turn 'restraint' consumption of these foods with attending regular school and female gender.

Keywords: (maximum 5): adolescents, Cluster Analysis, sweetened beverages, unhealthy snacks

149/292. Association of serum 25-hydroxy-vitamin D3 level with body composition in healthy Serbian women

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Introduction: Low serum 25(OH)D3 is commonly found in obese adults. It has been linked to increased risk of osteoporosis, autoimmune diseases, cancer, cardiovascular disease and other chronic diseases.

Objectives: To investigate the association of serum vitamin D levels, measured by 25(OH)D3, with body mass index (BMI) and body fat percentage in healthy Serbian women.

Method / Design: Serum samples were collected from 87 apparently healthy women aged 18-68 years, with BMI 20-40. Among them, 66 women reported regular menstrual cycle and 21 women were postmenopausal. Linear regression analysis for serum 25(OH)D3 and logistic analysis for vitamin D deficiency [serum 25(OH)D3 <20 ng/mL] were performed to determine significant predictors among BMI and body fat percentage, after adjustment of age, season and menopausal status.

Results: In the univariate linear regression analysis, BMI and body fat were inversely related to 25(OH)D3, with correlation coefficients -0.283 (p=0.029) and -0.543 (p=0.003) respectively. However, after adjustment of season (winter or summer months), only BMI remained significantly associated with vitamin D status: ß=-0.799 (95% CI -1.511 to -0.086), p=0.029. Furthermore, univariate logistic regression showed a weak positive association between vitamin D deficiency and BMI (OR 1.151, 95% CI 1.045-1.268, p=0.004) and body fat percentage (OR 1.080, 95% CI 1.012-1.152, p=0.019), and after adjustment of season and menopausal status results remained similar for both BMI (OR 1.156, 95% CI 1.046-1.278, p=0.004) and body fat (OR 1.075, 95% CI 1.002-1.152, p=0.042).

Conclusions: In the current study BMI was inversely associated with serum 25(OH)D3, and higher BMI and body fat percentage were found to be associated with higher probability for vitamin D deficiency. This study was supported by the Grant No. III 41030 from the Ministry of Education, Science and Technological Development, Republic of Serbia.

Keywords: (maximum 5): Vitamin D, Vitamin D deficiency, Body mass index, Body fat percentage, Serbian women

149/325. Macro- and micronutrient intakes in picky eaters: a cause for concern?

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Introduction: Picky eating is characterised by an unwillingness to eat familiar foods or to try new foods, as well as strong food preferences. While it is thought that picky eating may result in alterations in the intake of energy and some micronutrients, it is not clearly established whether any dietary distortion is meaningful in comparison with recommended dietary guidelines.

Objectives: To quantify potential differences in macro- and micronutrient intakes in children identified as picky eaters (PE) versus non-PE. To compare dietary intakes in PE and non-PE with UK reference nutrient intakes (RNI).

Method / Design: PE were identified in the Avon Longitudinal Study of Parents and Children (ALSPAC) database from a questionnaire completed by the caregiver when the child was 38 months. Dietary intake was assessed at 43 months with a 3-day diet diary. Intakes were compared between PE and non-PE and with RNIs.

Results: There were no significant differences in energy, or the percentages of energy from carbohydrate, or non-milk extrinsic sugar (NMES) intakes between PE and non-PE; the percentage of energy from protein was lower in PE than non-PE (13.5% vs 14.3%, p=0.003) but mean intakes were well above UK recommendations. Intakes of iron (5.9 vs 6.5 mg/day, p<0.003) and zinc (4.9 vs 5.3 mg/day, p=0.011) were lower in PE than in non-PE, respectively. For iron, 78.4% of children with PE had intakes below the UK RNI compared with 65.4% of non-PE children, and for zinc the values were 58.8% and 47.0%, respectively.

Conclusions: There was little evidence that picky eating resulted in physiologically important changes in macronutrient intakes. However, intakes of zinc and iron were lower in children with PE than those

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without. A higher proportion of PE were at risk of deficiency for zinc and iron than non-PE children. Nutritional assessment of PE should include micronutrient intakes.

Keywords: (maximum 5): ALSPAC, picky eating, macronutrients, micronutrients, antioxidants

149/360. Dietary carbohydrate and fat quality and risk of cardiovascular disease in the sun project

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Introduction: Beyond the total quantity of dietary fat and carbohydrate intake, further research is needed on the relative effects of the quality of dietary fatty acids and carbohydrates. Specifically, some dimensions of carbohydrate quality can contribute to better account for the carbohydrate role as a determinant of cardiovascular disease (CVD).

Objectives: To examine the association between scores of carbohydrate/fat quality and the risk of CVD in a large Mediterranean cohort

Method / Design: We assessed the baseline dietary intake of 17424 middle-aged adults. The Carbohydrate Quality Index (CQI) was defined by four criteria: dietary fiber intake, glycemic index, whole grains/total grains ratio and solid/total carbohydrate ratio. The Fat Quality Index (FQI) was calculated using the intake of fatty acids as (monounsaturates + polyunsaturates) / (saturates + trans fatty acids). Cox models were used to estimate adjusted hazard ratios (HR) of incident CVD according to quartiles of each score (CQI, FQI).

Results: We observed 129 incident cases of CVD during 10.1 years of median follow-up. An inverse association for CQI was found (HR=0.50, 95 %CI 0.26-0.97 for the highest versus the lowest quartile, p for trend=0.045), while no association was found for FQI (HR=0.73, 95 %CI 0.44-1.20 p for trend=0.347).

Conclusions: In this Mediterranean cohort, a better quality of dietary carbohydrates showed a significant inverse association with the incidence of CVD, which highlights that "heart-healthy diet" should focus its attention in improving quality of carbohydrates.

Keywords: (maximum 5): carbohydrate quality index; fat quality index; cardiovascular disease; Mediterranean cohort; SUN project.

149/370. Contribution of food sources, especially fat based foods to vitamin D intake in three countries

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Introduction: Vitamin D intakes are low in European countries. There are not many foods that are naturally rich in vitamin D. Therefore, foods fortified with vitamin D can make an important contribution to intake of vitamin D.

Objectives: To investigate the contribution of different food sources to vitamin D intake in United Kingdom (UK), Netherlands (NL) and Sweden (SE).

Method / Design: We analysed national representative dietary surveys from UK (population age >1y), NL (7-69y) and SE (18-80y). Mean intake of dietary vitamin D in each population were compared with recommended intake levels (5μg/d EU and 7-10 μg/d Scandinavia), and the main food sources contributing to its intake were determined.

Results: Reported mean (±SD) intake of vitamin D were lower than the recommendations in each country with 2.71(±2.04) μg/d in UK, 3.45(±2.28) μg/d in NL and 6.96(±4.8) μg/d in SE. In the UK, the three main dietary sources of vitamin D intake were fish, providing 0.75μg/d (27%), meat 0.63μg/d (23%) and fat based foods (such as spreads, margarine, butter, oils) 0.51μg/d (19%). In NL, main contributors to vitamin D intake were fat based foods 1.37μg/d (39%), followed by meat 0.73μg/d (21%) and fish 0.49μg/d (14%). In SE, fish was the major source of vitamin D with 3.1μg/d (44%), next was fat based foods 0.87μg/d (12%) and meat 0.77μg/d (11%). Within the fat based food group, margarine was the predominant vitamin D source. Margarine contributed to 35% of total vitamin D intake in NL, 12% in Sweden, and 8% in UK.

Conclusions: Vitamin D intakes from foods are lower than recommended intake in UK, NL and SE. Next to fish and meat, fat based foods and in particular margarine fortified with vitamin D, are important contributors to intake of vitamin D in the general population.

Keywords: (maximum 5): vitamin D, food sources, fats spreads, margarine

149/377. A systematic review of vitamin D status in central and Eastern European countries: data from the ODIN project

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Introduction: Serum/plasma 25(OH)D is the best indicator of vitamin D status. It reflects vitamin D produced cutaneously and that obtained from food and supplements. One of the aims of the EU FP-VII ODIN project (www.odin-vitD.eu) is to quantify the prevalence of vitamin D deficiency in Europe, data which will inform establishment of food-based strategies for its prevention.

Objectives: To systematically review available data on serum 25(OH)D in well-described population groups in Central and Eastern European (CEE) countries and to estimate the prevalence of vitamin D deficiency in CEE countries from the published and grey literature and national reports.

Method / Design: Searches were conducted in MEDLINE, EMBASE (Ovid), Global health and bibliographies. Identified studies were assessed for inclusion and validity, with independent duplication. Collaborators within the Capacity Development Network in Nutrition in CEE countries (CAPNUTRA) has greatly contributed to the finding studies included as grey literature.

Results: No studies on vitamin D status were found for Albania, Bosnia and Herzegovina and Macedonia. From available data, summertime mean 25(OH)D concentrations in adults ranged about 33 nmol/L in Ukraine, 60 nmol/L in Estonia and Serbia, to >80 nmol/L in Hungary and Lithuania (males only). Winter time mean concentrations ranged from 30 nmol/L in Serbia and Ukraine, 42 nmol/L in Estonia and Poland, 36 nmol/L in female and 42 nmol/L in male in Bulgaria, 47 nmol/L in Hungary and Lithuania and >60 nmol/L in Czech Republic. National studies are limited for children and adolescent, pregnancy women and elderly in CEE countries.

Conclusions: The results indicate that data on vitamin D status from CEE countries is very limited and that existing data seems to suggest that serum 25(OH)D concentrations are low in several countries. This work was supported European Union's Seventh Framework Programme (FP7/2007-2013) under grant agreement no.613977 (ODIN).

Keywords: (maximum 5): vitamin D, CEE countries, vitamin D deficiency, ODIN

149/380. Bioaccessibility and cellular uptake of plum and cabbage polyphenols and carotenoids

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Introduction: Plum and cabbage are frequently consumed in Westernized Countries, and are rich in bioactive constituents, especially carotenoids and polyphenols. However, many phytochemicals are influenced by food preparation procedures, and their presence not necessarily ensures good bioaccessibility and intestinal uptake.

Objectives: To investigate the influence of typical kitchen preparation procedures on frequently consumed plum and Brassicaceae varieties and to study bioaccessibility and cellular uptake of polyphenols/carotenoids.

Method / Design: From 27 cabbage and 17 plum varieties, 8 were studied further in-depth (Brassicaceae: Duchi, Scots' Kale, Kale, Kalorama. Plums: Cherry Plum, Plum 620, Ersinger, Italian Plum). Kitchen procedures included freezing, thawing, chopping, steaming and boiling. In-vitro digestion was carried out and the bioaccessible fraction was determined for carotenoids/polyphenols (UPLC). For cellular uptake following digestion, Caco-2 intestinal cells (TC-7 line), were compared to 90% Caco-2 with 10% HT-29 MTX (mucus producing) cells, both differentiated.

Results: Carotenoids were not significantly influenced by the kitchen procedures, while for polyphenols, both boiling and steaming resulted in significantly reduced total phenolics ($P<0.05$). Carotenoid bioaccessibility did not differ between plum vs. brassicaceae varieties. Xanthophyll bioaccessibility was higher than carotene bioaccessibility ($P=0.02$). Polyphenol bioaccessibility was low (<10%), and was compromised by the milk chosen to enhance carotenoid bioaccessibiliy. Major polyphenols following GI digestion were neochlorogenic acid and cryptochlorogenic acid. Carotenoid cellular uptake varied according to variety (0.3 to 4%). Xanthophyll cellular uptake was higher (10.2%) than carotene uptake (4.1%, $P<0.01$), while cellular uptake between the Caco-2 and the co-culture cell model did not differ significantly. 6.2% of total carotenoids were recovered after colonic fermentation.

Conclusions: Both plums and cabbages are reasonable sources of carotenoids and polyphenols, though the bioaccessible fraction can vary considerably from the native profile. The mucus layer in HT-29-MTX cells did not compromise carotenoid cellular uptake.

Keywords: (maximum 5): Carotenoids, polyphenols, in-vitro digestion, cellular uptake, kitchen preparation.

149/383. Dietary patterns: Identification and analysis of diet quality and influential factors

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partment of Food Economics and Consumption Studies. Germany; (3) Robert Koch Institute Berlin. Department of Epidemiology and Health Monitoring. Germany.

Introduction: The question to be addressed in this study was, whether dietary habits can be identified which are typically 'healthy' on the one hand (vegetables, fish, whole-meal-products, etc.), and typically 'unhealthy' on the other (sweets, snacks etc.), or if consumers rather tend to combine healthier with unhealthier food groups.

Objectives: The study aimed to verify if such dietary patterns exist and if so, how the diet quality of these patterns can be described. Furthermore, the population groups consuming these dietary patterns were identified.

Method / Design: This study made use of representative German consumption data from 2011. Approximately 12 million purchases from 13,131 households are recorded in these data. In accordance with healthy diet criteria such as fat content, share of whole meal, etc. individual foods were assigned to the 18 food groups of the German food guide pyramid. Mixed products such as salami pizza were assigned according to their food shares. Based on the 18 groups a principal component analyse was applied to identify dietary patterns. For these patterns nutrient and energy densities were examined. Using regression analysis the association between the dietary patterns and socio economic and attitude variables was analyzed.

Results: Three dietary patterns were identified. The first one was characterized by a higher consumption of natural, unprocessed foods, the second by an increased consumption of processed foods and the third by a meat-oriented diet. Only the first pattern could be characterized as healthy, because it was associated with higher nutrient and lower energy densities. However, even this pattern differed from current nutrition recommendations. In addition to factors such as income and age, attitudes were significantly associated with the dietary patterns.

Conclusions: Since there are specific aspects to be improved in all dietary patterns, group-specific nutrition recommendations should be developed.

Keywords: (maximum 5): dietary patterns, nutrient and energy densities, attitudes

149/384. Dietary intake and sources of vitamin D in Pakistani immigrants living in Copenhagen

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Introduction: There is a high prevalence of vitamin D deficiency in the Northern countries, especially among immigrants. Vitamin D status is mainly affected by sun exposure and dietary intake of vitamin D. The dietary vitamin D intake is low in the general Danish population as assessed by the Danish National Survey of Dietary Habits 2003-08 (DANSDA). However, this survey does not include immigrants.

Objectives: To assess the total vitamin D intake in a Pakistani immigrant population and what food groups contribute with most vitamin D.

Method / Design: Dietary intake was assessed by a semi-quantitative culture-sensitive Food Frequency Questionnaire (FFQ). The subjects included 77 Pakistani men and 87 Pakistani women living in Copenhagen. The dietary assessment was performed during baseline sampling of an intervention study at the National Food Institute, Denmark.

Results: Median (25th;75th percentiles) intake of vitamin D was 2.2 (1.6;4.0) µg/day in Pakistani men and 1.7 (1.2;2.4) µg/day in Pakistani women. In comparison, median (10th;90th percentile) vitamin D intake, estimated in DANSDA, was 2.8 (1.5;7.2) µg/day for men (n=1569) and 2.2 (1.1;6.5) µg/day for women (n=1785). The intake of fish, meat and poultry accounted for the majority (~60%) of the dietary vitamin D in both Pakistani men and women. Fish and meat were equally important sources of vitamin D, although the intake of fish had the highest individual variability. Poultry was a greater source of vitamin D among the Pakistani population compared to the Danish population, in which fish contributed with most vitamin D.

Conclusions: The dietary intake of vitamin D in the Pakistani population was lower than the general Danish population. Fish and meat were the main sources of vitamin D in the Pakistani population. Poultry revealed itself as a more important source among Pakistanis compared to Danes.

Keywords: (maximum 5): Vitamin D intake, Dietary sources of vitamin D, Pakistani immigrants, Danish National Dietary Survey.

149/386. Deficits in our comprehension on bioavailability aspects of phytochemicals – a position paper

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Introduction: Many phytochemicals, including polyphenols and carotenoids, have been associated with a variety of health benefits, e.g. reduced incidence of cardio-vascular diseases and several types of cancer. However, discrepancies exist between observational and intervention studies, especially for pure compounds. These may in part be due to differences with respect to their bioavailability and their presence in plants as mixtures. Prior to exerting their bioactivity, these compounds must be made bioavailable, and considerable differences may arise due to their matrix release, changes during digestion, uptake, metabolism, and biodistribution.

Objectives: To emphasize prominent gaps in our understanding around factors influencing the bioavailability, and therefore bioactivity, of phytochemicals.

Method / Design: For this position paper, a review of factors influencing bioavailability, starting from food processing, to realistic mixed diets, gastric and intestinal aspects, to tissue and colonic metabolism and biotransformation was conducted, focussing on polyphenols and carotenoids as water and lipophilic representatives, respectively.

Results: While recent work has greatly enhanced our insights into the metabolism/bioavailability of a range of phytochemicals, many factors governing matrix release, solubilisation, cellular uptake and biotransformation remain poorly understood. Major aspects deserving more attention include effects of (innovative) processing techniques, synergistic effects of mixed/whole diets, factors effecting micelle formation, co-constituents influencing influx/efflux via transporters or altering phase I/II metabolism.

Conclusions: In the future, enhanced availability of analytical possibilities such as broader availability of instruments to measure food texture, visualization of micelles (TEM, Mastersizer), improved cell models of absorption/metabolism (mucus producing, liver cells, 3-D models), ways to produce knock-out variants (e.g. of certain transporters) in animal models (nematodes, mice etc.) to study pathways of absorption and bioactivity of metabolites, and improved chromatographic techniques and commercial availability of metabolites (e.g. glucuronides) will aid toward an improved understanding of these important aspects of bioavailability.

Keywords: (maximum 5): food processing, microbiota, mixed diet, transporters, biotransformation.

149/389. "Healthy eating from the start!" – Evidence-based dietary guidelines

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Introduction: A well balanced diet and good eating habits are crucial for health and wellbeing throughout life. The increasing prevalence of nutrition- and lifestyle-associated diseases, especially overweight and obesity in childhood and adolescence, highlight the necessity of target-group-specific and environment-oriented measures.

Objectives: The aim was to provide scientifically grounded and quality assured information on complementary feeding and on nutrition of 1 to 3 year old toddlers to experts and to the public.

Method / Design: Comparisons of different national and international guidelines were made. Ranges of subjects were formulated and for each subject a literature research strategy was designed. Recommendations were worked out and run through an exhaustive expert consultation.

Results: The dietary guidelines on complementary feeding include 12 subject areas such as information on the optimal age and time of starting complementary feeding or information on foods which are suitable or should be avoided during the first year of life. The guidelines on the nutrition of 1 to 3 year old toddlers are mainly formulated as food based dietary guidelines. The guidelines were provided in a target-group-specific way (downloads, brochures, information graphics also available in Turkish and Bosnian-Croatian-Serb language) for the public and experts. Since 2012 more than 800 experts have been trained in "train the trainer" programs and 1,212 workshops for parents and caregivers (n=9,052) have been implemented successfully throughout Austria.

Conclusions: The evidence-based dietary guidelines, "train the trainer" programs and workshops are initial steps to improve the dietary habits of infants and children up to the age of three years.

Keywords: (maximum 5): dietary guidelines, complementary feeding, infant, toddler, nutrition

149/393. Selenium status of elderly German subjects as compared to updated target values

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Introduction: Selenium (Se) is integral part of several selenoproteins with diverse functions. Recently updated dietary reference values for Se of 60-70 µg/day target to reach plasma Se concentrations of 100 to 120 µg/L, which are assumed sufficient to reach maximum

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selenoprotein P (SePP) concentration (DGE, 2015). However, studies show that glutathione peroxidase (GPx) activity already levels off at plasma Se concentrations around 90 µg/L.

Objectives: This study compares plasma Se concentrations of Se-supplement users (SU) and non-supplement users (NSU) within a sample of physically mobile, community-dwelling elderly subjects of the longitudinal study on the health and nutrition status in an aging population in Giessen (GISELA) with regard to the newly updated target values.

Method / Design: In 2002, plasma Se levels of 270 female and 118 male (median age 72 y) were determined using atomic absorption spectrophotometry. Se supplement use was assessed by questionnaire. Differences between NSU (n=347) and SU (n=41) were assessed using Mann-Whitney-U-test.

Results: SU showed higher plasma Se concentrations than NSU (median 73 µg/L vs 56 µg/L, $p<0.001$). Five NSU (1.4%) and eight SU (19.5%) reached plasma Se levels of > 90 µg/L. Only one NSU (0.3 %) and four SU (9.8 %) had plasma Se concentrations of 100-120 µg/L.

Conclusions: Although SU had higher plasma Se concentrations than NSU, and more often reached plasma Se levels for maximum GPx activity and SePP saturation, the results indicate that plasma Se levels for maximum SePP concentration are rarely achieved in community-dwelling elderly subjects. The impact of plasma Se levels below target values for maximum GPx activity and SePP saturation on long-term health status of elderly subjects warrants further investigation.

Keywords: (maximum 5): Selenium, supplementation, elderly, selenoprotein P, glutathione peroxidase

149/396. Study of the BMI and two indexes of adherence to the Mediterranean diet in a population of children from 8 to 17 years old in Andalucía.

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Introduction: The formal communication tries to show the possible existing differences in the Body Mass Index (BMI), the Index of Adherence to the Mediterranean diet for children (KIDMED) and the Children Mediterranean Diet Score (cMDS) for the nutritional surveys conducted in Andalucía (ENAI 2008) and ENAII (2014).

Objectives: To investigate BMI, KIDMED and cMDS of the population polled in 2008 regarding the one polled in 2014.

Method / Design: All analized data belongs to ENAI and ENAII studies of 1.289 and 1.348 children respectively, between 8 and 17 years. The Weight Status has been calculated from the IMC contrasting the values in the tables of the Foundation Orbegozo (2011), for age and sex. The methodology described in Serra-Majem 2014 was used for KIDMED index. The cMDS, was calculated attending the score proposed by Panagiotakos et al. 2006; modifying some values to adapt to the children and teenagers population. Values were established in relation to adherence: £29 (low); 30-33 (moderated) and ≥34 (high). The parametric method, t-Student was applied to check the null hypothesis of comparison of the averages, with a statistical significance level of $p\leq0,05$.

Results: For Weight Status there is a trend towards the statistical significance. An increase of 3.8 % of individuals in state of overweight and obesity is observed in 2014 compared to 2008. The KIDMED presents statistically significant differences going from an "optimum" value of 7.3 of average in 2008 to a value of 5,7 of average in 2014. Likewise, cMDS presents significant differences coming down from an average value of 31.3 to 30,2, therefore tending to a low adherence.

Conclusions: A progressive abandonment of the Mediterranean Diet in the children and teen population of Andalucía is observed. It seems to have relation with the increase of the overweight and obesity values.

Keywords: (maximum 5): Mediterranean. Diet. Score. Adherence. Nutrition.

149/397. Does food fortification with vitamin D improve the vitamin D status of the general population?

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Introduction: In Finland, intake of vitamin D from food has been low and synthesis in the skin is limited which has led to low vitamin D status. To improve vitamin D status at the population level, fortification of fluid milk products and fat spreads with vitamin D was begun in 2003 and was increased further in 2010.

Objectives: The objective was to examine the impact of vitamin D fortification by evaluating the change in vitamin D status in the Finnish adult population between 2000 and 2011.

Method / Design: The study population comprised individuals aged ≥30 years from the Health 2000 Survey and its follow-up, the Health 2011 Survey, representing the Finnish adult population. Serum 25-hydroxyvitamin D concentration (25(OH)D), the biomarker of vitamin D status, was determined from frozen samples (-70°C) by radioimmunoassay in Health 2000 (n=6134) and by chemiluminescent microparticle immunoassay in Health 2011 (n=4102). Linear and

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logistic regression models were used to assess the adjusted means and prevalences.

Results: The mean age-adjusted 25(OH)D concentration was 45 nmol/l in both men and women in 2000. In 2011 the mean concentrations were 30 nmol/l higher (75 nmol/l in men and 76 nmol/l in women; p for the difference between 2000 and 2011 <0.001). In 2000, only one third of the population had adequate (≥50 nmol/l) vitamin D status whereas in 2011 almost all (90 %) had 25(OH)D concentration at least 50 nmol/l.

Conclusions: Serum 25(OH)D concentrations have significantly increased among Finnish adult population during the last 11 years suggesting that fortification of food with vitamin D is an effective strategy in improving vitamin D status at population level. Further analyses are required to assess whether there have been changes in other factors which have an effect on vitamin D status.

Keywords: (maximum 5): vitamin D; 25-hydroxyvitamin D; fortification of food; population survey; follow-up study

149/402. Dietary patterns and hearing loss in older people.

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Introduction: Hearing loss is highly prevalent in older people and can reduce quality of life substantially. Emerging research suggests that potentially modifiable risk factors, including risk factors previously related to cardiovascular disease risk, may be associated with a decreased or increased incidence of hearing loss. This has prompted investigation into the possibility that certain nutrients, foods or dietary patterns may also be associated with incidence of hearing loss.

Objectives: We prospectively investigated the association between dietary patterns and hearing loss in men enrolled in the Caerphilly study.

Method / Design: The Caerphilly study began in 1979-1983 with recruitment of 2512 men aged 45-59 years. Dietary data was collected using a self-administered, semi-quantitative, 56-item food-frequency questionnaire at baseline (first phase; 1979-1983) and pure-tone unaided audiometric threshold was assessed at 0.5, 1, 2 and 4kHz during phase two (1984-1988). Factor (principal component) analysis was carried out to determine a posteriori dietary patterns and multivariate linear regression models were used to examine associations with hearing loss (assessed as pure tone average).

Results: Three dietary patterns were determined using factor analysis- Traditional, Healthy, High sugar/Alcohol avoider. Unadjusted univariate analysis showed a significant association between the Healthy pattern and hearing loss (β=-1.16; 95%CI=-1.69, -0.63; P value <0.001) and between the High sugar/Alcohol avoider pattern and hearing loss (β=0.78; 95%CI=0.25, 1.32; P value = 0.004). However, once the regression model was adjusted for potential confounding factors (age, body mass index, systolic blood pressure, smoking, alcohol consumption, physical activity, social class, occupation, diabetes and lipids), these associations became non-significant (P=0.17 and 0.08 respectively).

Conclusions: A posteriori derived dietary patterns were not found to be associated with hearing loss in middle-aged men in the Caerphilly study. The role of dietary factors in hearing loss remains to be established and warrants further investigation.

Keywords: (maximum 5): Dietary patterns, Hearing loss, Ageing.

149/403. Dietary patterns and retinal vascular calibre in the Irish Nun Eye Study

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Introduction: Retinal vessel abnormalities are associated with cardiovascular disease risk. Widening of retinal venules is associated with increased risk of stroke while narrowing of retinal arterioles independently predicts incident hypertension, coronary heart disease and diabetes. Dietary factors are known to play an important role in cardiovascular health however few studies have examined the association between dietary patterns (DP) and retinal microvascular health.

Objectives: To examine the association between a posteriori-derived DPs and retinal vascular calibre (RVC) in elderly Irish nuns.

Method / Design: This was a cross-sectional study of 1233 participants (mean age: 76.3y) from the Irish Nun Eye Study (INES). Retinal vessel diameters (central retinal arteriole equivalent (CRAE) and central retinal venule equivalent (CRVE)) were measured from digital eye images using computer-assisted software. DP analysis was performed using principal component analysis from completed food frequency questionnaires. Regression models were used to assess associations between DP and retinal vessel diameters, adjusting for age, BMI, refraction, smoking and alcohol status, hypertension, diabetes

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mellitus, ischaemic heart disease, cerebrovascular accident and fellow RVC.

Results: Two DPs were identified: a 'healthy' pattern (high factor loadings for fruit, vegetables, wholegrains and oily fish) and an 'unhealthy' pattern (high factor loadings for sugar, sweets, crisps and chips). Following adjustment for confounding factors, results showed that those who adhered most closely to the unhealthy dietary pattern had higher CRVE (p=0.03) and lower CRAE (p=0.01) compared to the least unhealthy dietary pattern. No independent relationship was observed between the healthy dietary pattern and RVC.

Conclusions: In this cohort, an unhealthy dietary pattern was independently associated with a widening of retinal venules and narrowing of retinal arterioles. While associations have been observed, further studies are required to establish whether change in dietary behaviour would result in changes in RVC.

Keywords: (maximum 5): retinal vascular calibre, dietary patterns

149/404. Impact of different breakfast meals on food choices and eating behaviors

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Introduction: The nutritional benefit of eating breakfast is widely accepted; breakfast consumers are less predisposed to overweight and obesity, and show a lower body mass index. Further, breakfast seems to be positively associated with healthy eating patterns, to help in promoting morning satiety and to reduce energy intake at lunch and during the whole day.

Objectives: To determine the impact of different breakfast meals on food choices at subsequent meal, and on daily eating habits.

Method / Design: Four-ways, crossover, controlled trial, with four breakfast models. Participants were six healthy volunteers men (age 24 ± 3 years; BMI 23.3 ± 2.6 kg/m2; mean ± standard deviation) randomised to one breakfast, on four different weeks, separated by at least one week. Breakfast meals were one non-caloric control and three tests, different in cognitive/perceptual characteristics and in nutritional composition: iso-caloric (~ 330 kcal), with equal protein and fibre contents, but with different carbohydrate and lipids profiles. Double weighting of food was used to analyse food choices and nutritional values of meals during an ad libitum lunch buffet. Food intake during the whole day was analysed using a 7-days food diary.

Results: Lunch food choices were similar in all breakfast meals. Food variety and quantity did not significantly change, so nutritional composition of lunch was comparable. Similar values were found for daily energy and nutrients intake. However, the control breakfast was linked to a higher intake in both lunch and daily data.

Conclusions: Food choices at lunch were not affected by the nutritional profile of the breakfast previously eaten, but could be driven by organoleptic, hedonistic and cognitive characteristics of available foods. Eating breakfast did not increase energy intake during the day compared to skipping breakfast.

Keywords: (maximum 5): Breakfast, Food choices, Eating habits, Lunch, Dietary intake.

149/406. Effect of Monosodium Glutamate on the sensory properties of fish soup

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Introduction: Monosodium glutamate (MSG) is the most widely used food ingredient as a flavor enhancer. When combined with a small amount of table salt, MSG allows the use of less salt during food preparation. Sea bass (Dicentrarchus labrax Linne, 1785) is an economically farmed species in Turkey. Large quantities of fish waste, such as head, bone and tail remain after filleting and are usually used as sub-industry products. Ready-to-eat fish soup is one of the most preferred sub-industry products which offers practical quick meal for consumers.

Objectives: In this study, effect of Monosodium Glutamate on the sensory properties of fish soup was investigated.

Method / Design: Head, bone and tail of sea bass were used as fish waste. For each group 230 grams of waste were weighed and put into a pot with carrot (35 g), onion (45 g), mushroom (3 g), parsley (3 g) and flour (9 g). Salt and the two different MSG-salt combinations were added into the soup as 6, 3-3, 2-4 grams, respectively. Then they were boiled in 1 liter water for 35 min. Sensory properties of three soup groups were evaluated by ten panelists and paired comparison test was used.

Results: MSG improved especially the flavor characteristics of soup, enhanced fish flavor, acceptability, whole aroma and taste of the soup.

Conclusions: Panelists preferred the soups with MSG rather than the only salt added soup. Fishy taste in soup prepared with MSG-Salt (2-4 g) was more dominant in comparison to the soup prepared with MSG-Salt (3-3 g). Flavor characters, such as continuity, mouthfulness and impact, of the soup prepared with MSG-Salt (3-3 g) was much more apparent than the one prepared with MSG-Salt (2-4 g).

Keywords: (maximum 5): Monosodium glutamate, fish soup, ready-to-eat food, salt

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149/412. Vitamin D intakes in central and eastern European countries- literature review

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Introduction: In the context of growing global awareness on vitamin D deficiency, its adverse health consequences are unacknowledged in Central and Eastern European countries (CEEC) due to the paucity of published data on vitamin D intake.

Objectives: To conduct systematic review and collection of data from open access and grey literature sources on dietary surveys across CEEC to enable summary estimates of vitamin D intake.

Method / Design: The search strategy was developed in Medline and adapted to Embase and Global Health. Keywords were chosen from the PubMed Medical Subject Headings terms. In addition, data was collected from gray literature in collaboration with experts from CAPNUTRA.

Results: 2138 articles were identified on vitamin D intake. Articles were mostly excluded because of lack of vitamin D intake data. For the purpose of the review, 20 studies were included in final repository. Available data from CEEC indicates a risk of inadequate vitamin D intake in all population groups. Range of the mean intakes in children and adolescents was 1- 4.8 μg/day, in adults 0.9 - 6.0 μg/day while in lactating and pregnant women mean intakes was between 1.5 μg/day in Croatia to 2.6 μg/day in Poland and Slovenia.

Conclusions: Vitamin D intakes comparison across CEEC was limited by use of different methodologies. Prioritization of data collection on a national basis in CEEC using standardized approaches is needed to develop evidence-based strategies to meet vitamin D requirements important for public health nutrition policy in CEEC.

Keywords: (maximum 5): KEYWORDS: D vitamin intake; Central and Eastern Europe; literature review; ODIN project

Acknowledgements: This research was carried out as part of the ODIN project [Food-based solutions for optimal vitamin D nutrition and health through the lifecycle] funded by the European Commission under the FP7 program [Grant Agreement no: 613977] and Ministry of Science, Serbia , project number III 41030

149/418. Vitamin D and cognitive functions in in elderly volunteers

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Introduction: Ageing is inevitably associated with a progressive cognitive decline. With the rising percentage of the elderly in society, the number of people with dementia and cognitive impairment increases, which is a challenge for public health care. Low vitamin D status is widespread in the elderly population. Recent studies suggest a link between mental health and nutritional status of vitamin D, however it is still uncertain whether this relation is causal.

Objectives: The objective of the study was to investigate the association of cognitive status with vitamin D serum level in a group of elderly volunteers.

Method / Design: The cross-sectional study was conducted among free-living 60 volunteers, aged 60 to 93. Blood samples were collected to determine serum level of: 25(OH)D, parathyroid hormone and total calcium. The cognitive function was tested using the Mini Mental State Examination (MMSE), the Geriatric Depression Scale (GDS) and other. The study protocol was approved by the ethical commission at the National Food and Nutrition Institute in Warsaw. Supported by WULS-SGGW grant 505-10-100200-K00264-99.

Results: Mean vitamin D serum level was 17.1±7.6 ng/ml and in most individuals (92%) was insufficient. The mean MMSE score was 27.8±1.8, in 35% individuals it indicated the mild cognitive impairment (MCI), and in 3% it suggested "dementia". The GDS test score of majority of subjects was within "normal" range, while the result of 18% of individuals was in the range of depressive disorders. There was no significant relation between 25(OH)D status and cognitive performance.

Conclusions: There was no statistically significant associations between vitamin D serum level and results of cognitive function tests in elderly volunteers.

Keywords: (maximum 5): vitamin D, cognitive function, elderly

149/420. Diet and life expectancy in Poland between 1950 and 2012

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Introduction: Life expectancy in Poland in the years 1950-2012 showed an upward trend. It was 72.7 years in males and 81.0 in females in 2012.

Diet is probably significant factor that could influence this increase.

Objectives: The objective of the study was to investigate the relationship between selected dietary factors and life expectancy in Poland in 1950-2012.

Method / Design: The data on life expectancy were derived from regular publications of the Central Statistical Office.

The information source on the dietary pattern was the database established by the National Food and Nutrition Institute including data derived from the national food balance sheets showing food quantities available for consumption per capita/year and original calculations on the amounts of the energy and nutrients from food.

The Spearman rank correlation coefficient (r) was used as a measure of the relationship between examined variables.

Results: Positive correlation was found for life expectancy in 1950-2012 and the consumption of vegetables (r=0.62 for males and 0.77 for females), fruit (respectively 0.82 and 0.88), vegetable fats (0.89 and 0.98) and fish (0.53 and 0.54). Adverse correlation was noted in the case of red meat (-0.60 and

-0.53). Life expectancy also positively correlated with the intake of some nutrients such as: ascorbic acid (0.70 and 0.83), vitamin E (0.90 and 0.98), vitamin D (0.77 and 0.85) and beta-carotene (0.33 and 0.58).

After 1990 life expectancy was adversely related to salt consumption (-0.99 in both sexes).

Conclusions: Some positive changes in dietary pattern in Poland could influence among others an increase in life expectancy in 1950-2012. These changes include increase in consumption of vegetables, fruit, vegetable fats and fish, and decrease in red meat and salt consumption and higher intake of ascorbic acid, vitamin E, vitamin D and beta-carotene.

Keywords: (maximum 5): DIET, LIFE EXPECTANCY, TRENDS

149/427. Saturated and trans fat intake in adults; analysis from UK and US national surveys

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Introduction: Increased saturated (SFA) and trans fat (TFA) in our diet can raise blood level of low density lipoprotein cholesterol, a risk factor for cardiovascular diseases. Therefore, public health authorities recommend reducing intake of these fats to <10% (SFA) and <1% (TFA) of calories (FAO/WHO 2010).

Objectives: This study assessed recent data on total SFA and TFA intake in UK and US and compared actual with recommended intakes.

Method / Design: SFA and TFA intakes were estimated using dietary recalls from UK National Diet Nutrition Survey 2008-2010 and US National Health and Nutrition Examination Survey 2009-2010. Individual SFA were calculated for US data.

Results: The mean percentage of calories from SFA was 12.5% (UK) and 10.8% (US), with no gender differences. Men's SFA intake was 29.8 in the UK and 30.2 g/day in the US, while among women the respective figures were 22.8 (UK) and 21.5 g/day (US). 95th percentile intakes were 47.5 (18.8%, UK) and 51.7 g/day (16.1%, US). Atherogenic SFA (lauric + myristic + palmitic acids) intake was similar across genders (~7.0%) in the US. TFA intake was similar across genders at 0.7% in both countries. Mean intake was 1.47 g/day (UK) and 1.64 g/day (US), with 95th percentile intake at 2.80 g/day (1.18%, UK) and 3.51 g/day (1.22%, US).

Conclusions: The mean consumption of SFA in adults exceeds recommendations in the UK and US. From a public health perspective the extremes in the intake distribution, (e.g. the 95th percentile intake) warrants further investigation. Data for the US, however, indicate that the mean intake of "atherogenic" SFA is lower than the 8% upper limit set by the French authority, the only authority that sets limits for specific SFA. Only a small proportion of the population in both countries exceeds the 1% limit set by most authorities for TFA.

Keywords: (maximum 5): Saturated; trans; fat; intake; recommendations

149/439. Phenolic compounds as quality parameters of wines

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Introduction: Phenolic compounds belong to the group of bioactive food components, whose presence in food improve its health quality. As antioxidants, they prevent a number of serious illnesses such as atherosclerosis or cancer. Grapes are a valuable source of phenolic compounds, which largerly get into the produced wine.

Objectives: The aim of the work was to determine whether wines available in the Polish market differ from one another in the content of phenolic compounds.

Method / Design: The research material included two groups of imported Chilean grape wines, whose distinguishing factor was the price. These were red dry wines produced from three types of grape variety: Cabernet Sauvignon, Merlot and Carmenere as well as dry white wine produced from Chardonnay variety. Products were purchased in one of the well-known chain shops located in Olsztyn, Poland.

Organoleptic evaluation was carried out in accordance with Polish standard PN-A-79122:1996. General content of phenolic compounds in wines was analysed by spectrophotometric method. The content of phenolic acids was determined by HPLC method using acid and enzymatic hydrolysis.

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Results: The concentration of phenolic compounds in red wines (1778,21 μg/ml) was almost ten times greater than in white wines (183,12 μg/ml). The content of phenolic acids differed markedly from one wine brand to another. The amount of gallic acid was at the highest level and was in the range of 143,66 μg/ml to 290,88 μg/ml. Ferulic acid was the least concentrated and it ranged from 0,22 μg/ml to 2,77 μg/ml.

Conclusions: The total content of phenolic compounds is a distinguishing factor of wines available in the Polish market depending on the colour and grape variety. Depending on the price of the researched products, wines differ in the content of individual phenolic acids.

Keywords: (maximum 5): phenolic compounds: phenolic acids: wine

149/443. Impact of bioavailability estimation on the assessment of inadequate nutrient intakes in French adults

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Introduction: Nutritional adequacy, a key-dimension of diet sustainability, depends on nutrients intake but also on bioavailability. The recommended intakes are based on average estimated nutrient bioavailability, although the latter is influenced by many factors including food and nutrient contents of individual diets.

Objectives: To evaluate the impact of bioavailability estimation when assessing the prevalence of iron, zinc and vitamin A (VA) inadequate intakes in French adults.

Method / Design: Individual nutrient intakes were estimated using dietary data (n=1899) from the French national survey INCA2. Prevalence of VA, iron and zinc inadequate intakes were estimated using i) the usual dietary pattern approach, based on average conversion factors of pro-VA carotenoids to estimate retinol equivalents (RE) and on average estimations of iron and zinc bioavailability recommended by WHO for western diets, and ii) an individual diet approach, based on food-group specific conversion factors for VA and on diet-based algorithms for estimating iron and zinc absorption rates.

Results: Using the food-group specific conversion factors led to a mean VA intake of 851.7±699.1 μgRE/d and a prevalence of VA inadequate intake of 22.9%, which were respectively significantly different from the mean intake (895.2±706.5 μgRE/d, $p<0.001$) and prevalence (18.5%, $p=0.001$) estimated using WHO-factors.

Using the zinc-algorithm led to a mean absorption rate of 27.6±5.5% and a prevalence of zinc inadequacy of 1.7%, which was not significantly different from the prevalence calculated with the WHO-estimate (1.5%, $p=0.603$).

Using the iron-algorithm led to a mean absorption rate of 13.9±3.2% and a prevalence of iron inadequacy of 27.5%, which was significantly higher than the prevalence calculated with the WHO-estimate (18.8%, $p<0.001$).

Conclusions: In French diets, the prevalence of iron and VA inadequate intakes were significantly different depending on the approach used to estimate bioavailability. For zinc, no difference was found between estimates from dietary pattern and individual diet approaches.

Keywords: (maximum 5): Bioavailability, nutritional adequacy, recommended nutrient intakes

149/444. The content of phenolic compounds as a distinguishing factor of locally available buckwheat products

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Introduction: Buckwheat is a rich source of numerous nutrients such as proteins, vitamins and phenolic compounds, whose antioxidant properties have a positive influence on the organism. Due to the absence of gluten, it is a valuable resource in the production of functional food. These days, consumers purchase food products more and more consciously, wanting to supply the organism with healthy components.

Objectives: The objective of the work was to determine whether the buckwheat products available locally differ from one another in the content of phenolic compounds.

Method / Design: The research material included locally available buckwheat products (buckwheat flour, buckwheat flakes, unroasted buckwheat groats, and toasted buckwheat groats of various brands). The products were purchased in a health food shop and in one of the well-known chain shops, located in Olsztyn, Poland.

Commodity evaluation was performed in accordance with the applicable standard PN-76/A-74204 and PN-64/A74013. The general content of phenolic compounds was determined by spectrophotometric method acc. to Emmons and others (1999). The obtained results were expressed as gallic acid equivalent.

Results: The quantity of phenolic compounds in the researched buckwheat products ranged from 918,80 μg/g s.m to 3595,20 μg/g s.m. The highest overall concentration of phenols was determined in unroasted buckwheat groats 3595,20 μg/g s.m and buckwheat flour 3394,83 μg/g s.m. The phenolic compound content in roasted buckwheat groats varied from 918,80 μg/g s.m to 1748,65 μg/g s.m. On the basis of the statistical significance analysis it has been concluded that the total content of phenolic compounds is a distinguishing characteristics of locally available buckwheat products.

Conclusions: The type of buckwheat products chosen by the consumer shall decide on the quantity of phenolic compounds delivered to the organism.

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Keywords: (maximum 5): phenolic compounds: buckwheat products

149/447. Plasma fatty acid profile after nutritionally relevant intakes of oily fish and fish oil supplement

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Introduction: It is well known that long-term and regular intakes of long chain (LC) n-3 polyunsaturated fatty acids (PUFAs) from fish or fish oil supplements are useful in improving n-3 fatty status. Dietary guidelines recommend use of these fatty acids in purpose of cardiovascular primary and secondary preventions.

Objectives: The objective of this study was to explore the difference in plasma fatty acid profile following general recommendations for fish intake or fish oil supplement usage.

Method / Design: Participants were randomised to receive salmon (oily fish) providing 274 mg EPA + 671 mg DHA/day or commercial fish oil supplement providing 396 mg EPA + 250 mg DHA/day in cross-over trial over 8 weeks period separated by the 6 months washout period. Fatty acids were extracted from plasma and analysed by gas chromatography.

Results: The initial plasma concentration of fatty acids was not different between groups at baseline and after the washout phase. After 8 weeks, there was a significant increase in the level of EPA, DHA and total n-3 fatty acids in plasma of both groups. The percentage values of EPA increased by 135% in salmon group ($p<0.0001$) and 152% in fish oil group ($p<0.0001$), whereas DHA increased by 145% in salmon ($p<0.0001$) and 121% in fish oil group ($p<0.010$). The increase of plasma total n-3 fatty acids observed after 8 wks of the salmon consumption was greater when compared with fish oil (45% vs 27%) ($p<0.05$) and mirrored the content in used dietary sources.

Conclusions: Plasma n-3 fatty acid profile was remarkably increased with both salmon and fish oil capsules intervention. Increase of plasma EPA and DHA levels was dose-dependent.

Keywords: (maximum 5): plasma, n-3 fatty acids, fish, fish oil supplements

149/449. Dietary determinants of iron intake in Irish pre-school children

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Introduction: Iron is important for growth and cognitive and neurological development in young children. Inadequate intakes of iron have been reported in Irish children with 23% of 1 year olds and about 10% of 2 and 3 year olds having intakes below recommendations.

Objectives: To investigate the dietary patterns influencing iron intakes in 1-4 year (12-59 month) old Irish children.

Method / Design: A 4-day weighed food record collected food intake-data from 500 pre-school children in the National Pre-School Nutrition Survey (NPNS; www.iuna.net). Nutrient intake was analysed using WISP© based on UK and Irish food composition databases. Children were divided into three groups based on mean daily iron intake: low medium or high consumers, stratified by age.

Results: The mean daily intake of iron ranged from 7.0 to 7.8mg/d for age 1-4 years. The greatest difference in iron intake between high and low consumers was observed for one year olds (6.3mg/d). Infant/Growing-up milks accounted for 54% and 30% of the difference in iron intakes between high and low consumers at age 1 and 2 years. Breakfast cereals were important contributors to the difference at all ages (29%, 32%, 44%, and 67% at age 1, 2, 3 and 4 years respectively). Nutritional supplements accounted for 16% and 30% of the difference at 2 and 3 years respectively, attributable to the number of consumers. Meat accounted for ≤ 6% of the difference at any age.

Conclusions: Most of the difference in iron intakes between high and low consumers at age 1 to 4 years is attributable to fortified foods (infant/growing-up milks for age 1 and 2 years and breakfast cereals for all ages) and nutritional supplements (for age 2 and 3 years). These results are useful in developing age-specific dietary strategies to increase iron intakes in pre-school children.

Keywords: (maximum 5): Iron, Pre-school children, Dietary guidelines

149/459. Value of voluntary fortification in reducing risk of micronutrient deficiency during conscious energy restriction (dieting).

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Introduction: Over half of the European Population are overweight and around one-quarter obese. The WHO goal to halt the rise in obesity focuses on correcting energy imbalance, however conscious restriction of energy intake (to prevent weight gain or achieve loss), may have the undesirable consequence of reducing micronutrient intake.

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Objectives: To undertake a review of published evidence to:

1. Assess risk of micronutrient deficiency in Europe.
2. Examine impact of dieting on micronutrient intake.
3. Identify effective methods to deliver micronutrients to dieters.

Method / Design: Review of evidence published since 1990, including Pubmed, Cochrane library and National Dietary Surveys to address the objectives.

Results: One in five adults across Europe have pre-existing low intakes of vitamin D, folic acid, vitamin C, calcium, selenium, and iodine. Zinc inadequacy is also common, especially among women with 1 in 10 affected. Energy restriction results in a concomitant reduction in micronutrient intake, even when macronutrient balance is improved. Fortification can reduce risk of sub-optimal micronutrient intakes at a population level, and also improve individual status for selected micronutrients (e.g. folate, vitamin D and riboflavin) in both children and adults. Commonly consumed fortified foods include breakfast cereals, milks, breads, fat spreads, cereal bars and juices.

Conclusions: Voluntary fortification of foods appears to be an effective strategy to increase micronutrient intakes and reduce inadequacy - without increasing calorie intake. Food manufacturers in Europe are currently fortifying with a range of micronutrients such as B-group vitamins, D, C, iron and more recently zinc. Fortification of the foods routinely consumed by large numbers of the European population will enable delivery of micronutrients specifically to meet the needs of consumers consciously restricting their energy intake.

Keywords: (maximum 5): energy, restriction, dieting, micronutrients, fortification

149/462. The effect of dietary counselling on diet in pregnant women at risk for gestational diabetes

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Introduction: The prevalence of gestational diabetes (GDM) is increasing worldwide. GDM might be prevented by improving diet of pregnant women.

Objectives: The objective of the study was to evaluate the effect of dietary counselling on food intake in pregnant women at increased GDM risk.

Method / Design: This study was a part of the Finnish gestational diabetes prevention study (RADIEL) which is a randomized controlled lifestyle intervention study. The present study included pregnant women with previous GDM or BMI ≥30 kg/m2 who were allocated into two groups. The control group received standard antenatal dietary counselling according to national recommendations. The intervention group participated, in addition, in one individual dietary counselling session and one group dietary counselling session. Food intake was assessed using a food frequency questionnaire (FFQ). The follow-up of the present study was conducted between February 2008 and January 2014, and included 242 pregnant women who were followed from the first to the second trimester of pregnancy. Bootstrap type analysis of covariance was used to indicate the changes in food intake.

Results: The intake of low-fat cheese increased in the intervention group and decreased in the control group (baseline adjusted means 0.09 times/day and -0.14 times/day; P = 0.040). Also, the intake of fish increased more in the intervention group compared to the control group (baseline adjusted means 0.28 times/day and 0.06 times/day; P = 0.011).

Conclusions: The present study showed that dietary counselling in early pregnancy can improve diet of pregnant women at increased GDM risk.

Keywords: (maximum 5): Dietary counselling, Food intake, Pregnancy, Gestational diabetes

149/479. Health implications of a vegan diet: nutrient status, body weight and blood pressure – a literature review

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Introduction: This paper reviews the literature regarding health implications of a vegan diet.

Objectives: The aim of the study was (1) to identify evidence-based results concerning the nutrient status of a vegan diet and (2) to elucidate whether a vegan diet affects body mass index (BMI) and blood pressure compared to a non-vegetarian and a vegetarian diet.

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Method / Design: The review follows the PRISMA (preferred reporting items for systematic reviews and meta-analyses) statement guidelines. Eligible studies published between 1 January 2004 and 31 December 2014 were retrieved via an electronic search of PubMed.

Results: The search yielded 441 citations. 36 studies were included (36 on nutrient status, four on BMI and seven on blood pressure). In general, a vegan diet was able to meet the recommendations of the German Nutrition Society regarding intake of total and saturated fat as well as carbohydrates. Protein intake was relatively high but usually still acceptable. Compared to non-vegetarians, most vegans consumed considerably higher amounts of fibre, carbohydrates and polyunsaturated fat. Differences between vegans and lacto(-ovo) vegetarians were less pronounced. Regarding micronutrients, the majority of vegans suffered from vitamin B12 deficiency and had an inadequate calcium supply. As for BMI and blood pressure, there was no overall significant difference between vegans and non-vegetarians or lacto(-ovo) vegetarians. Although three studies identified a lower diastolic blood pressure in vegans compared to non-vegetarians, such a difference was only found by one study for systolic blood pressure.

Conclusions: Vegans should pay particular attention to ensure adequate supply of vitamin B12 and calcium. Further large epidemiological studies are warranted.

Keywords: (maximum 5): vegan; nutrients; BMI; blood pressure

149/481. Nutrients intake, meal quality and lipidemic profile among overweight young and middle age individuals

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Introduction: Dietary intake among excess weight individuals is characterized by high caloric intake, which contributes to weight gain. Over the years, the metabolic rate decreases and inadequate intake of calories and nutrients are reflected directly in the blood profile of individuals.

Objectives: Compare dietary and blood data among overweight young and middle age individuals.

Method / Design: A total of 106 individuals participated and 53.8% of them were under 31 years old. Anthropometric (weight, waist circumference), dietetic (24-hour diet recall) and biochemical (lipid profile, blood glucose, hormones) assessment were performed. The quantitative dietary data analysis was performed using the software NDSR. Qualitative dietary data used the Food-Based Classification of Eating Episodes Model (FBEE). For comparison between age groups, T test was performed for independent samples, and chi-square test using SPSS software.

Results: The data regarding food intake of individuals under 31 years old had more inadequacies, characterized by: significantly higher energy intake of total calories, carbohydrates and lipids, as well as the most inadequate total cholesterol intake and high intake of saturated fatty acids. In addition, younger individuals showed higher rate of meal omission and lower intake of fruits for breakfast and vegetables at dinner, furthermore, a higher intake of sweets at dinner. Despite individuals over 31 years old presenting consume higher quality snacks and complete dinners (animal protein intake, carbohydrates and fruits and vegetables), the analysis of the blood data reported that VLDL, LDL, total cholesterol, triglycerides and glucose were significantly higher.

Conclusions: Despite having most inadequate quality of meals, individuals under 31 years old are less susceptible to alterations of blood lipids profile due to the unbalanced diet, which shows that youth can be a protective factor for metabolic changes.

Keywords: (maximum 5): Overweight, Age, dietary assessment

149/482. Associations between dietary inflammatory index and bone mineral density among perimenopausal women

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Introduction: Chronic inflammation is associated with disorders such as metabolic syndrome, diabetes, cardiovascular disease and cancer. A literature-based dietary inflammatory index (DII) can be used to characterize diets of individuals, according to their inflammatory potential. Osteoporosis is a global public health problem. Bone mineral density (BMD) is the one of the criteria for the diagnosis or exclusion osteoporosis and the diet can influence on it.

Objectives: The purpose of this study was to examine the association between the dietary inflammatory index and bone mineral density in a sample of perimenopausal women.

Method / Design: The study was conducted in Warmia and Mazury, of 322 perimenopausal women aged 33 - 63 years. Assessment of dietary intakes were obtained from repeated 24-h dietary recall interviews conducted 7 times at irregular intervals. The DII was computed based on the food parameter-specific DII scores which was summed in overall DII. The measurements of BMD were made by ultrasound device (DBM Sonic Bone Profiler) and expressed in BMD T-score.

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Logistic regression models estimated associations between DII and the risk of osteoporosis.

Results: Women's diets had anti-inflammatory influence (DII > 0). The results of analyzing the association between the DII and BMD indicated that the women in group with the lowest DII (Tertile 1 < 219,91) had a lower values of BMD (9,4±35,3) than a women with the highest DII (Tertile 3 >= 418,78) and highest BMD (16,4±41,6). Logistic regression models showed no relationships between DII and the risk of osteoporosis.

Conclusions: No observed statistically significant associations between DII and BMD in the group of perimenopausal women. Research of the effect of dietary inflammatory index is an important step to expand knowledge about the impact of nutrition and determine the applicability of using it in treatment of chronic disease.

Keywords: (maximum 5): Dietary inflammatory index, bone mineral density, perimenopausal women

149/490. Dietary behaviors among men and women overweight and their consequences on biochemical markers

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Introduction: Inadequacy dietetic is seen as one of the key determinants of overweight and changes in lipid, glycemic and hormonal markers. Some peculiarities are observed according to gender, which may differ dietary behavior that promotes the weight gain between men and women.

Objectives: Compare the dietary patterns and changes in blood markers of risk among individuals with overweight by gender.

Method / Design: A total of 106 overweight individuals were assessed at a university campus clinical nutrition. Anthropometric measurements (weight, waist circumference) and dietary assessment (24-hour diet recall) were performed. For quantitative data the software NDSR was used and DRIs for assessment of the adequacy of intake. Qualitative diet analysis followed the methodology of daily meals evaluation, food-based classification of day eating episodes model. Blood sampling was performed for evaluation of biochemical markers for lipid profile, blood glucose and hormones. For comparison between genders, T test was performed for independent samples, and chi-square test using SPSS software.

Results: The sample was composed by 64.2% of women. For them, the main cause of their weight gain was stress and anxiety. The comparison between genders regarding the dietary and blood data showed that men had higher food intake, also leading to greater intake of energy and macronutrients, however the high intake was not associated with higher levels of dietary adequacy in relation to women. Women showed inadequate fiber intake. Regarding the qualitative evaluation of the diet per meal, men had their supper composed primarily by Pastries food group while women showed low fruit intake at breakfast, which may have contributed to this meal be classified as "incomplete meal". The blood markers analysis confirmed the male individuals had high levels of triglycerides and VLDL cholesterol and also AST and ALT.

Conclusions: Inadequate dietary intake among men contributed to the higher rates of lipid markers

Keywords: (maximum 5): OVERWEIGHT; GENDER; NUTRITIONAL ASSESSMENT

149/495. Protein intake and change in lean mass in elderly participated in resistance exercise program.

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Introduction: Aging is associated with a decrease in lean body mass (LBM), which accelerates after the age of 60 years and is a contributor to disability, frailty and functional impairment. Contributors to these changes in LBM are low energy intake, low protein intake, physical inactivity and other factors. Resistance exercise and increased protein intake have been suggested to delay or prevent the age-related loss of LBM.

Objectives: The aim was to investigate whether energy- and potein intake were related to changes in LBM after a resistance exercise programm.

Method / Design: Participants (N=236, 73.7±5.7yrs, 58.2% female) participated in a supervised 12-week resistance exercise program (REP). Body composition (DXA), quadriceps strength, 6 minute walk for distance (6MWD), timed-up-and-go performance (TUG) and food intake before and after the REP. Food intake was estimated with three days weighed food diary. Associations of change in LBM with energy intake, macronutrient, muscular strength and physical function after the REP were investigated using multivariate statistics.

Results: Two-hundred-and-eleven (90.3%) participants completed REP. Gainers (n=169) increased lean mass (1.1±1.1 kg) where losers decreased lean mass (- 0.3±1.4 kg). No significant difference between the two groups was found in age, BMI, LBM, quadriceps strength, 6MWD or TUG at baseline. Participants who lost LBM had significant lower energy intake, 1551 kcal/day vs. 1724 kcal/day

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(p=0.046) and lower protein intake both as total protein (p<0.001) and as protein per kg, body weight, 0.86 g protein/body weight vs. 0.98 g protein/body weight (p=0.009).

Conclusions: Our study shows that energy and dietary protein intake was positively associated with increase in LBM in older adults participating in REP. The results shows that dietary protein intake was positively associated with increase in LBM in older adults with a

mean protein intake higher than the current RDA of 0.8 g/kg per day.

Keywords: (maximum 5): lean body mass, resistance exercise, protein intake

149/497. Dietary scores at midlife and healthy aging in a French prospective cohort

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Introduction: Over the last few decades, multidimensional concepts often referred to as "healthy aging" have emerged. These concepts aim to capture health during aging as a whole, beyond specific medical conditions or body functions. While nutrition has been advocated as a major determinant of healthy aging, studies investigating the link between diet and such multidimensional concepts are scarce.

Objectives: Our objective was to investigate the association between adherence to French food-based and nutrient-based guidelines at midlife, as assessed by three dietary scores, and a multidimensional model of healthy aging.

Method / Design: Healthy aging was assessed in 2007-2009, after 13 years of follow-up, among 2329 participants of the SUpplémentation en Vitamines et Minéraux AntioXydants (SU.VI.MAX) study aged 45-60 years at baseline (1994-1995) and initially free of diabetes, cardiovascular disease and cancer. Healthy aging was defined as not developing any major chronic disease, good physical and cognitive functioning, no limitations in instrumental activities of daily living, no depressive symptoms, no health-related limitations in social life, good overall self-perceived health and no function-limiting pain. Data from repeated 24-h dietary records provided at baseline permitted the computation of the modified French Programme National Nutrition Santé -Guideline Score (mPNNS-GS), the Probability of Adequate Nutrient Intake Dietary Score (PANDiet), and the Diet Quality Index-International (DQI-I). Associations of these scores with healthy aging were assessed by logistic regression.

Results: In 2007-2009, 41.6% of men and 36.3% of women met our criteria of healthy aging. After adjustment for potential confounders, higher scores of the mPNNS-GS (p for trend =0.009) and the PANDiet (p trend=0.04) were associated with higher odds of healthy aging. We observed no association between the DQI-I and healthy aging.

Conclusions: This study suggests a beneficial long-term role of a high adherence to both food-based and nutrient-based French dietary guidelines for a healthy aging process.

Keywords: (maximum 5): nutrition, dietary score, healthy aging, midlife exposure

149/511. Children on vegetarian diets – what do we know about benefits or risks?

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Introduction: Prevalence of children on vegetarian diets is assumed to be on the rise, but representative data are hardly available in particular since manifestations of vegetarian diets are blurred in dietary practice. Although vegetarian diets are supposed to be healthy in general, some concerns remain whether the specific dietary requirements during infancy, childhood and adolescence can be met. So the impact of vegetarian diets on health and nutrient status of children needs to be clarified.

Objectives: The objective of this systematic review was to evaluate studies on dietary intake and health status of infants, children and adolescents on appropriately characterized vegetarian diets.

Method / Design: PubMed, Greenpilot, Medpilot, Web of Science und Google scholar were searched for relevant studies. Additionally references of reviews and expert opinions were considered. Inclusion criteria: sufficient dietary information (1) to define vegetarian type diet and (2) to evaluate characteristics of nutritional and health status. Case reports and studies from non-industrialized countries were excluded.

Results: 28 publications from 16 studies with mostly small samples mainly undertaken in the 1980s and 1990s met our criteria. Most participants came from families with high social status, nutrient supplementation was common. Growth and body weight generally were found within the lower reference range. High prevalences of low status of vitamin B12, D and iron and indications of impaired bone health were often reported. In particular children on macrobiotic diets suffered from multiple nutrient deficiencies and showed signs of growth retardation.

Conclusions: Conclusion: Due to the study heterogeneity, the small samples, selection towards upper social classes and the scarcity of recent studies the existing data do not allow to draw firm conclu-

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sions on health benefits or risks of present-day vegetarian type diets of children and adolescents in Europe.

Keywords: (maximum 5): vegetarian diet, health, infant, children, adolescents

149/516. Twenty-year trends in socio-economic differences in selected nutrition habits in Lithuania

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Introduction: In Lithuania, the transition period from a centralized-communist to a market-oriented economy was characterized by a widening gap between social strata. Social and economic changes in a country may impact socio-demographic differences in diet.

Objectives: The aim of the study was to assess trends in selected food habits of the Lithuanian adult population by socio-economic status in the last 20 years.

Method / Design: The data were obtained from 1994, 1996, 1998, 2000, 2002, 2004, 2006, 2008, 2010, 2012 and 2014 cross-sectional postal surveys of Lithuanian health behaviours, using the same methodology and questionnaires. For every survey, a nationally representative random sample of 3000 individuals aged 20-64 was drawn from the National Population Register. In total, 8738 men and 11818 women participated in these surveys.

Results: Our study showed some improvement in food habits of the Lithuanian population during the study period: both men and women reported a decreased consumption of animal fat, while the use of vegetable oil in cooking and consumption of fresh vegetables increased. In 1996, daily consumption of fresh vegetables was reported by 3.6% of men and 5.4% of women, while in the 2014 this proportion was 21.3% and 28.2%. Although all social groups have changed their diet, social differences in nutrition habits still remain significant: those with a higher level of education had healthier food habits than those with low education. The educational gradient in analyzed food habits, except the use of vegetable oil, enlarged. A higher proportion of the rural population compared to urban reduced their usage of butter on bread, but drinking of high-fat milk remains more prevalent in the rural area.

Conclusions: Differences in dietary habits were found between adults by gender and SES. These inequalities should be recognized in the future food and nutrition policies and interventions.

Keywords: (maximum 5): Nutrition habits, trends, social differences

149/536. Nutritional status and health-related physical activity of Warsaw medical students

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Introduction: Nutritional status and physical activity have been recognized as a significant risk factor for noncommunicable diseases[1] and all-cause mortality.

Objectives: The aim of the study was to assess physical activity and nutritional status of Warsaw medical students interested in healthy lifestyle.

Method / Design: The retrospective study included complete data from 77 of total 170 students (40 women and 37 men), who underwent the following assessments: anthropometric variables (bioelectrical impedance using Maltron BioScan 920-II), physical activity level (SenseWear 7.0 professional), submaximal cardio-respiratory test (Fitmate Med Cosmed).

Results: No significant differences were observed between men and women in physical activity level (1,8±0,3 METS), lengh of moderate physical activity (3-6 METS) (209,4±87,4 min/day) or sleep (399,9±121,4 min/day) and fat mass (12,3±5,2 kg).

Men displayed significantly greater values of body mass index, percentage of fat tisue , percentage and mass of free-fat tissue, body protein, glycogene, percentage and mass of total, intra – and extracellular body water, kalium, calcium, resting metabolic rate (RMR), total energy expenditure (TEE), maximal oxygen uptake (VO2max) and metabolic equivalent ($p < 0.05$) than women and these might be related to gender differences in body composition.

The correlation analysis (based on Spearman's rank correlation coefficient) revealed the significant positive correlation between TEE, moderate physical activity, RMR, FFM, TBW, ICW, ECW, muscle mass, glycogen, protein, kalium, calcium and VO2max & metabolic equivalent .

Conclusions: Total daily energy expenditure is associated both with the better nutritional status and the higher values of cardiorespiratory indicators.

Keywords: (maximum 5): nutritional status, physical activity

149/543. Flavonoids intake among Polish and Spanish students

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Introduction: Flavonoids are a group of bioactive compounds that are extensively found in foodstuffs of plant origin. Their regular consumption plays an important role in the prevention of degenerative diseases, particularly cardiovascular diseases, and cancers.

Objectives: To estimate dietary flavonoids intake among Polish and Spanish students and to establish main dietary sources of flavonoids

Method / Design: This study included 91 Polish and 60 Spanish students.

Dietary data were collected using a food frequency questionnaire. The dietary USDA Database for the flavonoid content of selected foods was used to calculate daily and weekly flavonoids intakes in the subjects.

Results: The average flavonoids consumption among the Polish students was 801 mg/day, and among Spanish students 297 mg/day. Food categories such as beverages, vegetables and fruits were found to be significant sources of flavonoids among both Polish and Spanish students. Tea, oranges, orange juice, dried parsley and oregano were the main contributors in the Polish students. Oranges, tea, chickpeas, orange juice and dried parsley were the main sources of flavonoids in Spanish students.

Conclusions: The amount of flavonoids consumption in Polish students was more than two times higher than in Spanish students. Polish students drank much more tea than Spanish students. Tea is a very good source of flavonoids. Compared to other population studies consumption flavonoids in both student groups was adequate. It seems that a diet rich in flavonoids is beneficial, therefore future studies should focus on dietary intakes of individual flavonoids.

Keywords: (maximum 5): flavonoids intake, patterns of consumption, student population

149/544. Eating Behaviour Of German University Students – Current Food Intake And Changes Since Start Of Studies

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Introduction: Research indicates that a balanced diet reduces the risk of future disease, such as obesity or diabetes. It is therefore important to establish a balanced diet already early in life. However, adolescence is characterised by different changes that may influence eating behaviour. For instance, the transition from school to university is associated with changing life circumstances, which might result in a reorientation of eating behaviour.

Objectives: We aimed at describing the current food intake of university students, at identifying potential changes in their eating behaviour since start of studies, and at identifying reported barriers for a healthy diet.

Method / Design: We used data of the Nutrition and Physical Activity Study (NuPhA), a cross-sectional online survey among students at German universities (Data collection: 2014/10/31-2015/01/15). Altogether, 689 university students (30.5% male; 16-29 years) participated.

Results: Concerning current food intake, 29.3% of the university students consumed fresh fruit several times a day. Brown bread was eaten by 10.3% less than once a week. While 1.9% reported to eat fast food 4-7 times a week, 52.5% consumed fast food less than once a week. Two-thirds (65.3%) reported that their eating behaviour has changed since they have entered university. A decreased consumption since start of studies was reported for red meat (53.5%), poultry (43.4%), and fish (37.3%). More than half of the students (55.2%) reported a decreased consumption of regular meals since start of studies. Most important barriers for a healthy diet were lack of time due to studies and non-availability of healthy meals in university canteens (both 18.3%).

Conclusions: Our findings indicate that changes in eating behaviour may occur during the transition from school to university. Qualitative studies may be helpful to further explore and better understand the determinants of food intake and the reasons for changes in eating behaviour among university students.

Keywords: (maximum 5): eating behaviour, adolescents, university students, Germany

149/549. Compliance with the Dutch food based dietary guidelines

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Introduction: The Dutch food based dietary guidelines are a tool for planning a healthy dietary pattern. A dietary pattern that is in agreement with these guidelines could reduce the intake of saturated fatty acids, salt and sugar, and increase the intake of fibers. For the development of policy on health diet, to product innovation and nutritional information, it is necessary to have insight in the national food consumption.

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Objectives: To evaluate whether the food consumption of Dutch people is in agreement with the Dutch food based dietary guidelines.

Method / Design: This study was conducted with the Dutch Food Consumption Survey from 2007-2010. This survey contains detailed information about the diet of 3819 of children and adults between 7 and 69 years of age,. Information on the composition of foods was obtained via the Dutch Food Composition Database (NEVO-2011). Also differences between population subgroups were analyzed.

Results: Almost three-quarters of the diet of the Dutch consists of foods in the Dutch Wheel-of-Healthy-Eating (WHE). These include fruit and vegetables, potatoes, bread, rice and pasta, dairy products, meat and fish, fats and oils, and water. A quarter of their diet consists of products that are not included here, such as snacks and beverages other than water, tea or coffee. This is more than is recommended. Furthermore, even within food groups included in the WHE, Dutch people often consume less healthy variants, such as white rice instead of brown rice or margarine instead of oil. Children consume more sweet and salty snacks, non-alcoholic beverages and sandwich filling. People with a high socio-economic-status consume more vegetables, fruit, fish, water, coffee, tea and alcoholic beverages.

Conclusions: The compliance with the food based dietary guidelines is not high. This tendency is stronger in some population subgroups, like children and people with low socio-economic-status.

Keywords: (maximum 5): food consumption survey, dietary guidelines, foods, adults, children

149/558. Dietary patterns and diet quality differ according to levels and types of dairy products consumed

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Introduction: Health recommendations emphasize the daily consumption of dairy products with no further detail on types.

Objectives: We aimed to describe dietary patterns and adherence to recommendations according to the types of dairy products consumed.

Method / Design: Data from the French nation-wide 2010 CCAF cross-sectional dietary survey were analyzed. Food groups were collected with a 7-day food record. The sample comprised 986 French of 25-64 years old. For each of the 3 dairy categories (milk, fresh dairy products (FDP), and cheese), we defined non-, low, medium and high consumers splitting consumers into 3 similar-sized groups. The PANDiet (Probability of Adequate Nutrient intake) score was used to assess diet quality through adherence to nutritional recommendations

Results: The sample distribution was different between milk, FDP and cheese with respectively, 45%, 22% and 9% of non-consumers in the population. High FDP consumers were preferentially women, whereas high cheese consumers were preferentially men. The proportion of older adults was higher among high FDP and cheese, but was lower among high milk consumers. Daily calorie intake was higher among high milk and cheese consumers compared to low consumers (resp. +163kcal/day, +501kcal/day), whereas no significant relationship was found with FDP consumption. BMI was not correlated to milk and FDP consumption but significantly higher in high cheese consumers. Calcium intakes increased with the level of consumption whatever the category (milk, cheese or FDP). The PANDiet score differed according to the different consumption pattern, with increasing scores being observed from no to high intakes of milk and FDP (+4pts) and decreasing scores being observed from no to high cheese intakes (-2pts).

Conclusions: Consumers of milk, FDP and cheese have different dietary patterns. Diet quality is better among high consumers of milk and FDP than among people with lower consumptions or high consumers of cheese.

Keywords: (maximum 5): French adults, dairy products, diet quality

149/560. Role of young child formulae in reaching nutritional requirements: an individual modeling approach

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Introduction: The European Food Safety Authority (EFSA) states that young child formula (YCF) "cannot be considered as a necessity to satisfy the nutritional requirements" of 12-36 month-old young children.

Objectives: To quantify the role of YCF to meet nutritional adequacy in the diets of UK young children.

Method / Design: Observed food intakes of 12-18 month-old children from the Diet and Nutrition Survey of Infants and Young Children (N=1147) were used for the study. Four groups of children were defined, according to the consumption of YCF and/or supplements. For each observed diet, a nutritionally adequate (i.e. meeting all EFSA nutrient's requirements) diet was generated, first only with repertoire-foods (i.e. foods already consumed by each child), and then,

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by giving access to all foods in the database, including YCF. Dietary changes needed to obtain nutritionally adequate diets were evaluated.

Results: Only 0.1% of the 707 children not consuming YCF nor supplements could meet nutrient requirements with their repertoire-foods only. YCF increased the feasibility of adequate diets with individual repertoire-foods without and with supplements to 49% and 74% respectively. With access to all foods, all optimized diets could be made adequate, but the largest food changes were needed for children not consuming YCF nor supplements. In this group, an average of 313g/day of YCF was needed to meet nutrient requirements; a decrease of 265g of cow's milk and an increase of 61 g of fruits and vegetables were also observed.

Conclusions: A shift from cow's milk to YCF was needed to reach nutritional adequacy in 12-18 month-old children, especially in children taking no supplements. These results may help to clarify the role of YCF with and without supplements to cover the nutrient needs of young children.

Keywords: (maximum 5): YCF, individual diet modeling, UK, diet, EFSA

149/561. Inadequacy in dietary intake in Brazilian women athletes

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Introduction: Athletes may have different nutrient profiles by gender. The investigation of these profiles could help in the development of specific nutritional intervention strategies

Objectives: To evaluate and compare the nutritional profile between male and female athletes

Method / Design: The study included 80 high performance athletes, including 43 male and 37 female of different sports. The athletes dietary intake was evaluated by a 24-hour recall. The Nutrition Data System for Research 2014 software (NDSR) was used to calculate nutrient intakes. Macronutrient data were compared to athletes guidelines and the dietary reference intakes (DRI) were used as the reference for vitamins and minerals intake. Food groups were compared to the Brazilian Food Pyramid adapted to athletes. Comparison between groups was conducted using Student´s T-test for independent samples and Mann-Whitney´s test.

Results: Both groups showed a high inadequacy in caloric intake, carbohydrate, polyunsaturated fat and dietary fiber. Men were more inadequate for protein intake and saturated fat, while women showed a higher percentage of inadequacy in monounsaturated fat ($p<0,05$). Regarding micronutrients, both groups showed a high inadequacy in vitamin A, E, D and calcium intake. Men were more inadequate in vitamin C and sodium, while women had a higher percentage of inadequacy in vitamin B12, B3, magnesium, folate, phosphorus, and five times more probability of inadequate iron intake. Women had a more inadequate intake of fruit, meat than men and a water intake and a number of meals below the recommended guidelines ($p<0,05$). Both groups had a high percentage of inadequate intakes of oils and fats, sweets and dairy products.

Conclusions: Athletes of both sexes present inadequacies on dietary intake, however, these were higher among women.

Keywords: (maximum 5): DIETARY INTAKE. FEMALE ATHLETES. NUTRITIONAL RISK

149/571. Study for assessment of traditional food intake in Lebanon

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Introduction: All emerging countries are now subjected to a dietary transition accompanied by a development of degenerative pathologies related to human diet.

Objectives: To determine the contribution of the traditional Lebanese food to the relative overall intake and to evaluate its contribution in covering the various nutritional needs.

Method / Design: We developed and validated a photographic atlas of food portions, a food frequency questionnaire and a table of food composition corresponding to the traditional Lebanese dishes. Using these tools, the daily mean intake of traditional dishes was quantified in a representative population sample of 566 Lebanese adults, aged 20–85 years, randomly selected in 5 areas of Lebanon.

Results: The modern Lebanese population preserved an important place for the traditional food: 57 % of the Lebanese population consumes more than 2 traditional dishes per day. This diet is characterized by a dominating contribution of fruits and vegetables (42 %), cereals (34 %) and legumes (7 %).

The Lebanese population, through the consumption of the only traditional dishes of which the energy intake exceeds the 75 %, has mean energy intake of 2047 kcal/day. The breakdown shows a statistical mean of carbohydrates ranging up to 46 %; 11% of proteins; 43% of lipids; 10 % of SFA, 20 % of MUFA and 10 % of PUFA. The Lebanese population covers almost all their needs in vitamins and minerals.

The Lebanese daily food ration presents a strong trend today to evolve towards diets rich in lipids on the detriment of carbohydrates.

Conclusions: Lebanon seems to be the place of coexistence between the tradition and the modernity. A valorization of the still very present traditional diet in the food habits should allow to slow down the nutritional transition and to improve the health of the population.

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Keywords: (maximum 5): Traditional Food and Nutrient intake, Dietary assessment, Lebanon.

149/572. Intake of selected nutrients in the diet of patients Warsaw nephrology clinic

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Introduction: Proper nutrition is the basis for the prophylaxis and treatment of renal diseases, including inhibition of progress and prevent complications.

Objectives: The aim of the study was to determine the intake of selected nutrients in the diet of patients nephrology clinic in Warsaw based on 72-hour interview nutrition. Rated consumption of energy, protein, fat, carbohydrates, and some minerals.

Method / Design: The study was conducted in November 2012, a group of 82 patients, eight nephrology clinic in Warsaw by a copyright, anonymous questionnaire of 72-hours interview nutritional. To obtain reliable results, interviews were conducted by the interviewer, with an album of photographs of products and dishes.

The results were developed using a computer program Diet 5, and Epi Info statistical software using Student's t-test and the Mann-Whitney / Wilcoxon

Results: The responses were found inadequate intake of energy, including energy from carbohydrates, potassium, magnesium, calcium, and excessive intake of protein.

Conclusions: The diet of the subjects was not properly balanced, could potentially have a negative impact on the health of the patients surveyed. The results confirm the need for permanent care diet to improve nutrition education among kidney patients

Keywords: (maximum 5): Proper nutrition
renal diseases

149/577. Correlation between vitamin D status and visceral fat tissue in overweight and obese adults

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Introduction: The relation between the serum vitamin D levels and the body fat distribution in obesity is not sufficiently studied in Bulgarian population.

Objectives: To describe the correlation between serum 25(OH) D levels and body composition parameters in Bulgarian overweight and obese adults.

Method / Design: One hundred seventy nine overweight and obese adults participated - 80 men and 89 women, wich mean age was 42.8 and 45.7 years respectively . Overweight were 32.5% and obese adults were 67.5%. Food consumption was examined by 24-h recall, food frequency questionnaire (FFQ), and the physical activity level (PAL) by IPAQ. Physical examination (body weight, waist circumference, blood pressure) were performed. Body composition was measured on leg to leg body impedance analyzer (Tanita BC 420 MA, Tanita Corp., Tokyo, Japan) and dual-energy X-ray absorptiometry (DXA) on the GE Lunar Prodigy PRO. Serum levels of vitamin D were measured as 25(OH)D Total (Immunotest, Roche Diagnostics, Switzerland). Correlation analysis was performed on a SPSS17.0 for Windows platform and included 10 possible curves. The data were analyzed pos hoc for men and women.

Results: The mean serum 25(OH) vitamin D levels were 32.2 ± 21.0 nmol/l in women and 36.4 ± 20.3 nmol/l in men. We were able to find statistically significant positive association between serum 25(OH) vitamin D and Body Mass Index (BMI), kg and % fat mass, visceral fat tissue, kg Fat-Free Mass (FFM) and kgTotal Body Water. The sub-analyses (men versus women) did not produce any additional information.

Conclusions: The results will be a basis to establish the relationship as between the serum levels of 25(OH) D and the quantity of fat and fat-free tissue in overweight and obesity as the type of obesity - visceral or subcutaneous in adults.

Keywords: (maximum 5): 25(OH)vitamin D, overweight, obesity, visceral fat tissue

149/587. Factors related to children, adolescents and their parents health and the association of theses factors with their neighbourhood

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Introduction: Cities modern environment is associated with several events related to population's health and sickness. The way people realize their neighborhood can change their behavior, and this can be associated with life quality.

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Objectives: Check factors related to health and nutrition of children, adolescents and their parents and the association of these factors with the satisfaction with their neighborhood.

Method / Design: Cross-sectional study made with 370 children and adolescents from Juiz de Fora, Minas Gerais, Brazil, between 2013 and 2015. To evaluate the social environment, was used the Neighborhood Environment Walkability Scale (NEWS), in the Portuguese validated version. The questionnaire was answered by phone by their parents. It was used seventeen questions related to neighborhood satisfaction. Statistical tests chi-square, T student and Mann Whitney were made.

Results: There was a higher frequency of dissatisfaction for the variables: ease and enjoyment in cycling (73%), access to fun (82%) and safety from criminality (75%). For most satisfaction, include: number of known people (95%), number of friends (90%) and if is a good place to live (78%). About 51% of adults are dissatisfied with their neighborhood. Between non-white skin children was most frequent the parents' dissatisfaction (83%). Toward the nutritional status, it was observed that among the unhappy parents, most children did not have overweight (70%), no statistics differences were found between the age, body mass index and waist circumference and the reporting of satisfaction/ dissatisfaction. Individuals with higher income are more satisfied with their neighborhood.

Conclusions: Despite of limitations, evidences found in this study show that environmental characteristics are important aspects for welfare promotion and are related to people behavior and health outcomes. These findings are initial and require further investigation on Brazilian cities to better understand the links between environment and health.

FOUNDING: CNPq Conselho Nacional de Desenvolvimento Científico e Tecnológico.

Keywords: (maximum 5): Perception, environment, public health

149/607. Do energy labels influence served portion sizes and meal composition?

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Introduction: Consumer education via energy content labelling and front of pack healthy choice labels was suggested as a strategy to promote healthy choices and a reduction in energy intake. Previous studies on the effectiveness of nutrition information labels on portion size and product choice found mixed results. The majority of studies found that kilojoule information did not influence product choice. However, it is unclear whether consumers presented with energy labels select smaller portions or shift their choices with the composition of a multi-component meal.

Objectives: This study tested whether pesenting information on the energy content and a label with information on healthiness influenced the self-selected portion size of individual foods and meals.

Method / Design: 116 young adults (M=24, SD=0.5 years) were invited to serve what they perceived as an adequate portion of breakfast cereal, fruit salad (healthy snack) and chocolate (unhealthy snack), as well as a three component meal (chicken, fries and vegetables). They were randomly assigned into one of three experimental conditions. Participants viewed either a kJ/100g label, a 'Health-Star' rating label or they did not receive any information on the nutrient content of the foods presented. Served portion and meals weights were compared between experimental groups using ANOVA.

Results: Neither energy labels nor the Health-Star label influenced the portion sizes of foods or meal components that individuals served themselves. However, the average self-served portion sizes of all foods, except vegetables, were significantly greater than the recommended portion sizes.

Conclusions: Although labels may help consumers to make better food product choices, this study indicates that presenting food label information relate dto energy content and healthiness do not affect portion size decisions. Future public health efforts should focus on community awaness of or the design of nutrition information labels that help consumers choose appropriate portion sizes.

Keywords: (maximum 5): Experiment, portion size, energy label, food choice, meal composition

149/615. Adherence to the Mediterranean diet is associated with higher BMDs in middle aged and elderly Chinese adults

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Introduction: Adherence to the Mediterranean diet (MD) is associated with lower risk of chronic diseases, but limited data are available on bone health.

Objectives: We investigated the association of the MD pattern with bone mineral density (BMDs) in Chinese adults.

Method / Design: A total of 2092 women and 1051 men aged 40-75 years in urban Guangzhou, China were included in this cross-sectional study. Dietary information was assessed using a 79-items food frequency questionnaire by face-to-face interviews at the fisrt and second survives 3-y later, and the mean values were used for the alternate Mediterranean diet (aMed) scores calculation. BMDs at the whole body, lumbar spine, and hip sites were measured using a dual energy X-ray absorptiometry at the second survey.

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Results: After adjusted for potential covariates, higher aMed scores were positively and dose-dependently associated with BMDs in total participants (all P-trend<0.001), and results were more pronounced in women than in men. The BMDs were 2.39% (whole body), 4.07% (lumbar spine), 3.43% (total hip), 4.44% (femur neck), 3.45% (trochanter), 3.49% (intertrochanter) and 5.31% (Wards' area) higher in Q5 (highest, vs. Q1) quintiles of aMed scores in total subjects (all P <0.01). Similar associations were found but attenuated after stratified by gender. The corresponding percentage mean differences in BMDs were 2.10%-4.22% (all P<0.05) at all studied sites except Wards area in women. Only positive trend remained significant at the sties of whole body, total hip, femur neck and intertrochanter (P for trend=0.007~0.015) in men.

Conclusions: Our results show better adherence to MD (higher aMed scores) provids benefit associations with BMDs in middle aged and elderly Chinese, particular among women. The aMed scores may be of great utility value in the protection of osteoporosis in Asians.

Keywords: (maximum 5): dietary quality; Mediterranean diet score; bone density; adults

149/618. Brazilian elderly energy and macronutrient intake

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Introduction: Nutrition is an important determinant of the quality of ageing due to its potential to modulate the transition from vulnerability to frailty and dependence. Besides the effort to monitor dietary characteristics, Brazil still face the lack of elderly population based data.

Objectives: Estimate Brazilian elderly energy and macronutrient dietary intake.

Method / Design: Data from the National Dietary Survey, of the 2008-2009 Household Budget Survey of all individuals aged 60 and over (N= 4,322 subjects), divided in age groups (5 years intervals) were included. The two non-consecutive day dietary records were used to estimate habitual energy and macronutrient intake. The evaluation of nutrient content used the National Cancer Institute method including sex and region as covariates. The complexity of sample design and correction of intra-individual variability were considered.

Results: In general, older Brazilian men had higher mean calorie intake. Northwest elderly men aged 60-64 years had the highest values (2091.67 Kcal). Lower energy intake were found for older age groups for both sex but, Midwest elderly women aged ≥75 years had the lowest values (1374.34 kcal). Higher values of carbohydrate contribution to total intake (around 53%) were found for older men from the Southeast and for women from the Northeast aged ≥75 years. Fat contribution to total energy intake were within the recommended values for both sex (means from 23.34% up to 28.55%) but, Midwest, Southeast and South men had higher values. Women of 65-70 years from Southeast (10.09%) and men of ≥75 years from South (10.06%) presented the highest contribution of saturated fat.

Conclusions: Energy and macronutrient differences between sex, age group and Brazilian Regions were identified. Overall macronutrients distribution were inadequate, especially for the lower carbohydrate contribution. Brazilian elderly dietary recommendations could stimulate increase on complex carbohydrate intake and attention to protein and lipid profile.

Keywords: (maximum 5): Elderly, diet assessment

149/623. Nutritional assessment in male patients with major depression

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Introduction: Patients with major depression may lose or increase their appetite by stress. The evaluation about relationship between mental disorder and nutritional assessment is not enough.

Objectives: The purpose of this study is to evaluate about the nutritional assessment before and after the treatment in male patients with major depression.

Method / Design: The total cholesterol and uric acid level in 86 male patients with major depression were compared with those in 86 healthy volunteers who visited hospital for medical checkup. Those patients treated with SSRI and counseling in a male menopausal clinic. We also evaluated changes of the total cholesterol and uric acid level after treatment.

Results: Before mental treatment, the total cholesterol levels in patients were significantly lower than those in healthy volunteers (206±33 vs. 216±36mg/dl, p=0.063) and the uric acid levels in patients were slightly lower than those in health volunteers(5.7±1.2 vs. 6.2±1.1mg/dl, p<0.05). After mental treatment, the total cholesterol and uric acid levels in patients significantly increased (total cholesterol: 220±38mg/dl, p<0.001, uric acid: 6.1±1.3mg/dl, p<0.01).

Conclusions: Many male patients with major depression might lose their appetite, so a total cholesterol and uric acid level is generally low before treatment. Their appetite increased and their gastrointestinal disorder improved after mental treatment, so a total cholesterol and uric acid level in many patients increased. Therefore, we should care about life-style diseases after treatment in male patients with major depression.

Keywords: (maximum 5): mental stress, appetite, total cholesterol, uric acid

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149/625. Dietary patterns of the French adult population - Study from the INCA2 survey (2006-2007)

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Introduction: From a public health perspective, the definition of dietary patterns is a major issue to establish practical guidelines and policies to promote better and healthier food behaviours.

Objectives: The main objectives of this study were to identify the major dietary patterns in the French adult population and to determinate their principal characteristics (socioeconomic, life style, nutritional, environmental).

Method / Design: The dietary patterns were identified from the consumption data of the second French cross-sectional dietary survey (INCA2, 2006-2007). The Non-Negative Matrix Factorization (NMF) method were implemented to identify the dietary patterns and followed by a Hierarchical Cluster Analysis. Then logistic regressions were used to determine the main demographic, socio-economic and life style determinants. For each pattern, the nutritional profiles and the exposition to a selection of chemical contaminants were also assessed.

Results: Seven dietary patterns were identified: "Small eaters", "Health-conscious", "Mediterranean", "Sweet and processed", "Traditional", "Snacky" and "Eat to survive". As an example of description, it was observed that men and women characterized by the "Health-conscious" pattern are more likely to be older, and no smoker. They have higher intakes for the major minerals and vitamins as well as a higher diet diversity score. On the other way, individuals from this pattern are more exposed to aluminium, cadmium and PCB-NDL than the overall population. Such description was also conducted for all other patterns and interesting differences were observed for nutritional intakes, nutritional quality scores and food contaminants exposure as well as socioeconomic, demographic and some behaviour factors.

Conclusions: The study provided seven dietary patterns among the French adults population with distinct eating behaviours, resulting in specific nutritional intakes and food contaminants exposure. From a public health perspective, the results highlighted the necessity to conduct a benefice/risk approach when dealing with food consumption.

Keywords: (maximum 5): dietary patterns, nutritional intakes, exposure to chemical contaminants

149/633. Compliance to the Mediterranean diet in a free living population of Southern Italy

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Introduction: Nutritional surveys have shown that compliance to dietary recommendations is low worldwide. Evidence-based guidelines recommend the Mediterranean diet as a model for prevention of chronic diseases.

Objectives: 1) To assess the adherence to a healthy diet in a population living in Southern Italy with strong Mediterranean culinary traditions, and 2) to evaluate potential factors related to poor dietary compliance.

Method / Design: Four hundred and eleven healthy subjects of both genders, aged 18 to 70 years, were recruited among people shopping in a large supermarket. Adherence to a healthy diet was assessed by a validated 9-items food frequency questionnaire (MediQuest) on foods typical of the al Mediterranean tradition. Social factors associated with poor compliance to the Mediterranean diet were assessed.

Results: The study sample obtained an average Mediterranean diet score (range from 0 to 9) of 5.1±1.35 indicating a moderate adherence to the traditional diet. Good compliance was observed for regular olive oil (84.4%) and wholegrain (50.4%) intake, and infrequent consumption of animal fat (65.2%), and meat (58.6%). Low adherence was detected for regular fruit (18.2%), vegetables (31.4%), legumes (28.5%) and fish (16.1%) consumption. Poor adherence to the traditional Mediterranean diet was associated to a younger age, unemployment, low income and being single.

Conclusions: Adherence to a healthy diet was not optimal in the study population, despite its strong Mediterranean background. As expected, social factors affected compliance. Our results show the importance of promoting a healthy diet also in people with a Mediterranean background, particularly in those with social characteristics associated with a poor adherence to the Mediterranean diet.

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Keywords: (maximum 5): MEDITERRANEAN DIET: COMPLIANCE: SCORE

149/643. Application of the food standard Agency Nutrient Profiling System to individual diet in French children

Author(s): (1) Valerie Deschamps; (2) Julia Chantal; (1) Benoit Salanave; (1) Charlotte Verdot; (3) Serge Hercberg; (1) Katia Castetbon.

Affiliation: *(1) Epidemiologist. Institut de veille sanitaire. France; (2) Nutritionist. Centre de recherche en epidemiologie nutritionnelle. France; (3) Professor of Nutrition. Centre de recherche en epidemiologie nutritionnelle. France.*

Introduction: Preventing and reducing children obesity is a priority in developed countries. Nutritional profiling systems can be used to help children choosing foods and reaching healthy diet.

Objectives: We assessed whether the use of the nutrient profiling system from the U.K. Food Standard Agency (FSA) applied to individual diets could be efficient to identify healthy dietary and nutrient intake in France.

Method / Design: The ENNS-children survey was a national cross-sectional multistage sampling representative survey in 3-17 year-old children living in mainland France (N=1,675). Food intake was estimated using three 24h recalls. Each food was computed for its FSA score. Aggregated score was computed at the individual level using arithmetic energy-weighted means. Nutrient intake and food group consumption were described by tertiles of individual diet FSA score. Sampling scheme and weighting were taken into account for descriptions and comparisons across tertiles.

Results: In both age ranges of 3-10 and of 11-17 years old, significant differences were observed between the lowest (less favorable) and the highest tertiles of FSA score: +87g/d in 3-10y and +115g/d in 11-17y for fruit and vegetables; +9g/d in both groups for fish and seafood; +81ml/d in 3-10y and +62ml/d in 11-17y for milk and +25g/d in both groups for yogurt. Sweetened beverage consumption decreased when tertiles increased: -105 ml/d in 3-10y and 208ml/d in 11-17y. Percent of energy from fat and simple sugars intakes decreased with increasing of quartiles (-7g/d in 3-10y and -12g/d in 11-17y for simple sugars) while percent of energy from complex carbohydrate increased. Higher mineral and vitamin intakes were observed with increasing quartiles (e.g., +169mg/d in 3-10y and +104mg/d in 11-17y for calcium).

Conclusions: Our results show efficiency of the FSA nutrient profiling system applied to individual diet of children to identify ranges of healthy diet in the French context.

Keywords: (maximum 5): Nutrient-Profiling-System, Food-and-nutrient-intake, dietary-patterns, dietary-guidelines

149/645. Body image difference based on category of BMI in male adolescents

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Introduction: Body shape dissatisfaction has been found in male adolescents which can lead to inappropriate weight control practices and unhealthy dieting behaviours. These can be harmful for physical and cognitive development. Beside, the tendency of body shape dissatisfaction associated with nutritional status in male adolescents is not clear.

Objectives: This study aimed to determine the difference in body image associated with category of BMI in male adolescents.

Method / Design: This study was cross sectional design. Subjects were 84 male students at SMAN 1 Semarang and the selection of subjects were performed by simple randomization method that met the inclusion criteria. The body image data was collected using body image quetionnaire. The category of BMI data obtained through the measurement of height and weight were subsequently determined using BMI for age percentile from growth standards WHO 2007. The body image scores were classified in 4 categories: body shape satisfaction (<80), mild dissatisfaction (80-110), moderate dissatisfaction (111-140), severe dissatisfaction (>140).

Results: The mean of body image scores of subjects with underweight, normal weight, overweight, and obese were 67,60; 83,44; 93,33; 115,50 respectively. There were 48,8% subjects with body shape satisfaction, 32,14% mild dissatisfaction, 11,90% moderate dissatisfaction and 7,14% severe dissatisfaction. There were difference in body image according to category of BMI in male adolescents (p=0,000).

Conclusions: There were difference in body image according to category of BMI in male adolescents. The category of BMI and the mean of body image have a linear relationship, indicating that body shape dissatisfaction increased in subjects with overweight and obesity.

Keywords: (maximum 5): body image, BMI, male adolescents

149/646. Dietary patterns and body mass index of Romanian adults with cardio-vascular diseases

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Introduction: Promotion of a healthy diet and appropriate body weight are important components of cardio-vascular disease prevention and control.

Objectives: This study aimed to assess several dietary patterns and body mass index (BMI) of Romanian adults hospitalized because of diagnoses of cardio-vascular diseases (CVD).

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Method / Design: The study was performed in 2014 in 1 hospital setting from Cluj-Napoca, Romania. It involved 80 adult patients (45 to 78 years old) hospitalized with diagnoses of CVD. Anonymous questionnaires assessing several lifestyle related behaviors were filled in by the participants; based on their weight and height, the BMI was calculated.

Results: The results show that 76.2% of the participants recognize the role of consumption of fruits and vegetables for cardio-vascular diseases prevention and control, but only 8.8% know the recommendations of eating at least 5 portions of fruits and vegetables (around 400 g) daily and only 5% respecte these recommendations. The majority of the subjects know that the consumption of animal fat increases the risk for cardio-vascular diseases, but only half know about the protective effect of olive oil. Moreover, only one out of two patients declared their constant preoccupation for avoiding fat products, such as high fat dairy products and meat, while only 40% consume olive oil at least once a week. Around 80% of the participants know the risk of obesity for cardio-vascular diseases, but 81.2% have a BMI higher than 25. Two thirds of the patients declared that they received general information from health care professionals about diet and cardio-vascular prevention, while one quarter followed an educational program for this issue and only one out of ten patients followed a personalized program for loosing weight.

Conclusions: Comprehensive educational and counseling programs for promoting healthy nutrition and achievement of an appropriate body weight are needed for Romanian adults having CVD.

Keywords: (maximum 5): dietary patterns, Romanian adults

149/647. Application of the food standard Agency Nutrient Profiling System to individual diet in French adults

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Affiliation: *(1) Epidemiologist. Institut de veille sanitaire. France; (2) Nutritionist. Centre de recherche en epidemiologie nutritionnelle. France; (3) Professor of Nutrition. Centre de recherche en epidemiologie nutritionnelle. France.*

Introduction: Unhealthy diets lead to an increased risk of chronic diseases. Nutritional profiling systems can be used to help the consumers choosing a healthy diet in accordance with the dietary guidelines.

Objectives: We assessed whether the nutrient profiling system from the U.K. Food Standard Agency (FSA) applied to individual diets could be effective to distinguish healthy dietary and nutrient intake in France.

Method / Design: The ENNS survey was a national cross-sectional multistage sampling representative survey in 18-74 year-old adults living in mainland France. Food intake was estimated using three 24 h recalls. Energy underreporters were excluded from analyses (361 among 3,115 participants in the survey). Each food was computed for its FSA score. Aggregated score was computed at the individual level using arithmetic energy-weighted means. Nutrient intake and food group consumption were described by quartiles of individual diet FSA score. Sampling scheme and weighting were taken into account for descriptions and comparisons across quartiles.

Results: In both genders, significant differences were observed between the lowest (less favorable FSA score) and the highest quartiles: +300g/d for men and +235g/d for women for fruit and vegetables, and +24g/d for men and +8g/d for women for fish-and-seafood. Lower amounts of consumption were showed for high-fat and sugary or salty foods (processed meat, biscuits and cakes, ice cream…) when quartiles increased. Energy intake and percent of energy from fat decreased with increasing quartiles (-515kcal/d for men and -306kcal/d for women for energy) and percent of energy from complex carbohydrate increased. Higher mineral and vitamin intakes were observed with increasing quartiles (e.g., +69mg/d for men and women for magnesium).

Conclusions: Our results show efficiency of the FSA nutrient profiling system applied to individual diet to identify ranges of healthy diets in adults in the French context.

Keywords: (maximum 5): Nutrient-Profiling-System, Food-and-nutrient-intake, dietary-patterns, dietary-guidelines

149/650. New Bulgarian recommendations for the complementary feeding of infants

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Introduction: The adequate complementary feeding (CF) of the infants is critical for their optimal child growth and development.

Objectives: To update the CF recommendations of the infants in Bulgaria.

Method / Design: The comprehensive overview of current scientific literature, related to the nutrition of infants during the last 10 years and the international joint statements on breastfeeding and CF was done from experts of Infant Feeding Joint Working Group. The findings in national surveys on nutrition and nutritional status of infants identify the main problems: short duration of breastfeeding, low prevalence of exclusive breastfeeding; early and inadequate introduction of CF, widespread anemia in children 6-12 months old from minorities.

Results: Comparison between new recommendations and those from 2000, show that they provide guidance on the desired feeding behaviours, the amount, consistency, frequency, energy density and nutrient content of foods. It is emphasized on the individual approach, as the first introduction of complementary foods at about 6 months after the birth of the infants. First complementary food for exclusively/partially breastfed infants needs to be iron-rich cereal, for the rapid recovery of their iron stores and the reduction of the risk of iron defi-

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ciency. In non-breastfed infants (on the basis of pediatricians'opinion) the first complementary food may be pureed vegetables, because the breast-milk substitutes are iron-enriched. The introduction of potentially allergenic foods as those which contain gluten is done gradually while the infant is still breast-fed. The introduction of fruit juices recommended after 6 months of age due to the risk of caries and the need for food higher in energy density during the first months of the CF period.

Conclusions: The new recommendations for the CF are part of targeted efforts at a national level to improve nutrition of the infants in Bulgaria and the prevention of socially significant diseases in later life.

Keywords: (maximum 5): complementary feeding, recommendation

149/655. Whole grain intakes and dietary sources in adults and children from three European countries

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Introduction: Diets high in whole grain are associated with several nutritional and health benefits, yet few national dietary surveys measure whole grain intakes.

Objectives: The aim of this study was to describe whole grain intakes and dietary sources in the UK, France and Italy.

Method / Design: Data was extracted from national dietary surveys for the UK (NDNS 2008-11)1, France (CCAF 2010)2 and Italy (INRAN SCAI 2005-06)3. A food diary/record of 4, 7 and 3 days duration were used to assess dietary intakes in the UK, France and Italy respectively. For the UK, the whole grain content of foods was estimated using unpublished list of wholegrain foods4 while quantitative ingredient declarations on food labels were mainly used in France and Italy.

Results: The highest whole grain intakes were reported in the UK; median intakes were 20g/d in adults and 13g/d in children and >80% of the population were consumers. In France and Italy, ≤45% and ≤25% of each population group were consumers of whole grain respectively with similar intakes in consumers in both countries; 5.4g/d and 4.5g/d in children respectively and 8.1g/d and 9.8g/d in adults respectively. The US quantitative recommendation of 48g/d was achieved by 17% of British adults and 6% of children whereas < 3% of adults and children in France and Italy achieved this target. The main food contributors to whole grain intakes in children were ready to eat breakfast cereals (RTEBCs) (30-50%) and bread (27-35%) while bread was the main source in adults in all countries (43-55%) followed by RTEBCs in the UK (24%) and France (26%) and biscuits in Italy (20%).

Conclusions: Whole grain intakes appear variable across Europe but remain significantly below quantitative recommendations in all countries. Efforts are needed to increase consumption of whole grain across Europe.

Keywords: (maximum 5): whole grain, intakes, sources, dietary recommendations

149/663. How to balance diets of individuals with excessive free sugar intakes? Answer through diet modelling

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Introduction: WHO recently confirmed its recommendation of reducing intake of free sugars to less than 10% of total energy, with no particular recommendation on total sugars.

Objectives: To determine potential dietary changes to achieve nutritional adequacy for individuals with excessive intakes of free sugars, while staying as close as possible to their dietary habits.

Method / Design: Observed 7-d food intakes of 1719 adults from the French national survey INCA2 were used. For the first time in France, the national food composition table was completed with free sugars. Two groups of subjects were defined, having >10% (EXCESS) or ≤10% (ADEQ) energy contribution from free sugars in their observed diets. For each individual, an iso-caloric optimized diet that was nutritionally adequate (i.e. fulfilling all nutrient recommendations, including 10% energy maximum for free sugars) was generated using diet modelling. Diet quality was assessed with the PanDIET score and energy density (ED).

Results: EXCESS individuals represented 40% of the total population. Compared to ADEQ ones, they consumed significantly more energy (+65kcal/d) and had lower quality diets (PanDIET: -4pts; ED: +20kcal/100g). For EXCESS individuals, the optimization reduced free sugars (-25g/d) to reach a maximum of 10% energy and increased non free sugars (+22g/d), leading to a slight decrease in total sugars.

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The main dietary changes in the optimized diets consisted of decreasing the amount of sugar-sweetened beverages (-75g/d, -68%), sweet products (-42g/d, -25%) and fruit juices (-27g/d, -31%) while increasing fruits and vegetables (+230g/d, +76%), plain milk (+12g/d, +14%) and fresh dairy products (plain and sweet) (+11g/d, +12%).

Conclusions: Diets of individuals with excessive intakes of free sugars can be optimized mostly via an increase in fruits and vegetables and a decrease in sugar-sweetened beverages and sweet products.

Keywords: (maximum 5): Free sugars, linear programming, individual diet modelling, dietary recommended intakes

149/667. Leafy vegetable consumption by children and their mother in Ouagadougou (Burkina Faso)

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Introduction: Iron, zinc and vitamin A deficiencies still represent a major public health problem in sub-Saharan Africa, mainly for young children and women of childbearing age. Leafy vegetables (LV) could be used as local resources of these micronutrients, if consumed in sufficient amount.

Objectives: The objective was to assess the consumption of leafy vegetables in the traditional diet of young children and their mother in Ouagadougou.

Method / Design: A qualitative consumption survey of 800 mothers having a 12-23 month-old child, randomly selected in the whole town of Ouagadougou was realized. We investigated the type of leaves consumed and the frequency and form of consumption.

Results: Seventeen different LV had been consumed by the people surveyed during the year preceding the survey. Some leaves were consumed by more than 85% of the mothers (roselle small size, amaranth, Jew's mallow, baobab, salad, cabbage), others by 85 to 50% of the mothers (Malabar spinach, roselle large size, Ethiopian egg plant, African spider plant, salad, cowpea) and the remaining by 49 to 5% of the mothers (moringa, potato, black nightshade, Cassia tora, okra and cassava). Analogous result was obtained for the children, except that for the same previous LV groups, the percentage of subjects who consumed were respectively >70%, 69-25% and 24-4%. Most women or children ate from 4 to 5 different LV during the previous week. Most leaves were purchased in the fresh form, except Jew's mallow and baobab leaves that were mostly purchased in the dried form. Except for the salad, the leaves were consumed after cooking mainly as sauces traditionally eaten with a cereal paste.

Conclusions: Considering the diversity of LV consumed and their continuous consumption over the year in Ouagadougou, their use in food diversification strategies to fight micronutrient deficiencies should be encouraged.

Keywords: (maximum 5): leafy vegetables, traditional diet, sauces, micronutrient,

149/672. Essential fatty acids in the traditional diet of young children in Burkina Faso

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Introduction: Data on the composition in polyunsaturated fatty acids (PUFA) of foods from low-income countries are scarce. In young children, an inadequate intake of PUFA, mainly of the essential linoleic and linolenic acids (LA, ALA) might be detrimental for the growth, development and long-term health.

Objectives: This work aims to assess the satisfaction of essential fatty acid requirements of young children from the main traditional dish of Burkina Faso: leafy vegetable (LV) sauces eaten together with a cereal-based paste called "tô".

Method / Design: LV, cereals and sauce ingredients were purchased locally. Nutritionally improved sauces were prepared based on traditional recipes. Fatty acids were quantified by gas chromatography. Satisfaction of essential fatty acid requirements from whole dishes (sauce + tô) was calculated based on mean intakes of the dish measured in 12 young children (12-23 months old) in Ouagadougou.

Results: Decorticated maize or whole grain pearl millet flours used to prepare the paste have low lipid contents, 1.4 and 5.9% of dry matter (DM) respectively, with around 50% PUFA (essentially LA). Amaranth and Jew's mallow leaves contain 5.5-8.5% DM of lipids of which 66% PUFA (about 50% ALA and 16% LA). Sauces prepared with the leafy vegetables contain around 30% DM of total lipid, coming from groundnut (84-85%), leaves (6-7%), condiment (5%) and dried fish (4%). Their PUFA content is around 30%. A whole dish prepared with amaranth sauce brings about 19% of total lipid requirement but 66% and 40% respectively of LA and ALA requirements. For the dish with Jew's mallow sauce, values are respectively 19%, 65 and 34%.

Conclusions: The traditional dish of LV sauce and tô eaten twice a day by young children could satisfy their LA and ALA requirements. But other lipid sources are necessary to satisfy those of total lipids.

Keywords: (maximum 5): PUFA, LA, ALA, leafy vegetable, cereal

149/674. Development and validation of a food-frequency questionnaire to assess sodium intake in healthy Mexican adults.

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Introduction: High consumption of sodium in diet is a risk factor for chronic-diseases. Several studies reported changes in diet patterns in Mexico such as the increase in consumption of foods with high sodium content. There are epidemiological methods to describe these changes, however only few studies validate the use of food frequency questionnaires (FFQ), especially in healthy populations to design nutritional interventions in public health strategies.

Objectives: To evaluate sodium intake and diet quality of a healthy adult's cohort; to describe dietary patterns related with a high consumption of sodium and its association with biomarkers of sodium intake.

Method / Design: In 102 participants diet was assessed using a food-frequency-questionnaire (FFQ) applied each one twice during ten months. FFQ included 96 regular consumption Mexican foods (twelve food groups), emphasizing those with significant amounts of sodium (hidden) using the principal component analysis method (PCA). Food and nutrient consumption were compared with those reported in at least eight 24-hour recall (reference method). Urine and serum sodium concentrations were associated with the identified dietary patterns. We evaluated diet-quality with a score based on nutritional recommendations for Mexicans. Dietary components, serum, and urinary sodium concentrations were analyzed with Pearson or Spearman correlation coefficients and ANOVA test. Models were adjusted for total diet-energy and socio-demographic variables.

Results: According to sodium intake, two diet patterns were identified: prudent and risky. Risky pattern contributed with more than two grams of sodium per day in 86% of the participants. High consumption of sweet-beverages, dairy, and industrialized-food (0.64, 0.78, and 0.82) as well as the low consumption of fruits-vegetables (0.71) were associated with high sodium intake and elevated urinary sodium concentrations. ($P<0.005$).

Conclusions: In these subjects, FFQ is a valid tool for the evaluation of sodium intake; however, relative validity and reproducibility analysis are required.

Keywords: (maximum 5): diet-quality, dietary patterns, validation, 24-hour-recall.

149/675. Correlation between vitamin D status and metabolic parameters in overweight and obese adults

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Introduction: The relation between the serum vitamin D levels and metabolic parameters - fasting plasma glucose, cholesterol profiles and triglycerides in obesity is not sufficiently studied in Bulgarian population.

Objectives: To describe the correlation between serum 25(OH)D levels and metabolic parameters - fasting plasma glucose, total cholesterol, LDL- and HDL - cholesterol, triglycerides and blood pressure in Bulgarian overweight and obese adults.

Method / Design: 179 overweight and obese adults participated - 80 men and 89 women, from wich 32.5% were overweight and 67.5% were obese adults. The mean age of studied group was 44.3 years. Physical examination (body weight, waist circumference, blood pressure) were performed. Body fat distribution and type of obesity were evaluated using two methods: bioelectrical impedance on the device Tanita BC 420 MA and dual-energy X-ray absorptiometry (DXA) on the GE Lunar Prodigy PRO. The serum levels of 25(OH)D were measured by an immunoassay for quantitative in vitro measurement of 25(OH)D (Roche Diagnostic). Fasting plasma glucose, cholesterol profiles and triglyserides were analyzed on a Cobas Integra 400 analyzer (Roche Diagnostics). The data were analyzed pos hoc for men and women.

Results: The mean serum 25(OH) vitamin D levels were 34.2 ± 20.7 nmol/l in studied group - 38.2 ± 21.5 nmol/l in overweight and 32.2 ± 20.1 nmol/l in obese adults. We were unable to find any statistically significant correlation between serum 25(OH) vitamin D and waist circumference, systolic/diastolic blood pressure, total cholesterol (TC), HDL- and LDL- cholesterol and triglycerides. The sub-analyses (men versus women) showed positive statistically association with fasting blood glucose, total cholesterol, HDL- cholesterol and triglycerides in men.

Conclusions: The influence of vitamin D on the metabolic parameters might be weak on the individual level in men, rather than in women.

Keywords: (maximum 5): 25(OH)vitamin D, obesity, fasting plasma glucose, cholesterol, triglycerides

149/678. Physical activity level parallels daily water intake; The European Hydration Research Study (EHRS)

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Introduction: Daily water turnover depends on climate, body size and composition, fluid ingestion and physical activity among other factors. It is unclear if hydration status in individuals with high levels of physical activity (PA) is compromised due to higher water losses (respiratory, sweating) or is maintained by increased fluid ingestion.

Objectives: To explore the associations between PA levels and fluid turnover and hydration status (urine osmolality) in a free-living large European sample.

Method / Design: 590 men and women from Spain, Greece and Germany self-reported daily PA using the International PA Questionnaire (IPAQ), collected 24 h urine and registered food and fluid intake diary during 7 consecutive days. IPAQ results were categorized into low, moderate and high PA level. Fluid intake was calculated using nutrition software and daily urine volume and osmolality were used to assess urinary output and hydration status, respectively. One way ANOVA was used to assess differences among activity levels. Type I error was predefined at 0.05. Data are presented as mean±SD.

Results: Daily water intake increased in parallel with PA level (2.4±0.7; 2.7±1.0; and 3.1±1.0 L for low, moderate and high level, respectively; $p<0.05$) as well as urine volume (1.47±0.4; 1.61±0.7; and 1.87±0.8 L for low, moderate and high level, respectively; $p<0.05$). Non-urinary water losses (faecal, sweat and respiratory losses) increased with PA level (0.93; 1.09; and 1.23 L). Urine osmolality was not different among activity levels.

Conclusions: Water intake is well matched with PA level likely to maintain hydration status in a large free-living European sample. Urine output parallels PA which along with the association with water intake suggests increased water turnover with increased PA.

Keywords: (maximum 5): Hydration status; Water turnover; Physical Activity; Urine osmolality; Daily urine volume

149/679. Dietary patterns in Ghanaians in Europe and in their compatriots in Ghana: The RODAM project

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Introduction: Migrant populations from sub-Saharan Africa to Europe and their compatriots in the countries of origin are disproportionately affected by obesity and type 2 diabetes. Nutrition transition may contribute to this observation. However, the dietary behaviour of these populations has not been clearly characterised.

Objectives: The primary objective of this study is to identify dietary patterns of Ghanaian migrant populations in three different European cities, and among rural and urban Ghanaians. Secondly, we aim to characterise the identified dietary patterns with respect to demographic, socioeconomic, clinical, and lifestyle factors to assess determinants of adherence to these.

Method / Design: This analysis is based on the multi-centre RODAM project (Research on Obesity and Diabetes among African Migrants) conducted among Ghanaian adults from rural and urban Ghana, Amsterdam, London, and Berlin. Data collection includes a health questionnaire, physical examination and biological samples (n=5,807). Usual food intake (servings/week) was assessed by a semi-quantitative Ghana-Food Propensity Questionnaire (G-FPQ), comprising 124 food items. In the five location-datasets, exploratory factor analysis will be performed to identify dietary patterns in the different locations.

Results: G-FPQ data are available from a total of 4,534 participants (38% men, age = 46 ± 12 years, BMI = 26.4 ± 5.5 kg/m2), 1428 from urban Ghana, 1098 from rural Ghana, 975 from Amsterdam, 469 from London, and 564 from Berlin. In Europe, the intake frequencies of bread/cereals, spreads, coffee/tea, and sodas/juices was higher than in Ghana, while the consumption of typical Ghanaian foods, such as plantain/cocoyam, and fermented maize products, was lower. In Ghana, urban dwellers consumed less fruits, starchy and fermented foods, but more rice/pasta and sodas/juices than rural residents.

Conclusions: In this middle aged, overweight population, intake frequencies of typical Ghanaian foods and industrialised products differ between Ghana and Europe. Factor analysis will reveal distinct dietary patterns.

Keywords: (maximum 5): RODAM , dietary patterns, African migrants.

149/681. The effects of substitution dietary guidelines on dietary intake: the DIPI single-blinded randomized controlled trial

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Introduction: It is well established that individual dietary components play a role in the development of ischemic heart disease (IHD).

Objectives: To examine the effects of substitution dietary guidelines specifically aimed at the prevention of IHD on the dietary intake in the general adult Danish population.

Method / Design: A 6 month randomized, single-blinded parallel dietary intervention study was conducted in a real life setting with adult participants with minimum 1 risk marker of IHD. At baseline participants were assigned to follow A) the official Danish dietary guidelines B) specific IHD dietary substitution guidelines, or C) a habitual diet (control). Guidelines were provided on-line and via leaflets and recipes. Dietary intake was assessed for 7 consecutive days by a web-based dietary assessment tool. Preliminary t-test analyses were applied.

Results: At baseline 222 participants (59% women; age: 51 ± 9.0 years) enrolled in the study with a study compliance of 91% at the end of the intervention. The preliminary results shows that the content of fish in the diet (g/10 MJ/d) increased during the intervention period in group A and B (55±36 to 76±57, p=0.01 and 64±5 to 78±6, p=0.04 respectively. In group B the content of total fat and saturated fat (g/10 MJ/d) was reduced (97±15 to 92±16, p=0.01 and 37±7 to 33±7, p<0.001, respectively). The mean energy intake (MJ/day) was reduced in group B and C (9.1±2.7 to 8.3±2.5, p<0.01 and 9.1±2.9 to 8.4±2.8, p<0.01). In group B the dietary energy distribution (E%) from fat was decreased (35.8±5.7 to 34.0±6.0, p=0.01) and dietary fibre (E%) was increased (1.9±0.5 to 2.2±0.5, p<0.001).

Conclusions: The preliminary results shows that dietary substitution guidelines targeted prevention of IHD for 6 months promotes favorable changes in dietary composition in an adult Danish population.

Keywords: (maximum 5): Ischemic heart disease, substitution, intervention, dietary guidelines, prevention

149/684. Age and time trends of circadian eating pattern in children and adolescents

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Introduction: Eating patterns underlie a circadian rhythmicity. Aspects of circadian eating pattern (CEP), e.g. meal frequency (MF), snack frequency (SF) or duration of nightly fasting (DNF) are discussed to affect health, e.g. the development of obesity and type 2 diabetes.

Objectives: Our objectives were to describe age and time trends of CEP in 1246 participants (3-18 years old) of the German DONALD (Dortmund Nutritional Anthropometric Longitudinally Designed) study.

Method / Design: 9757 3-day weighed dietary records from 1985 to 2014 were available. Eating occasions were either assigned to meals (>10 % of daily energy intake) or snacks (<10 % of daily energy intake). Polynomial mixed-effects regression models were used to analyze age and time trends.

Results: Median MF decreased from 4.0 meals/day in 3-6-year-olds to 3.7 meals/day in 14-18-year-olds (linear trend: p<0.0001). MF increased until 2005, followed by a slight decrease afterwards (linear trend: p=0.0012, quadratic trend: p=0.0047). SF decreased with age and flattened in adolescence (linear trend: p<0.0001, quadratic trend: p<0.0001). SF showed a wavelike time course (linear p=0.0055, quadratic: p=0.0005 and cubic trend: p=0.0003). Effect sizes of time trends in MF and SF were small. Median DNF decreased in boys/girls from 796/803 minutes in 3-6-year-olds to 739/755 minutes in 14-18-year-olds (linear, quadratic and cubic trend: p<0.0001). In girls DNF increased during study course (p=0.0167).

Conclusions: MF and SF in DONALD study participants remained fairly stable over the study period with higher frequencies in childhood indicating a more regularly CEP than in adolescence. Higher DNF in younger boys and girls could be explained by longer sleep duration. The relevance of increasing DNF over time should be further examined.

Keywords: (maximum 5): circadian; meal frequency; nightly fasting; children; trend analysis

149/687. Role of protein and fat content, and protein/carbohydrate ratio in weight maintenance? The DiOGenes Study

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Introduction: Diets high in protein with reduced carbohydrate content have been shown to produce weight loss and improve body composition. The randomized DiOGenes study found a weight maintaining effect of higher protein / low glycaemic index diet. Whether the effect is due to increased protein or reduced carbohydrate is uncertain, as is the role played by increased fat content.

Objectives: To determine if "protein as proportion of total energy" or "protein:carbohydrate (P:CHO) ratio" are equally predictive determinants of changes in body weight (BW) and composition after weight loss in obese and overweight adults in the DiOGenes study. Furthermore, to examine and compare P:CHO ratio and protein intake as predictors of BW regain.

Method / Design: The study consisted of an 8 week weight loss phase and 6 month weight maintenance phase (WM). During WM subjects were randomized to five diets, differing in protein and glycaemic index. Analyses were based on pooled data from all subjects.

Results: Increased P:CHO ratio was significantly associated with decreased BW regain ($\beta = -0.48$, $p=0.006$). A non-significant trend for decreased fat mass regain (kg) with increased P:CHO ratio was also observed ($p=0.06$). P:CHO ratio and protein intake (E%) were found to be equally strong predictors of body weight regain. Proportion of energy from fat increased with increasing P:CHO ratio. Increase in fat content up to ~30% of energy was positively associated with weight gain, but further increase in fat content was inversely associated with weight gain.

Conclusions: These results suggest that weight control can be achieved both by increasing protein content, and reducing carbohydrate intake to increase the ratio of protein to carbohydrate in the diet. An increase in fat content above ~30% of energy does not impair weight control, suggesting that inclusion of nutrient-dense fatty foods (e.g. fish, eggs, cheese, and meat) may be advantageous.

Keywords: (maximum 5): Obesity, protein, body weight, body composition

149/689. Food consumption of different meat consumer groups: Results of the German national nutrition survey II

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Introduction: High meat consumption has adverse effects on environment and human health. For the development of more sustainable and healthier diets, information about dietary patterns is needed.

Objectives: To investigate the food consumption of groups with different amounts of meat in their diet.

Method / Design: Data analysis is based on the German National Nutrition Survey II with 12.915 participants aged 18 to 80 years. Food consumption was assessed using two 24h-recalls. Meat consumers were classified into quintiles according to the amount of meat consumed and a group of vegetarians was identified by self-reporting. Food consumption among these groups was compared using arithmetic means and 95% confidence intervals. All calculations were done for absolute and energy-adjusted (regression method) food consumption stratified by sex.

Results: Among meat consumer groups, differences in mean food consumption were observed for 8/12 (men/women) out of 15 food groups. Men and women in higher meat consumption quintiles ate more bread, potatoes, fats/oils and sauces but less fruit, dairy products, fish and soups than those in lower quintiles. When comparing energy-adjusted values differences were found for 14/13 (men/women) food groups. Persons in energy-adjusted higher meat consumption quintiles consumed more potatoes and sauces and less of most other foods than persons with low meat consumption. Vegetarians consumed more cereals and soy products than meat consumers. Additionally, vegetarian women consumed more vegetables, fruits and nuts/seeds but fewer eggs. Compared to female low meat consumers, vegetarian woman ate more vegetables and soy products.

Conclusions: Food consumption varies considerably among groups with different amounts of meat in their diet. Persons with high meat consumption deviate much more in their total food consumption from the recommendations for a healthy and sustainable diet than persons with low meat consumption and vegetarians.

Keywords: (maximum 5): meat consumption, vegetarian diet

149/693. Dietary patterns in weight loss maintenance. Results from the MedWeight study.

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Introduction: The dietary habits contributing to weight loss maintenance are not sufficiently understood. Studying weight loss maintainers in comparison with regainers provides information on the behaviors differentiating the two groups.

Objectives: To identify and compare dietary patterns in weight loss maintainers and regainers. Additionally, to assess meal environment parameters potentially affecting maintenance of weight loss.

Method / Design: The MedWeight study is a registry evaluating the characteristics, and especially the diet, of weight loss maintainers and regainers, in a sample of Greek adults. Participants have intentio-

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nally lost ≥10% of their weight and are either maintaining this loss for over a year, or have regained weight. Questionnaires on demographics and lifestyle habits are completed online. Dietary assessment is carried out by two telephone 24-h recalls. Data are analyzed in terms of macronutrients, food groups, meal environment factors, and dietary patterns.

Results: Present analysis focused on 361 participants (32 years old, 39% men), 264 maintainers and 97 regainers. Energy and macronutrient intake did not differ by maintenance status, although protein intake tended to be higher in maintainers. Physical activity energy expenditure was greater for maintainers in men, but not women. Salty snacks, alcohol and regular soda were more frequently consumed by men regainers. Principal component analysis identified a healthy dietary pattern featuring mainly unprocessed cereal, fruit, vegetables, olive oil and low-fat dairy. This healthy pattern yielded a 4.6 odds ratio of being a maintainer in men, but showed no association with maintenance in women. Other characteristics of maintainers but not of regainers were involvement in meal preparation and eating at home for men, and a higher eating frequency and slower eating rate for women.

Conclusions: Men maintaining weight loss were much more likely to adhere to a healthy eating pattern. Eating-related behaviors were also associated with maintenance.

Keywords: (maximum 5): weight loss maintenance, maintainers, regainers, dietary patterns

149/694. Zinc intakes of New Zealand toddlers - not as adequate as they appear?

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Introduction: Phytate is primarily found in cereals and legumes and is the major inhibitor of zinc absorption, yet most national food composition databases do not currently include phytate. These data are required to determine whether phytate affects zinc absorption – particularly in New Zealand (NZ) toddlers who have low biochemical, but seemingly not dietary, zinc status.

Objectives: To determine dietary zinc and phytate intake, and whether phytate is likely to impact on zinc bioavailability, in NZ toddlers 12-24 months of age.

Method / Design: Weighed diet records were collected on five non-consecutive days from 153 mother-toddler pairs in the Eating Assessment in Toddlers (EAT) study (Wellington, Dunedin, and North Canterbury (NZ)). Phytate values were determined for 906 foods in the NZ food composition database using values from published literature. The Kai-culator diet analysis programme determined phytate and zinc intakes, and phytate:zinc molar ratio was calculated. Seven eating occasions were defined by time and energy content: 'early morning', 'breakfast', 'during morning', 'lunch', 'during afternoon', 'evening meal', 'during evening' in 44 participants.

Results: The median age of the toddlers was 16.8 months, 48% were female, 77% were NZ European, and 28% were breastfed. Median energy, zinc and phytate intakes per day were 3667kJ, 4.4mg, and 312mg. Although just 6.5% had a zinc intake less than the Estimated Average Requirement (2.5mg/day) and 7% had a daily phytate:zinc molar ratio above 15 (indicative of poor zinc bioavailability), 59% of the subsample had a phytate:zinc molar ratio above 15 for their 'breakfast' meal.

Conclusions: Most toddlers appeared to have adequate zinc intake, but zinc absorption from 'breakfast' may be impaired for many participants because the phytate:zinc molar ratio was so high for that meal. This may contribute to the reported discrepancy between the high rates of biochemical, and low rates of dietary, zinc deficiency in toddlers.

Keywords: (maximum 5): Toddlers, zinc, phytate, nutrient adequacy

149/695. Food services use salt more than recommended

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Introduction: Public food services have a remarkable role in public health and nutrition in Finland, also in lowering salt intake to meet the recommendation (5g per day), from the current intake 8,9g and 6,5g in men and women, respectively. The salt intake for a lunch eaten at public food services should contain no more than one third of daily salt intake.

Objectives: The objectives of this study is to measure the salt content of meals offered in public food services by salt meter and compare the results with the calculated salt content in recipes and the nutrition recommendations.

Method / Design: The salt content of meals offered in public food services was measured by DMT-20 (Digital Handheld Salt Meter). The salt was measured in eight kitchens of one municipality during four weeks. The eight kitchens prepared 140 to 1600 lunches per day for different customer groups. Kitchens use the same recipes, so the salt content should be very similar, and follow the calculated values (Aromi–software 12,2).

Results: The measured salt contents varied between kitchens and were higher than the calculated values, which met the recommendation. On average, main courses (n= 168) contained 1% salt. Soups contained 0.91% (0.8–1.04%) salt (n=37, recommendation 0.5%), casseroles 0.97% (0.6–1.3%) (n=38, recommendation 0.6%), the convenience food 1.07% (0.8-1.5%) (n=31, recommendation 0.8%) and sauces 1.03% (0.8-1.6%)(n=42, recommendation 0.8%). A 300g portion of soup contains 2.4–3.12g salt (48-62% of daily recommen-

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dation) and a 300g portion of casseroles 1.8-3.9g (36-78% of daily recommendation).

Conclusions: The meals served in public food services contained more salt than is recommended or in recipes. The results of this study show that the salt meter can be used to secure and develop nutritional quality of meals offered in food services.

Keywords: (maximum 5): public food services, salt content, nutritional quality, nutrition recommendations

149/702. Postprandial satiety perception of oat and wheat porridges in relation to viscosity

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Introduction: Dietary fiber-rich foods are known to provide a longer phase of postprandial satiety than dietary fiber-poor foods. In particular, oats are richer than wheat in beta-glucan, which has been reported to give a high satiety. Further, viscosity has been reported to be linked to postprandial satiety.

Objectives: This study investigates the relationship between dietary fiber content, viscosity and satiety perception of oats- and wheat-based This study investigates the relationship between dietary fiber content, viscosity and satiety perception of oats- and wheat-based porridges..

Method / Design: Four iso-caloric porridge recipes were developed which varied in cereal type and particle size. The oat flour and oat flakes contained identical nutritional compositions, with a dietary fiber content of 8g/100g. The wheat flakes contained the highest amount of dietary fibers (DF: 10g/100g) while sifted wheat flour (DF: 3.6 g/100g) was used as a base reference, in accordance with the literature. A human panel composed of 10 healthy women, experienced in professional product evaluations and scale usage through their occupation as trained sensory panelists, measured their postprandial satiety perception for 3.5 hours on Visual Analogue Scales (VAS). Viscosity of the porridge samples was measured by Rapid Visco Analyser in the prepared samples and in a simulated gastric phase using a static in vitro digestion model.

Results: Wheat flakes porridge showed the highest satiety performance. Remarkably, the oat flour porridge led to higher satiety than the oat flakes porridge despite equal nutrient contents. The observed differences in satiety perception were in accordance with the viscosity measurements conducted in the gastric phase, but not in the porridges themselves. Sifted wheat flour showed the lowest viscosity and satiety performance.

Conclusions: High dietary fiber content leads to higher postprandial satiety, but the particle size (in flour or flakes) also affect the satiating performance of oat porridge products.

Keywords: (maximum 5): Satiety perception, Viscosity, Oats, Wheat, Dietary fibers.

149/713. Consumption of sugars, food sources and adherence to dietary guidelines in the Netherlands

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Introduction: Sugar intake is highly debated due to the suggested health implications and the recently updated recommendations on free sugars by the World Health Organization.

Objectives: To estimate the intake of total mono- and disaccharides, free sugars, added sugars, and sucrose, food sources, and adherence to dietary guidelines in a representative sample of the Dutch population.

Method / Design: In all, 3817 men and women (7-69 years) from the Dutch National Food Consumption Survey 2007-2010 were studied. Values for sugar content of products were assigned using several food composition tables. Diet was assessed with two non-consecutive 24-hour recalls. Diet quality was studied in adults using the Dutch Healthy Diet index, a score which measures adherence to the Dutch dietary guidelines.

Results: Median intake was 115 g/d (22 en%) for total mono- and disaccharides, 74 g/d (14 en%) for free sugars, 64 g/d (12 en%) for added sugars, and 61 g/d (11 en%) for sucrose. Sugar consumption was higher in children than adults, and higher in men than women across all age categories. Soft drinks, cake/cookies, sugar/honey/jams, juices, and chocolate were main sources of total mono- and disaccharides, free sugars, added sugars, and sucrose. Prevalence of a free sugar intake <10 en% was 5% in boys and girls (7-18 years), 33% in men (19-69 years), and 29% in women (19-69 years); 0% of the children and 4% of the adults had a free sugar intake <5 en%. Overall diet quality was similar between adherent and non-adherent adults to the guideline of <10 en% free sugars.

Conclusions: Soft drinks, cake/cookies, sugar/honey/jams, juices, and chocolate contributed most to the consumption of sugars in the Netherlands. Adherence to the guideline of <10 en% free sugars was generally low, particularly in children. Overall diet quality did not differ between adherent and non-adherent adults.

Keywords: (maximum 5): sugars, added sugars, free sugars, consumption, guidelines

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149/714. Negative effect of divalent minerals on the bioaccessibility of pure carotenoids

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Introduction: Several dietary factors are known to affect the bioaccessibility of carotenoids. One factor that so far has been neglected is the influence of divalent minerals on the micellarization of carotenoids during gastrointestinal (GI) digestion. Our previous research indicated that divalent minerals could reduce the bioaccessibility and Caco-2 cellular uptake of carotenoids from spinach, though the effects have never been studied systematically and not with individual carotenoids.

Objectives: We hypothesize that high concentrations of divalent minerals lead to the formation of insoluble soap complexes with free fatty acids and bile salts, hampering carotenoid bioaccessibility.

Method / Design: Here, we investigate the effects of varying physiological concentrations (0 to 1000 mg /L) of calcium, magnesium and zinc on the bioaccessibility of lutein, neoxanthin, lycopene and beta-carotene following GI digestion. Bioaccessibility measures were further compared to surface tension and viscosity measurements of the digested fluids.

Results: Addition of divalent minerals significantly decreased ($p<0.05$) the bioaccessibility of pure carotenoids, up to 100% in the case of calcium. We also observed the formation of insoluble complexes during GI. Increased divalent mineral concentrations were correlated to decreased viscosity and decreased carotenoid bioaccessibility ($0.99< r >0.8$). Surface tension of digesta was inversely correlated ($p<0.05$) with the bioaccessibility of lycopene and beta-carotene.

Conclusions: Although based on in vitro findings, it is plausible that similar interactions occur in vivo, with divalent minerals affecting the bioaccessibility and bioavailability of carotenoids and other liposoluble micronutrients, which may be of relevance for people taking supplements or those having GI abberations. More research on mineral – carotenoid interaction is warranted.

Keywords: (maximum 5): Minerals, carotenoids, bioaccessibility, in-vitro digestion, physico-chemical properties

149/716. Dietary patterns and serum folate among adolescents in Germany: results of the KiGGS-Study

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Introduction: Dietary pattern analysis gives a comprehensive impression of the food consumption habits within a population, but analyses of dietary patterns among adolescents are limited. One particular problem of the diet of adolescents is the inadequate intake of folate.

Objectives: The KiGGS study offers the opportunity to determine dietary patterns in a large representative sample of 12 to 17 year-old adolescents (2646 boys and 2551 girls). The association between identified dietary patterns and serum folate was analysed.

Method / Design: Food intake was assessed using a semi-quantitative food frequency questionnaire and data were aggregated to 34 food groups. Principal component analysis was applied to these food groups to determine the major dietary patterns. The association between the dietary patterns and serum folate concentrations was analysed with linear regression analysis.

Results: The 'healthy' pattern, characterized by wholemeal bread, fruits and salad vegetables, was seen among both sexes. Among boys, a high adherence to the 'western' pattern was characterized by a higher intake of salty snacks, and burgers/sausages and the 'traditional' pattern was characterized by white bread, meat, and processed meat. The most pronounced dietary pattern among girls was the 'western/traditional' pattern, which was characterized by salty snacks, burgers/sausages, French fries, desserts, pancakes, confectionary, potatoes, and white bread.

Higher pattern scores reflect a higher adherence to the pattern. The 'healthy' pattern scores among boys and girls were positively associated with serum folate ($p=.013$, $p=.039$). Among boys the 'traditional' dietary pattern ($p=.010$), and among girls the 'western/traditional' dietary pattern ($p=.017$) were negatively associated with serum folate.

Conclusions: Three dietary patterns among boys and two among girls were found. The 'healthy' dietary patterns were associated with higher serum folate concentrations and should be promoted to achieve, among others, an adequate supply of this micro nutrient.

Keywords: (maximum 5): dietary patterns, adolescents, FFQ, serum folate

149/734. Calcium and Vitamin D intake in school-age children in Poland

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Introduction: Calcium and vitamin D are important for optimal function of many organs and tissues. A low intake of calcium often co-exists with vitamin D deficiency and both have an influence on a bone health. There is still ongoing problem of not sufficient calcium and vitamin D intake in Poland.

Objectives: The aim of the study was to assess the calcium and vitamin D content in daily diets of Polish school-age children.

Method / Design: The study was carried out in 2006, 2008, 2009, 2010 and 2011 among 981 girls and boys aged 9-13 years with the use of one-day dietary recall method. The data on calcium and vitamin D content in food products were based on the National Food Composition Tables. The results of calcium intake were compared to the Estimated Average Requirements (EAR) and the results of vitamin D intake were compared to the Adequate Intake (AI) and EAR.

Results: The mean total daily calcium intake in the group of pupils was 579 mg and ranged from 547 mg (girls) to 614 mg (boys). The comparison of individual calcium intake to EAR values showed that 88.9% diets were below EAR. The main sources of calcium in pupils' diets were milk and milk products (69.4%). The mean total daily vitamin D intake in the group of studied pupils was 2 μg and ranged from 1.9 μg (girls) to 2.1 μg (boys). In comparison to EAR and AI, the 99.3% and 95.6% of diets (respectively) were with the risk of deficiency of vitamin D. The main sources of vitamin D in pupils' diets were plant fats (43%) and meat products including meat (22.7%)

Conclusions: This study shows that diets of school children aged 9-13 years in Poland are low in calcium and vitamin D in relation to the recommendations.

Keywords: (maximum 5): calcium, vitamin D, intake, girls, boys

149/763. Nutritional supplement use and impact on nutrient adequacy in older Irish adults

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Introduction: Nutritional supplements may be useful to bridge the gap between actual and recommended intakes of micronutrients.

Objectives: The objective of this study was to describe the use of nutritional supplements in Irish adults aged 65 years and over using a sub-sample (n=226) of the Irish National Adult Nutrition Survey (2008-2010) (www.iuna.net). The impact of nutritional supplements on adequacy of micronutrient intakes was also assessed.

Method / Design: A 4-day semi-weighed food record was used to collect food intake data including nutritional supplement type and usage. Nutrient intakes were estimated using food composition tables (UK and Irish). A supplement user was defined as a respondent who consumed a nutrient containing supplement during the survey period. Micronutrient intakes were estimated for supplement users (including and excluding contribution from supplements) and for non-users. After exclusion of energy-under-reporters, the % of each group with intakes below the Estimated Average Requirement was established for vitamin A, D calcium and iron.

Results: Thirty-eight percent of adults aged 65 years and over were supplement users. Multivitamin/mineral combinations (30%) were the most frequently reported type of supplement followed by cod liver oils/fish oils (22%). Supplement users had a lower prevalence of inadequate intakes compared to non-users for calcium, iron and vitamins A and D. Among supplement users, nutritional supplements made a significant contribution 37-77% to the intake of a broad range of micronutrients. Nutritional supplements reduced the % of users with inadequate intakes for iron and vitamin A (males only) and calcium and vitamin D (males and females).

Conclusions: Nutritional supplements are consumed by a substantial proportion of Irish adults aged 65 years and over and are effective in improving intakes of key micronutrients in this group.

Keywords: (maximum 5): Nutritional Supplements; Older adults; Micronutrient adequacy

149/771. Yogurt consumption in the Italian adult population: associations with anthropometric, nutritional and lifestyle features

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Introduction: The association between yogurt consumption and a better quality of the diet and some parameters of overall health, is supported by several epidemiological data. However, such association requires further evidence, especially in populations with different dietary habits (e.g. Italy).

Objectives: To compare specific dietary and lifestyle habits in Italian regular yogurt consumers (C) and non-consumers (NC) and to investigate possible associations between yogurt consumption and health parameters.

Method / Design: Population: 1992 Italian adults randomly recruited by 200 general practitioners (GP) in 20 Italian regions for the LIZ study in 2013 (Liquidi e Zuccheri nella popolazione italiana: liquids and sugars in the Italian population). Data: anthropometrics

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and blood pressure (BP) measured by GPs; intakes of water and beverages and any sweet food collected using 3 days food diaries (two weekdays and one on a weekend day) in the form of single choice questionnaires; questionnaires for the assessment of knowledge and practice in the field of nutrition and health.

Results: The typical Italian yogurt consumer was found to be woman, aged<60y, BMI<25, normotensive, physically active, graduate, milk consumer, more trained about nutrition guidelines and taking care to healthy nutritional practice. The following parameters were significantly different in C (42.4% of the total sample consuming at least 1 yogurt during the 3 days of the survey) vs NC: age (49.7±15.0 vs 52.3±16.1), weight (70.2±14.0 vs 72.7±14.5), BMI (25.4±4.6 vs 26.2±4.6) and systolic BP (123.4±13.6 vs 125.8±13.3). After stepwise multivariate regression analyses gender, seasonality, education, fruit and milk consumption and vigorous physical activity were positively correlated ($p<0.05$), while diastolic BP was negatively correlated ($p<0.05$) to yogurt intake.

Conclusions: These results confirm the positive association between yogurt consumption and healthy lifestyle and substantiate the association between yogurt intake and adequate anthropometric parameters and lower blood pressure in the Italian population.

Keywords: (maximum 5): yogurt consumption, healthy lifestyle

149/773. Socioeconomic disparities and diet quality: What can the evolution of purchases of French households tell ?

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Introduction: The evidence of a social gradient in health and food-related diseases shows the crucial role of diet quality. However socioeconomic disparities in diet quality have seldom been studied on the long-term.

Objectives: The aim of this study was to observe the diet structure of French households according to their socioeconomic characteristics and to measure the disparities in nutritional quality from 1969 to 2010.

Method / Design: Time series of food-at-home purchases were built based on two representative household surveys : INSEE and Kantar. The average quantities purchased per capita each year were calculated for each food item and aggregated into 80 groups. Food quantities were converted in energy and nutrients using CIQUAL food composition database. The nutritional quality of purchases was estimated by the Mean Adequacy Ratio (MAR), i.e. the mean percentage of daily recommended intakes for 15 key nutrients calculated on a 2000kcal basis. Socioeconomic disparities were measured by disaggregating the above computations according to the household income quartiles from 1969, and to four educational levels of the household head from 1978. We also computed the MAR by income and education level.

Results: Results

We found that all income quartiles show a similar trend of improvement of the MAR from purchases between 1969 and 2010. However the MAR remains higher for the richest income quartile (75.3 to 86.0) than for the lowest one (66.4 to 80.1) throughout this period. By education levels from 1978, we found a higher MAR for higher education level than for lower one (82.5 vs 71.9) but with closer values at the end of the period (83.5 vs 81.5).

Conclusions: Diet quality of household purchases is better for higher income or highereducation households on the last decades. Disparities of diet quality seem to remain induced by income, but not any more by education.

Keywords: (maximum 5): Socioeconomic disparities, Food purchases, Nutritional quality

149/780. Neophobia in elderly and adolescent Europeans: a way to understand preferences and liking for vegetables.

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Introduction: Low consumption of vegetables can affect health. European Policies try to find ways to encourage the consumption of fruit & vegetables.

Objectives: To report results of neophobia effect on preference and liking for vegetables in DK, FR, IT and UK.

Method / Design: 400 elderly and 400 adolescents were recruited. They filled in the Food Neophobia Scale (FNS) and reported their preference for eleven vegetables. Ss rated liking for ten canned pea samples and eight canned sweet corn samples.

Results: FNS items were consistent within age groups of each country (Cronbach's alpha ≥ 0.8). No significant differences between elderly and adolescents were found in DK, FR and UK populations. Elderly resulted significantly more neophobic than adolescents in IT ($p<0.0001$). Low (L) and highly (H) neophobic Ss were selected. The effect of neophobia level, age and vegetables on preference was assessed in each country, independently. HSs rated preference for vegetables lower than LSs in all countries ($p< 0.001$). In general, differences

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in preference between HSs and LSs were higher in adolescents than in elderly. In the IT elderly group, neophobia level did not affect preference ratings. The effect of neophobia on preference for the vegetables varied depending on country. Neophobia level affected liking ratings mainly in adolescents. In general, HSs rated liking lower than LSs.

Conclusions: The results indicate that both groups from the same country tend to show the same neophobia value, confirming its persistence across the two age populations. The lower preference ratings of HSs in respect to LSs confirm neophobia as a good predictor of vegetable preference. Neophobia level tends to negatively affect liking ratings, mainly in adolescents, irrespective to their country.

Keywords: (maximum 5): Neophobia, vegetables, preference, food behavior

149/781. Alcoholic beverage preference and dietary habits in European elderly: the CHANCES project

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Introduction: The differential effects of beer, wine, and spirits consumption on mortality risk found in observational studies may be confounded by diet.

Objectives: To investigate associations between alcoholic beverage preference and diet in a large cross-sectional sample of elderly across different European cohorts.

Method / Design: From the Consortium on Health and Ageing: Network of Cohorts in Europe and the United States (CHANCES), four European cohorts were included, i.e. EPIC-Elderly (Spain, Greece, the Netherlands, Sweden), the SENECA Study, the Zutphen Elderly Study (the Netherlands), and the Rotterdam Elderly Study (the Netherlands). The study population included harmonized data of 30,947 elderly participants from 14 European countries. Baseline data on beer, wine, and spirit consumption, and dietary intake were studied. Diet quality was assessed using the Healthy Diet Indicator (HDI; score range 0-70), which measures adherence to the 2003 WHO dietary guidelines. Intakes and scores across categories of alcoholic beverage preference (beer, wine, spirit/no preference, non-consumers) were adjusted for age, sex, education, employment, prevalent diseases, and lifestyle factors (physical activity, smoking, and absolute alcohol consumption).

Results: In most cohorts, persons with a wine preference formed the largest group. After adjustment for socio-demographic and lifestyle factors, differences in food group intake and HDI score between alcoholic beverage preference categories were small and varied across countries. Persons with a wine preference tended to have a higher HDI score than non-consumers or persons with a beer preference, but differences were small. Overall, the preference for beer, wine, or spirits was not associated with specific dietary habits. Furthermore, diet quality did not differ according alcoholic beverage preference categories.

Conclusions: This study performed among ~31,000 elderly from 14 European countries using harmonized data showed that alcoholic beverage preference was not associated with differences in dietary habits and diet quality after adjustment for socio-demographic and lifestyle factors.

Keywords: (maximum 5): alcoholic beverage preference, wine, beer, diet, Europe

149/801. Antioxidant intake and adequacy in regular blood donors.

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Introduction: Reduced antioxidant dietary intake and insufficient oxidative balance are considered to play a major role in diverse chronic diseases and aging, as well as in acute pathological conditions.

Objectives: Since blood transfusion recipients are subjected to acute or sustained oxidative stress, we investigated the adequacy of the major antioxidant nutrients vitamin A, C and E, carotenoids (alpha- and beta- carotene, lycopene, beta cryptoxanthins, lutein and zeaxanthin), and selenium in the diet of healthy blood donors.

Method / Design: We interviewed 100 individuals (33 women and 67 men), 18-63 years old, volunteering as blood donors in the General University Hospital of Patras (Greece), up to a period of 35 years. Participants anthropometric characteristics were evaluated and dietary habits were recorded using a food frequency questionnaire. Finally, glucose sensitivity was tested in subjects prior and after body fluid replenishment in hospital premises.

Results: According to Body Mass Index (BMI) analysis, 36 donors were classified as of normal weight, 46 as pre-obese, and 17 as obese, while waist-to-hip ratio (WHR) was found above limits for 21 women and 41 men. Blood glucose shifted from 72-118 mg/dl after donation to 73-174mg/dl 30 min later, after orange juice consumption. Self-reported intake of vitamins C, E, A, alpha- and beta- carotene, lycopene, beta cryptoxanthins, lutein and zeaxanthin, as well and selenium was 181 mg (SD149), 18 mg (SD13), 11058 IU (SD9262), 622 μg (SD749), 5629 μg (SD4955), 8856 μg (SD8920), 287 μg (SD322), 4553 μg (SD4267) and 121 μg (SD79) respectively, significantly higher in men.

Conclusions: Basic nutrient antioxidant consumption in blood donors was satisfactory, in accordance with the recommended daily values. However, the overall metabolic profile could raise concerns

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about an underlying chronic oxidative stress that could affect health outcome in blood recipients.

Keywords: (maximum 5): antioxidant, blood donor, glucose, BMI, WHR

149/803. Establishing global nutrition standards for early life nutrition categories

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Introduction: The first 1000 days of life is a period of exceptional growth and development. Nutrition given during this time can have both positive and negative impacts on life-long health. Products designed for infants and young children have specific compositional requirements outlined in legislation. However, the scientific evidence underpinning them can be out of date and varies across countries. Furthermore, no legislation currently takes into account the specific nutritional needs of pregnant and breast-feeding women.

Objectives: To establish global nutrition standards which are based on the latest scientific evidence for commercially available products designed for pregnant and breast-feeding women, infants and young children.

Method / Design: We reviewed global legislation governing our four main product categories (Milks; Dry Foods; Wet Foods; Pregnancy & Breast-feeding) across the European Union, China and Codex. Further, we conducted a review of 74 pieces of scientific literature which are the basis of our current nutritional standards. We also gave consideration to the public health and nutrition situation of specific population groups, as well as food safety limits in the context of local eating habits.

Results: Due to variegated legislative and cultural factors across countries we have established a range of values per nutrient (minimum, maximum and, where possible, optimum) for each of our product categories.

Conclusions: The establishment of a set of global nutritional standards will enable us to develop products that optimise the diet of pregnant and breast-feeding women; meet the nutritional needs of rapidly developing infants and toddlers; recognise the diversity of early life feeding practices and habits in different countries. Ultimately, this will support improvement in both short and long term health outcomes. We believe that this not only establishes an exacting set of standards for our own product portfolio but could also provide a benchmark for other manufacturers and policy makers.

Keywords: (maximum 5): nutrition, pregnancy, infants, legislation, standards.

149/809. During Ramadan can high fibre fortified foods help consumers living in Arab Gulf countries fast more easily & healthily?

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Introduction: Arab Gulf countries are witnessing an epidemic in obesity and diabetes as well as nutritional deficiencies. Recent Food Based Dietary Guidelines recommend that fortified grain based foods should be eaten in preference to non-fortified grain foods to increase B vitamins, calcium, vitamin D and fibre intakes. 76-95% of the region is Muslim and the majority of adults fast during Ramadan.

Objectives: Ramadan is a period associated with large changes in lifestyle and dietary habits and increased likelihood of diet related side effects like constipation, digestive discomfort or unwanted weight gain. While fibre intakes in general are often inadequate in the Gulf diet, it is particularly important to eat adequate amounts during Ramadan, when an individual's diurnal rhythm is changed completely with unwanted physiological reactions as a result and risk of poorer diet quality.

Method / Design: Common side effects such as digestive discomfort could be relieved by increasing fibre consumption.

Results: Can high fibre fortified breakfast cereals eaten at the sunrise meal (sufur) reduce side effects of Ramadan and increase intakes of at risk nutrients like iron and vitamin D. In addition can fibre consumed at sufur help control hunger by increasing feelings of fullness.

Conclusions: Fasting during the holy month of Ramadan can be an opportunity to adopt healthy eating lifestyles and dietary habits which can lead to better weight management and improved nutritional health. This is important as there is concern amongst health officials in the Arabic Gulf countries of the need to modify dietary intake of high fat calorie foods to reduce the prevalence of obesity and other diet related diseases in the region, and to raise awareness of healthy food choices. High fibre fortified foods can help consumers living in Arab Gulf countries fast more easily & healthily during Ramadan.

Keywords: (maximum 5): Ramadan: fortified breakfast cereal: constipation: high fibre

149/813. Folic acid, iron deficiencies and anemia among Senegalese women of childbearing age: national study

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Introduction: Folic acid and iron deficiencies are widespread throughout the world and remain a global concern. These deficiencies are a risk factor for many diseases and contribute to higher rates of morbidity and mortality in developing countries.

Objectives: The aim of this study was to estimate the prevalence of folic acid, iron deficiencies and anemia among Senegalese women of childbearing age.

Method / Design: A national cross sectional survey using a stratified two-stage cluster sampling was conducted on a sample of 1012 women 15-49 years old. Folic acid deficiency was measured with microbiological method and defined as a plasma concentration <10 nmol/L; iron deficiency by plasma ferritin <12 µg/L with ELFA method and adjusted to subclinical inflammation/infection (CRP>5mg/L, AGP>1g/L). Anemia, measured by HemoCue, was defined as hemoglobin concentration <110 g/L in pregnant and <120 g/L in nonpregnant women.

Results: Mean folic acid concentration was 9.04±1.98 nmol/L and 49.2% of women had folic acid deficiency. Based on physiological status, our results showed that women have low folic acid concentration, especially during the breastfeeding period. Plasma folic acid concentration between rural (7.18±1.97 nmol/L) and urban (10.90±1.90 nmol/L) areas was significantly different ($p<0.0001$) and highest mean concentration (11.79±1.84 nmol/L) was noted in women living in Dakar, the capital. Overall, 28.4% of women were markedly infected, and after ferritin adjustment 38.5% had iron deficiency. Simultaneous iron and folic acid deficiencies affected 24.2% of women. Mean hemoglobin concentration was 116.86±19.43 g/L and 52.7% of women were anemic. Positive correlation was found between folic acid and hemoglobin ($r=0.116$ $p<0.05$).

Conclusions: This study shows that folic acid and iron status of Senegalese women are inadequate particularly in breastfeeding and rural women. Establishment of effectives strategies are needed to address these deficiencies and improve micronutrients status of women.

Keywords: (maximum 5): Folic acid - iron deficiency - anemia - Senegal

149/814. Dietary patterns and interpersonal relationships of adolescent girls in relation to the level of hormones regulating appetite (leptins and ghrelins)

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Introduction: Irregular nutrition and especially the abandonment of some meals as well as snacking habit between meals facilitate the development of excess weight and obesity.

Objectives: The aim of this study was to determine the relation between dietary patterns and interpersonal relationships of adolescent girls in relation to the level of leptin and ghrelin.

Method / Design: 529 girls from schools in Krakow were studied. The girls were 12.42±1.91 years of age on average. The nutrition behaviours were assessed by Food Frequency Questionnaire (FFQ) supplemented by questions regarding the occurrence of problems at school. The fasting level of leptin and ghrelin was determined in serum by means of Radioimmunoassay (RIA). A statistical model of Generalized Linear Model (GLZ group) was created, where the leptin level was analysed in relation to the number and type of meals, which expressed a significant match ($p=0.0275$).

Results: There was a statistically significant relationship between: 1. the frequency of having snacks between meals ($p= 0.0273$); not having breakfast ($p= 0.0211$); not having lunch ($p= 0.0195$) and having 1-2 meals a day ($p=0.0418$) and the occurrence of conflicts with teachers. 2. Not having breakfast and lower grades at school ($p=0.0343$). 3. Not having lunch ($p= 0.0147$) and having 1-2 meals a day ($p<0.0001$) and having behavioural problems. Omitting of particular meals was significantly more often declared by older girls. There was a significant relationship between the number of meals and leptin level ($p=0.0275$) and BMI value ($p<0.0001$). Girls having 4 and 5 meals a day were slimmer. In the case of ghrelin there was no such relationship.

Conclusions: 1. Nutrition patterns influence interpersonal relationships, the BMI index and serum leptin level.

2. Adolescent girls consider skipping meals as one of methods of body weight regulation.

Keywords: (maximum 5): dietary patterns, interpersonal relations, leptin, adolescent girls

149/823. Chromium – an essential micronutrient or fake? Lessons learned from over 50 years of research.

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Introduction: Chromium(III) has a documented effect on carbohydrate, lipid, and protein metabolism; however, the mechanism(s) of its action on the molecular level have not been fully understood.

Objectives: The aim of this presentation is to review the evolution of knowledge and the current state-of-the art about trivalent chromium that has been considered for over 50 years as an essential micronutrient for animals and humans.

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Method / Design: State-of-the -art about chromium(III) as microelement, based on available data and own results.

Results: Many clinical studies have demonstrated a significant improvement of glucose tolerance after Cr(III) supplementation in type 2 diabetics. However, other trials that failed to confirm beneficial effects of Cr(III) supplementation in diabetics. Irrespective of controversial scientific opinions, various Cr(III) compounds (e.g. Cr(III) tris(picolinate), nicotinate, histidinate) have been advertised, marketed worldwide, and used as popular dietary supplements to decrease body mass gain, improve glycemic control, or reduce appetite. Besides, Cr itself has been included into the list of nutrients in many national dietary guidelines. The results of the recent studies performed on experimental animals (rats) raised some doubts on the essentiality of Cr for mammals, including humans, and made researchers re-evaluate dietary recommendations on Cr. If Cr(III) is not an essential element for mammals, but at certain dosages improves impaired glucose and lipid homeostasis, its action could be called "pharmacological" at best. Recent studies demonstrated that Cr given at pharmacologically relevant doses generated beneficial effects on insulin sensitivity and cholesterol levels of rodent models of insulin insensitivity, including models of type 2 diabetes

Conclusions: The mode of action of Cr(III) at a molecular level is still an area of active debate; however, the movement of Cr(III) in the body in response to changes in insulin concentration suggests that Cr(III) could act as a second messenger, amplifying insulin signaling.

Keywords: (maximum 5): chromium, essentiality, mechanism, nutritional, pharmacological

149/826. Evaluation of safety of synthetic trinuclear chromium(III) acetate complex in rat

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Introduction: Among various Cr compounds proposed for dietary supplements and therapeutics, of particular interest is the Cr(III) propionate cation [Cr3O(O2CCH2CH3)6(H2O)3]+, known as Cr3. In this study, a new form of trinuclear chromium(III) complex with acetate [Cr3O(CH3CO2)6(H2O)3]+NO3 (CrAc) was synthesized and evaluated concerning its toxicological safety.

Objectives: This study aimed at assessing the safety of CrAc in rat (9 week sub-chronic toxicity assay).

Method / Design: CrAc, in the form of nitrate salt [Cr3O(CH3CO2)6(H2O)3]+NO3•H2O (25.4% Cr) was synthesized in our laboratory according to the method described previously. The safety of CrAc was evaluated using sub-chronic toxicity assay (90-day test) performed on 64 Wistar rats (32 males and 32 females) fed ad libitum standard Labofeed B diets, supplemented with CrAc, at doses of 1 (control), 10, 50 and 500 mg Cr/kg diet (approx. 0.1; 1; 5 and 50 mg Cr/kg b.w./day) for 12 weeks. The effects of supplementary Cr on nutritional indices blood haematological and biochemical indices, and lymphocyte genotoxicity (alkaline comet assay) were evaluated.

Results: The previous study revealed that this compound is of low acute toxicity potential, belongs to the 4th EU class of toxicity (non-classified). Supplementary CrGly given at dosages of 1-50 mg Cr/kg b.w./day to male and female rats neither affect overall nutritional indices, blood haematological and biochemical indices, nor produce genotoxic changes in blood lymphocytes (alkaline comet assay). However, high doses of this compound (50 mg Cr/kg b.w./d) led to accumulation of Cr in liver and kidneys in a dose-depended manner.

Conclusions: CrAc given by gavage at doses of 1-50 mg Cr/kg b.w. (approx. 4 - 200 mg/kg b.w./day for 90 days) does not affect major physiological indices, thus may be considered as safe for rat. However, exposure to high doses of this compound leads to accumulation of Cr in liver and kidneys

Keywords: (maximum 5): Chromium(III) acetate complex: supplementation: safety: rats

149/845. Cardiovascular fitness and low fat mass are related with vitamin D concentrations in elderly Spanish

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Introduction: Although levels of physical activity and aerobic capacity decline with age and the prevalence of obesity tends to increase, both of them are notable public health challenges for an adequate aging.The knowledge of the role of vitamin D status in general health has increased in the last few years with the discovery of vitamin D receptors in multiple tissue types, including muscle and adiposse tissue. Vitamin D is believed to stimulate muscle cell proliferation, which could be important to prevent or slow down sarcopenia.

Objectives: To assess how body composition and cardiorrespiratory fitness are related to 25-hydroxyvitamin D [25(OH)D] serum concentrations in Spanish elderly.

Method / Design: Serum 25(OH)D, body composition parameters (fat mass, fat free mass) by bioimpedance (TANITA Corp, BC-

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418MA) and cardiorrespiratory fitness by means of maximum oxygen consumption (VO2max) were measured in a subsample of 383 Spanish elderly (58.2% females), aged 55-88 years from the PREDIMED study. Data was analyzed using one-way ANOVA test dividing participants in tertiles by fat mass (kg) and controlling by age and city.

Results: No differences were found between sexes.There are significant differences in VO2max ($p<0.001$) and 25(OH)D serum concentrations ($p=0.045$) between fat mass groups. Subjects with lower fat mass (kg) presented higher VO2max and 25(OH)D serum concentrations than those with higher fat mass. Fat free mass did not show any significant difference.

Conclusions: High 25(OH)D serum concentrations are associated with low fat mass and higher maximum oxygen consumption in Spanish elderly. Therapeutic interventions to correct the high rates of vitamin D deficiency in elderly should be considered for cardiorrespiratory fitness improvement.

Supported by Instituto de Salud Carlos III (PI11/01791 & CB12/03/30038). ImFINE and NUCOX are members of the EXERNET research network (Spain).

Keywords: (maximum 5): Vitamin D, VO2 max, fat mass, body composition, elderly.

149/846. Water intake and hydration indices in healthy adults; The European Hydration Research Study (EHRS)

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Introduction: Hydration status is linked with health, wellness and performance; consequently it is of public health interest to evaluate hydration status of population groups.

Objectives: To evaluate hydration status and water intake and output for 7 consecutive days in healthy adults in summer and winter.

Method / Design: Volunteers living in Spain, Germany or Greece (n=590, 39±12y (50%males), 25±5Kg/m2 BMI participated in an 8-day study protocol in summer and in winter. Total water intake was evaluated from food and drink records gathered in 7 day diaries. Hydration status was measured in 24h urine samples collected for 7 days and in blood samples collected on days 1 and 8 of the protocol. Hydration indices in urine (24h volume, specific gravity, colour, sodium and potassium concentration) and blood (haemoglobin, haematocrit and osmolality) were associated with water intake.

Results: Total water intake was 2.7±1.0L/day, water from beverages 2.0±1.0L/day, water from foods 0.7 (0.5,1.0) L/day, 24h urine volume 1.8±0.9 L/day, 24h urine osmolality 628±219mOsmol/kgH2O, 24h specific gravity 1.017±0.006, 24h sodium concentration 124±53mEq/L, 24h potassium concentration 53±21mEq/L, colour 4±1, haemoglobin 15.0±1.9g/dL, haematocrit 43±4% and serum osmolality 294±12mOsmol/kgH2O. Water intake was higher in summer than in winter ($p<0.001$). Sodium and potassium concentration in urine and serum osmolality were higher in winter than in summer ($p<0.001$). Water intake was associated negatively with urine specific gravity, urine colour, urine sodium and potassium concentration ($p<0.01$). Applying urine osmolality cut-offs for hydration status, 21% of participants were hyperhydrated, 60% euhydrated and 19% dehydrated. Predictors for urine osmolality were age, country, gender, BMI but not season or physical activity.

Conclusions: Hydration indices on a large number of free-living individuals are provided. Most participants were euhydrated but a substantial number showed evidence of over- or under-hydration. Seasonal differences on total water intake were observed.

Keywords: (maximum 5): Hydration status, water intake, urine hydration indices, blood hydration indices, seasonality

149/853. Assessment of calorie and macro-nutrient intakes among women in Ibadan, Nigeria.

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Affiliation: *(1) Student, Department of Human Nutrition, University of Ibadan, Nigeria.; (2) Biostatistician and Lecturer, Department of Epidemiology and Medical Statistics, University of Ibadan, Nigeria.; (3) Professor of Nutrition, Department of Huma Nutrition, University of Ibadan, Nigeria.y.*

Introduction: Nutrition is vital in care-giving and reproductive roles of women. Long term exposure to inadequate nutrient intake is associated with poor nutritional status and vulnerability to poor pregnancy and lactation performance among women.

Objectives: We assessed caloric and macro-nutrient inadequacy among women across rural and urban households in Ibadan, Nigeria.

Method / Design: Two hundred and eighty five non-pregnant and non-lactating women (15-49years) were recruited through a multi-stage random sampling after duly informed consent; and interviewer-administered, semi-structured questionnaire was used to obtain information on demography, anthropometric measurements were taken using stadiometer to measure height to the nearest 0.1cm and weighing scale to measure weight to the nearest 0.1kg. Twenty four hour dietary recall was used to collect information on all food and drinks within the last 24hours preceding the interview and calorie and macro-nutrient intakes were assessed using adapted Total Dietary Assessment (TDA) software. Cut-off points for inadequate and adequate intake was set at <80.0% and ≥80.0% of RDA respectively. Descriptive statistics and chi-square ($\chi 2$) test were performed at $p<0.05$.

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Results: About 38.2% of respondents were from rural areas, mean age, height and weight was 29.3±8.3years, 161.3±7.4cm and 62.3±13.4kg respectively. Proportion of urban women (66.5%) with inadequate calorie intake was significantly ($\chi2$=4.9, p=0.025) higher than that of the rural women (53.2%). Similarly, significantly higher ($\chi2$=14.4, p=0.000) inadequate intake of protein was observed among urban women (43.2%) than rural women (21.1%). However, inadequate intakes of carbohydrate and fat do not differ significantly across women from rural (47.7%, 85.3%) and urban (57.4%, 85.2%) respectively.

Conclusions: Inadequacy in calorie and macronutrient intake is primarily high despite inherent rural urban differences, and urgent nutrition intervention is required to prevent long term exposure.

Keywords: (maximum 5): Calorie, Nutrient Intakes, Women, Nigeria

149/868. Adequacy of nutrient intake in the very old: Analysis of the Newcastle 85+ Study.

Author(s): (1) Nuno Mendonca; (2) Tom Hill; (3) Antoneta Granic; (4) John Mathers; (5) Karen Davies; (6) Wendy Wrieden; (7) Mario Siervo; (8) Chris Seal; (9) Carol Jagger; (4) Ashley Adamson.

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Introduction: Dietary intake data in large samples of very old adults are scarce. A plethora of socioeconomic, biological and lifestyle characteristics change with advancing age and place very old adults at increased risk of nutritional deficiencies.

Objectives: The aim of this study was to determine the adequacy of nutrient intake in a broadly representative sample of 85 year-olds living in the North East of England.

Method / Design: Complete dietary information, using a 2x24-hour repeated multiple pass recall, was available for 793 (302 men and 491 women) participants in the Newcastle 85+ Study (http://research.ncl.ac.uk/85plus). Energy, macronutrient, non-starch polysaccharides (dietary fibre as measured by the Englyst method), vitamin and mineral intakes were estimated from UK food composition tables (McCance and Widdowson 6th edition) and compared with current UK's Dietary Reference Values (DRV).

Results: Twenty percent (n=157) of participants met the estimated average requirement for dietary energy (9.6 MJ for men and 7.7 MJ for women). Less than 10% (n=71) and 30% (n=221) complied with the DRVs for non-starch polysaccharides (≥18 g) and saturated fatty acids (≤11% of dietary energy), respectively. Less than 40% and 25% of participants met the Reference Nutrient Intake (RNI) for all minerals (except sodium) and vitamins (except vitamin B12), respectively. More than 95% (n=37) were below the RNI for vitamin D. Twenty percent (20%) or more of these very old were below the Lower Reference Nutrient Intake (LRNI) for magnesium (n=175), potassium (n=238) and selenium (n=418). Underreporting and over-reporting of dietary intake, while not accounted for in the primary analysis was estimated at 12.3% (n=90) and 4.7% (n=34), respectively.

Conclusions: Dietary inadequacy of many nutrients, including energy, is common in these very old adults. However, since most nutrient DRVs are extrapolated from general adult populations, the significance of this inadequacy is largely unknown.

Keywords: (maximum 5): Nutrient adequacy, very old, Newcastle 85+ study.

149/871. Vitamin D status is associated with lower physical strength in elderly Spanish

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Introduction: In older people low serum vitamin D may cause mineralization defects, bone loss, and muscle weakness. However, it is still not clear if vitamin D status can predict low physical performance.

Objectives: The aim of this study was to assess the correlation between vitamin D concentration and physical strength.

Method / Design: A subsample of 383 participants (58.2% females) from the PREDIMED study with a mean age of 66.7 ± 6.6 years old was included in this study. Arm and legs strength was measured by means of validated physical fitness tests, and vitamin D status as serum 25(OH)D by chemiluminescence immunoassay.

Results: Mean 25(OH)D concentration was 25.82 ± 10.13 ng/mL. Deficiency (serum 25(OH)D <20ng/mL) was present in 27.5 of men and 32.7% of women, vitamin D insufficiency (serum 25(OH)D <30ng/mL) in 36.9% of men and 37.7% of women. Vitamin D levels were positively correlated with handgrip strength (r=0.11; p=0.03), leg strength (r=0.11; p=0.02) and arm-curl test (r= 0.23; p<0.001). Vita-

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min D sufficient subjects performed better in all tests than vitamin D deficient or insufficient subjects, but only in men the sitting handgrip and arm-curl test were significantly higher in the vitamin D sufficient group when comparing to VD groups (both p=0.029) Moreover, when controlling by sex, physical strength (all p<0.001) and vitamin D concentration (p>0.058) gradually decrease with age.

Conclusions: There was a high prevalence of low vitamin D levels among the studied elderly population. Low serum vitamin D was associated with a lower physical strength in elderly people. Further investigation and public health strategies should be required to assess the predictive value of vitamin D status on physical performance in this group.

Keywords: (maximum 5): Vitamin D, physical strength, physical performance and elderly.

149/876. Anthropometric indices and diet quality index in overweight and obese adolescents: Evasyon Study

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Introduction: Recent reviews have shown that multidisciplinary interventions are the most effective in weight management. The assessment of adolescent's diet quality is interest because food habits developing during childhood can be modified over time and predicts adult diet-related diseases. Diet quality index for adolescents (DQI-A) was widely used in European adolescents. BMI and fat mass index (FMI) are the best anthropometric indices in assessing body-fat changes in adolescents.

Objectives: To assess whether DQI-A score changes predict anthropometric indices in obese adolescents after 13 months in a multidisciplinary intervention treatment.

Method / Design: Multi-intervention approach (diet, physical activity and psychological support in a family-group-based treatment) was implemented during one-year intervention in 13-to-16-year-old overweight or obese Spanish adolescents. 156 adolescents, males (n=71) (31.6 kg/m2) and females (n=85) (30.5 kg/m2) were recruited. We assessed body composition using anthropometric indices and based on the Spanish food-based dietary guidelines, we adapted the DQI-A previously developed for European adolescents. All measurements were made at baseline and 13-months later. Non-parametric Spearman's rho partial correlation coefficients were applied to assess the associations between DQI-A and anthropometry indices changes on both measurements at the end of the EVASYON treatment programme (13 months), controlling for potential confounders (age).

Results: After controlling for age, DQI-A changes were correlated with BMI and FMI changes in males and females (BMI: rho = -0.391, p = 0.001 and rho = -0.384, p <0.001 and FMI: rho = -0.451, p<0.001 and rho = -0.232, p = 0.039, respectively), but FM (%) changes were only in males correlated (rho = -0.399, p <0.001).

Conclusions: DQI-A changes are associated with body composition changes in obese adolescents. We found BMI and FMI would be a good predictor of DQI-A changes in males and females. More researches are needed to find the best anthropometry indices predictor to DQI-A changes.

Keywords: (maximum 5): Body-composition, Multi-intervention approach, Fat-mass loss programme
Diet-Quality-Index-for-Adolescents, Body-Mass-Index

149/881. Comparison food dietary pattern of male and female lecturers in Lagos

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Introduction: The abundance and variety of foods to choose is extensive and directly influence the eating behavior and pattern of individuals as well as social classes. Teachers within Africa general tend to consume more food than other sedentary workers due to their higher energy output while carrying out their primary assignment.

Objectives: This study was carried out to assess the food preference and consumption pattern of Academic Staff within a Nigerian Institution.

Method / Design: 150 volunteers which comprise 75 male and female Lecturers of the Polytechnic filled Food- Frequency Questionnaires(FFQ) which include Nigerian foods distributed within the food classes a column to indicate its preference as well as questions eliciting socio-demographic, sources of food and feeding pattern to evaluate food consumption and preference.

Results: Tests of difference were performed between sex of respondents and Daily and weekly Food Frequencies as well as Preferences. There were major significant differences between sex of Respondents and the three parameters. Daily and weekly Food frequencies shows male Lecturers consume heavy carbohydrate local meals, beans, root & tubers daily, but no significant difference between both sex in the daily consumption of beef and sugary drinks with P-values greater than 0.05 i.e.0.0547 and 0.109 respectively for daily and no difference

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in the consumption non-leafy veggie and sugary drinks Weekly(0.660 and 0.783). Preference analysis shows significant difference in the consumption of carbohydrate, protein and fried meals only.

Conclusions: The results contradicts the universal trend of male preference for meat and drinks usually, while skipping of breakfast by 80% of the total number of Lecturers could be cosmopolitan lifestyle in Lagos.

Keywords: (maximum 5): FOOD PREFERENCE: FOOD FREQUENCY

149/885. Inadequate Nutrient Intake and Short Stature in Subjects with Diagnosed Cow's Milk Protein Allergy

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Introduction: Poor growth and inadequate nutrient intake by food allergic children have been suggested, particularly for children avoiding milk.

Objectives: To investigate the impact of a dairy-free diet on the final stature of IgE-mediated Cow Milk Allergy (IgE-CMA) young adults.

Method / Design: Anthropometric data was measured in 60 IgE-CMA patients [20.4±3.4 years old, 26 males (43%)] and 36 volunteers without IgE-CMA [control group, 22.5±4.2 years old, 15 males (42%)]. All of them were at least 2 years post pubertal, as classified by Tanner's Stage 5. Age- and gender-specific SDSs and percentiles were determined according to Centers for Disease Control and Prevention growth charts. Nutrient intake assessment was based on 24 hour dietary recall and presented as percent of dietary reference values (DRI's). Individuals with conditions or treatments affecting bone metabolism or growth, were excluded.

Results: Height (cm) and height-SDS were significantly reduced in CMA subjects when compared to controls (164.8±8.4 vs 168.5±7.8, p=0.03; -0.56±0.9 vs -0.04±0.7, p=0.004). An abnormal distribution of height-for-age was noted in the CMA group, as compared to the controls (49% vs 17% were categorized as less than the 25th percentile, and 18% vs 3% were categorized as less than the 10th percentile. In addition, height-SDS in CMA patients was significantly lower than their predicted height (mid-parental target height, MPH) (p<0.0001). Δheight-MPH in CMA patients and controls were -3.6±5.2 and -0.60±5.2 cm, respectively, p=0.01. The incidence of subjects consuming less than 67% of the DRI was greater in the CMA group, as compared to controls.

Conclusions: Individuals with CMA are at risk for not reaching their growth potential. Growth monitoring and appropriate dietary intervention may avoid nutritional deficiencies and growth retardation in these patients.

Keywords: (maximum 5): cow milk allergy, final adult height, nutrient intake

149/894. How do students usually buy fruits and vegetables in Denmark?

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Introduction: Fruits and vegetables are an important nutritional component for human health. Their intake can vary among different populations.

Objectives: This study aimed to investigate if there is a difference between Danish and non-Danish students regarding fruits and vegetables habits in Denmark.

Method / Design: This study is part of a cross-sectional study conducted at Aalborg University – Copenhagen 'Smoothies and Food Waste'. The study used a convenient sample with a wide range of nationalities. A questionnaire was used to investigate participants' demographic characteristics, fruit and vegetable preference, purchasing habits, daily intake and physical activity. It was distributed via email to all the students at Copenhagen campus. It was voluntarily filled during the spring 2014. The data were analyzed using descriptive statistics and Chi Square techniques. An alpha value of .05 was used to determine significant differences. All analyses were run in SPSS 22.0.

Results: The questionnaire was answered by 365 students. Two hundred and thirty two participants were female (163 male) and in both cases more than 60% had Danish nationality. Danish participants prefer to buy unripe bananas in contrast to non – Danish (P<0.007), but there is no difference in relation to tomatoes. Danish participants eat less fruits than non – Danish (P<0.01) but, they eat more vegetables (P<0.036). There are no differences regarding the preparations of fruits and vegetables among participants; nevertheless, Danish eat more vegetables in a hot meal or a soup than non – Danish (P<0.001).

Conclusions: Ripeness is an important characteristic when buying fruits and vegetables. Although international students are currently living in Denmark, they might remain having their own food habits. Despite these results, it is still necessary to promote a higher

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intake of fruits and vegetables and some of these sensory characteristics should be taken into account.

Keywords: (maximum 5): Fruits and vegetable intake, Denmark.

149/902. Heart rate and blood pressure among European adolescents in relation to dietary patterns

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Introduction: In adults, there is some evidence that healthy dietary patterns might reduce the risk of cardiovascular diseases, however studies that analyse this association in adolescents are still scarce.

Objectives: To examine the associations between heart rate, systolic (SBP), diastolic (DBP) and mean arterial blood pressure (MAP) among European adolescents with their usual intake of vegetables, fruits, dairy products, meat, fish and savoury snacks.

Method / Design: 2330 adolescents from the HELENA-study (12.5–17.5 years old; 1253 girls) were evaluated. Dietary intake was assessed using two computerized 24-hour dietary recalls. SBP, DBP and heart rate were measured and MAP calculated with the same type of device in all centres. Age, sex, body mass index, education level of the mother, physical activity and Tanner stage were considered as confounders. Associations were examined by multilevel linear regression. Tests for trend were assessed by tertiles of intake while controlling for the above mentioned confounders.

Results: Dairy products intake was negatively associated with heart rate (-0.099; CI -0.009, -0.004), SBP (-0.049; CI -0.006, -0.001), DBP (-0.092; CI -0.006, -0.002) and MAP (-0.082; CI -0.006, -0.002), and fish intake with heart rate (-0.081; CI -0.074, -0.023), SBP (-3.501; CI -0.065, -0.018) and MAP (-0.058; CI -0,041, -0.007). Meat intake was negatively associated with heart rate (-0.049; CI -0.003, 0.074). Significant decreasing trends were observed for heart rate, SBP, DBP and MAP across tertiles of dairy products, for SBP, MAP and heart rate across tertiles of fish intake and for heart rate across tertiles of meat and fruit intake ($p<0.05$). Significant increasing trends were observed for SBP and MAP across tertiles of snack intake ($p<0.05$).

Conclusions: Heart rate and blood pressure seem to be independent of vegetable intake. Fish and dairy products seem to decrease BP and heart rate while snack intake could increase BP.

Keywords: (maximum 5): Diet, dairy products, fish intake

149/906. Whole soybean foods increase satiety due to their high fibre content

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Introduction: Protein is the most satiating macronutrient but source of protein could modulate this effect.

Objectives: To compare the satiating effects of whole soybean based foods containing soy protein (SP) with non-soy protein (NSP) containing foods consumed within real meals.

Method / Design: In two studies, both employing a repeated measures crossover design, young, normal weight, healthy males (Study 1, n=20; Study 2, n=10) were randomised to consume SP or NSP breakfast (400kcals) and lunch (1000kcals) meals matched on appearance, weight and macronutrient composition but varying in protein source (percentage energy both meals in Study 1/Study2: Protein 20%/24%; CHO 50%/49%; Fat 30%/27%). In Study 1, but not Study 2, the SP meals (breakfast plus lunch) had a higher fibre content than the NSP meals (total difference = 10.6g). Subsequent food intake, for the rest of the day, was monitored.

Results: Study 1 - Food intake at an ad libitum buffet dinner was significantly lower after consumption of the SP breakfast and lunch meals (-172kcals, 16%, $P<0.05$). Although not statistically significant, total energy intake on the SP day (2975kcals) was 144 kcals less than on the NSP day (3119kcals). Subjective appetite measures showed the SP breakfast was more satiating than the NSP breakfast with similar trends at lunch. Study 2 – There were no significant differences in dinner meal or total test day energy intake or subjective appetite after consumption of the fibre matched SP and NSP meals.

Conclusions: The findings of Study 1 support a greater satiating effect of whole soybean based SP meals compared to NSP equicaloric meals. However, the results of Study 2 indicate that these effects are likely to be due to the naturally higher fibre present in whole soybean foods rather than their protein source.

Keywords: (maximum 5): SOYBEAN, FIBRE, PROTEIN SOURCE, SATIETY

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149/908. Are the retirees' households in Poland meeting the food/dietary recommendations?

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Introduction: Aging of the population has become a clearly visible process in developed countries. In Poland, as well as across the European Union, the population aged 65 and over (elderly people) is increasing due to lower fertility and mortality and the result is a growing number of retirees' households (RH). In advanced age it is important to stay in a good health. This condition is influenced by many factors, including well balanced diet which prevents nutritional deficiency and can reduce risk of developing chronic diseases. Over the last 10 years food consumption patterns in retirees' households has shifted and evolved.

Objectives: The aim of this study was to assess the level of compliance of retirees' households food consumption in Poland with current dietary recommendations.

Method / Design: The RH food consumption data were obtained from Household Budget Surveys for the years 2005 and 2012, prepared by Central Statistical Office. Demographic data, caloric value and nutritive components per capita in RH were obtained from Statistical Yearbook. Results were compared with dietary recommendations, including recommended nutrient intakes (protein, energy, carbohydrates, fats and lipids), set by national, international organizations.

Results: In the period 2005-2012 the number of retirees has increased by 50% and now they represent 16.2% of Poland's population. Analysis of food consumption (in particular foods that have a significant impact on human health) allowed to estimate the level of compliance with values recommended by nutritionists. Only consumption of fruits and vegetable by RH fulfilled the recommended 400 g of fruit and vegetables a day by WHO. Consumption of dairy products and fishes didn't comply with the recommendations.

Conclusions: Despite growing trends in living an active and healthy lifestyle the expenditures and consumption of food by retirees' households didn't change to maintain a well-balanced diet.

Keywords: (maximum 5): food consumption, dietary/food guidelines, retirees' households, household budget surveys

149/916. Nutrient intake and socioeconomic characteristics among French adults: analyses of effect modifications

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Introduction: Evidence is mounting that a low socioeconomic position (SEP) is associated with unhealthy dietary patterns. Some studies suggested that the relationships of the three major SEP indicators (education, occupation, income) with dietary intake are different and could even have a cumulative effect on diet. However, the role of each SEP factor remains unclear, especially regarding nutrients.

Objectives: We investigated the independent association of each SEP factor with nutrient intake. The effect modification of education and occupation on the relationships between income and nutrient intake was also assessed.

Method / Design: This cross-sectional analysis included 91,900 French adults participating in the NutriNet-Santé cohort study. Nutrient intake was estimated using three 24-hour records. Associations between SEP factors and nutrient intake were assessed using linear regression models adjusted for age and energy intake. When the interaction between SEP indicators was significant, stratified analyses were performed.

Results: In both genders, the highest educated individuals consumed more fibers, beta-carotene and vitamin C (differences:6-9%) and consumed less protein (5-6%) than the lowest educated subjects. Individuals with highest income consumed less complex carbohydrates(5-6%) and more magnesium (6%), vitamin B9 (5-7%) and vitamin C (12-14%) than those with lowest income. In women, managerial staff consumed more vitamin D (12%), magnesium(6.5%), and beta-carotene (7%) than manual workers. Only in lower educated subjects, those with highest income consumed more magnesium, beta-carotene and vitamin B9 (differences:6-12.5%) than those with lowest income. In manual workers and employees, men with highest income consumed more potassium than other income categories (differences:5-11%) whereas no difference was found between income classes in managerial staff.

Conclusions: Our study highlighted specific relationships between nutrient intake and each SEP indicator and effect modification of education and occupation on the relationships between income and nutrient intake. These findings could help to refine public health strategies in low socioeconomic groups.

Keywords: (maximum 5): Socioeconomic position
Nutrient intake
Income
Inequalities
Education

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149/920. Day-time dependent effects of fat-rich and carbohydrate-rich meals on metabolic parameters in healthy humans

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Introduction: A recent animal study has shown a potential benefit of a fat-rich diet at the beginning of the active phase and a carbohydrate-rich diet at the end (versus the opposite order) on glucose tolerance, beta-oxidation and body weight.

Objectives: We therefore aim to determine effects of two different diurnal patterns of meal composition on satiety-hunger-score and metabolic parameters in humans.

Method / Design: In a cross-over study, 20 men (age 46.4±14 years, BMI 27.5±4 kg/m2) consumed isocaloric carbohydrate-rich meals in the morning and fat-rich meals in the evening (diet A) or isocaloric fat-rich meals in the morning and carbohydrate-rich meals in the evening (diet B) for four weeks each. At the end of each intervention period, two 850 kcal meal tolerance tests, a carbohydrate-rich (MTT-HC) or a fat-rich (MTT-HF), were performed at 09.00 am and 03.40 pm, respectively, according to the participant´s previous dietary regimen. Insulin, C-peptide, glucose, and routine lipid markers were determined in plasma.

Results: Mean body weights were not affected by the diets. Diet A and Diet B did not differ in their effect on satiety-hunger-scores. Both diets decreased fasting blood glucose, insulin, and total cholesterol levels. As expected, MTT-HC induced a larger increase in glucose and insulin levels than MTT-HF. Postprandial glucose, insulin and C-peptide levels were higher in the afternoon compared to the morning for both MTT-HC and MTT-HF. In the afternoon, postprandial peak of insulin secretion was delayed and insulin excursion pattern showed a second peak independent of the meal composition. Postprandial NEFA levels were significantly higher in the afternoon compared to the morning only for MTT-HC.

Conclusions: Glucose tolerance decreases in the afternoon independent of meal composition. Eating small portions in the evening might be therefore a beneficial strategy for the prevention of obesity and type 2 diabetes.

Keywords: (maximum 5): diurnal pattern of meal composition, isocaloric diet, glucose metabolism

149/923. Evaluation of dietary intake and protein/energy ratio of diet of rural pregnant women of Bangladesh

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Introduction: Optimal nutrition of the pregnant women largely depends on the diet during pregnancy which should provide sufficient energy and other nutrients to nourish the fetus and the mother as well.

Objectives: To evaluate energy and nutrient intake and also protein/energy ratio of the diet of the rural pregnant women of Bangladesh.

Method / Design: A multiple pass recall (MPR) approach for 24-h dietary recall was conducted to assess energy and nutrient intake among 717 rural pregnant women of second and third trimester between the age ranges of 18-31 years for this cross-sectional study.

Results: The mean daily energy, protein and fiber intake of pregnant women was lower than that of the recommended dietary allowance (RDA) by 43%, 35%, and 29% respectively while carbohydrate intake was 1.6 times higher than the RDA. The mean intake of zinc, calcium, iron, and folate was represented only about 56%, 18%, 20%, and 12% of RDA for pregnant women. Compliance to RDA, mean daily intake of thiamin (43% of RDA), riboflavin (34% of RDA), niacin (78% of RDA), vitamin B6 (34% of RDA), vitamin C (54% of RDA), vitamin A (35% of RDA), vitamin D (2% of RDA), and vitamin E (11% of RDA) was very poor from the diet alone. The mean protein/energy ratio was found 0.09 of the diet of the pregnant women.

Conclusions: Energy and nutrient intake of the pregnant women was found grossly inadequate and below the RDA of pregnant women.

Keywords: (maximum 5): Pregnant women, nutrient intake, protein/energy ratio

149/925. Determinants of Nutritional Rehabilitation Success in Patients with Growth Faltering

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Introduction: Faltering growth is a common problem in Kuwait yet the risk factors are understudied.

Objectives: The current study was conducted to assess the risk factors determining the outcome of the nutritional rehabilitation of patients with growth faltering following up in the Clinical Nutrition Pediatric Outpatient Clinic, Al-Adan hospital.

Method / Design: This study was conducted on 122 patients 3-8 years old (60.6% Males), Kuwaiti children suffering from faltering growth; 75.4% of those were underweight and 24.6% were wasted. Dietetic history was taken and each patient was examined and labora-

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tory tests were requested to exclude secondary causes. Caloric requirements were calculated and a dietetic regimen was given for each case in accordance to their tolerance and preferences. The patients were followed for 6 months by assessing their anthropometric measurements and obtaining a dietary history in each visit. Success was determined when the anthropometric measurements fall above the -2 z scores on the WHO growth charts.

Results: Statistically more underweight patients showed improvement after 1 and 3 months in comparison to more stunted children failing to respond after 6 months follow up (p=0.041). Patients cared for by mothers and family members showed statistically earlier improvement compared to those cared for by foreign care givers (p=0.002). Distinctly more patients, among those receiving one fourth to one third of their calorie needs as supplementary milk and those using new recipes showed early improvement and less of them were non-responders by 6 months yet both comparisons didn`t reach statistical significance (p=0.69 and p=0.21 respectively).

Conclusions: Nutritional rehabilitation is easier for underweight patients and largely depends on the family participation. We recommend counselling the families explaining their role in the nutritional rehabilitation program of such patients with special emphasis on a tailored dietary regimen fulfilling the nutritional needs and including supplementary formulas.

Keywords: (maximum 5): Nutritional rehabilitation; Stunted; Underweight.

149/927. Intake and other determinants of vitamin D status in childhood and tracking from 1-to-6-years-of-age

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Introduction: Growing interest in vitamin-D calls for studies on intake and other determinants of status. Knowledge on tracking of vitamin-D status from younger age to childhood is lacking.

Objectives: To investigate vitamin-D intake and other determinants of vitamin-D status in healthy 6-year-old children, and tracking of serum 25(OH)D levels from 1-year-of-age.

Method / Design: Subjects were 139 Icelandic children from a longitudinal study with information on infant variables, vitamin-D intake and status at 6-years (measured June-December). A subsample of children (n=74) also had vitamin-D status measured at 1-year. Serum 25(OH)D≥50nmol/l described vitamin-D sufficiency.

Results: At 6-years, half of the children used supplements and median vitamin-D intake from food and supplements combined was 5.0μg/d (25th-75th percentiles=2.2-12.3). Mean serum 25(OH)D level was 56.5nmol/l (SD=17.9) and 64% of the children were vitamin-D sufficient. In a multivariate logistic model adjusted for sex, breastfeeding duration and age, vitamin-D intake at 6-years (OR=1.14, 95%CI=1.05-1.24) and vitamin-D status assessed in June as opposed to September-December (OR=0.19, 95%CI=0.05-0.71) were predictors of vitamin-D sufficiency at 6-years. Adding serum 25(OH)D at 1-year to the model increased r-square from 0.21 to 0.35 and serum 25(OH)D at 1-year became an independent predictor for vitamin-D sufficiency at 6-years (OR=1.02, 95%CI=1.00-1.04). A strong and negative association was observed between the serum 25(OH)D level assessed at 1-year and the change in serum 25(OH)D levels from 1-to-6-years (β=-0.90, p<0.001), even when adjusted for change in vitamin-D intake from 1-to-6-years.

Conclusions: Current vitamin-D intake, seasons and vitamin-D status in late infancy are predictors of vitamin-D status in children at start of school-age in northern latitudes. Serum 25(OH)D levels track from late infancy to childhood and higher serum 25(OH)D in infancy predicts a smaller change in serum 25(OH)D level from infancy to childhood.

Keywords: (maximum 5): vitamin-D; 25-hydroxyvitamin D; child; seasons; tracking

149/955. A systematic review of diet quality indices in relation to obesity

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Introduction: Diet is a major modifiable determinant of obesity. To assess diet quality in populations, tools have been introduced called "diet/dietary indices" that evaluate the level of adherence to a specified pattern or a set of recommendations. Yet, there are no review studies have provided a summarized comprehensive result of adherent dietary indices on obesity.

Objectives: We reviewed observational studies, focusing on the association of diet quality indices with obesity or abdominal obesity.

Method / Design: We systematically searched on the association between dietary indices and weight gain or obesity in English language publications available on the electronic literature of MEDLINE, ISI Web of Science, and Embase between January 1990 and September 2014. Among the wide variety of indices and weight-derived variables, studies with dietary guideline based indices and mean change for weight gain or odds ratio for obesity and abdominal obesity were selected.

Results: From a total of 479 articles, 31 studies were selected for the current review; nine had cohort and 22 had cross-sectional design. Associations of weight status with original HEI and other versions of HEI including AHEI, HEI-2005, and HEI-05 were examined in 13 studies; with 10 found a significant relation. Healthy eating index was

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better obesity predictor in men than in women. Diet scores were incapable to assess overall diet quality and shown no significant findings in developing countries (e.g., Iran, Brazil, Guatemala, and Seri Lanka) in comparison to US population. Additionally, indices based on dietary diversity scores were directly associated with weigh gain.

Conclusions: There is still insufficient evidence to draw definitive conclusions about the relation of dietary indices and obesity; however, about HEI can determined have inversely associated with obesity but about indices that developed based on Diversity have positively associated with obesity.

Keywords: (maximum 5): Dietary indices; Diet quality; Obesity

149/956. Dietary approaches to stop hypertension style diet is inversely associated with incident chronic kidney disease

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Introduction: Chronic kidney disease (CKD), a worldwide epidemic, is a complex disorder with high socioeconomic cost. The Dietary Approaches to Stop Hypertension (DASH) diet is a well-established overall dietary pattern with components, which has been identified as potential risk factors.

Objectives: This study was conducted to examine the association between adherence to the DASH score and incident CKD among an Iranian population.

Method / Design: We followed-up 1630 participants (50.5% women, mean age: 42.8 years) within the Tehran Lipid and Glucose Study (TLGS) for 6 years, who were initially free of CKD. Baseline diet was assessed using a valid and reliable 168-item food-frequency questionnaire. A DASH score based on eight components (fruits, vegetables, whole grains, nuts and legumes, low fat dairy, red and processed meats, sweetened beverages, and sodium) was calculated. Estimated glomerular filtration rate (eGFR) was calculated using the Modification of Diet in Renal Disease (MDRD) Study equation and CKD was defined as eGFR <60 mL/min/1.73 m2. Odds ratios (ORs) using multiple logistic regression reported for the association of incident CKD with DASH score.

Results: The incidence of CKD among those in the top quartile of the DASH score was 30%, which was 18% lower than among those in the bottom quintile. After controlling for age, sex, and total energy intake, adherence to the DASH diet was inversely associated with the incident CKD (OR: 0.55; 95% CI: 0.37-0.51). These associations remained significant even after additionally adjustment for physical activity, smoking, family history of diabetes, serum triglycerides, BMI, hypertension, and diabetes.

Conclusions: Adherence to the DASH-style diet is associated with a lower risk of incident CKD among adults during 6 years of follow-up.

Keywords: (maximum 5): DASH; Chronic kidney disease; Glomerular filtration rate; Diet quality

149/957. Effect of iodine supplementation on thyroglobulin concentration in adults: a randomised, double-blind, placebo-controlled intervention study

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Introduction: Thyroglobulin (Tg), a precursor of thyroid hormone, shows promise as a biomarker to assess iodine status; Tg increases in iodine deficiency. A median Tg <13 μg/L in school-aged children indicates adequate iodine status, however, it is not known whether Tg can also be used in adults.

Objectives: To determine the efficacy of Tg to assess iodine status in adults.

Method / Design: A randomized, double-blind, placebo-controlled supplementation trial was conducted in mildly iodine deficient adults aged 18-40 years who received 150 μg of potassium iodate (n=56) or placebo daily (n=56) for 24 weeks. Urinary iodine, thyroid-stimulating hormone (TSH) and free thyroxine concentration (fT4) was measured at baseline and 24 weeks. Serum Tg concentration was assessed at baseline, 8, 16 and 24 weeks.

Results: The mean (SD) age of the participants was 23.7 (3.6) years, 22% were males, and mean (SD) BMI was 23.9 (4.0) kg/m2. The overall median urinary iodine concentration (MUIC) (n=112) at baseline was 64 μg/L and the median Tg concentration was 16.6 μg/L confirming that the participants were mildly iodine deficient (i.e. MUIC of 50-99 μg/L and Tg >13 μg/L); mean TSH and fT4 concentration was 1.64 mIU/L and 16.2 pmol/L, respectively. At 24 weeks, there were no significant changes in TSH or fT4 concentration for either group, but iodine status significantly improved in the iodine-supplemented group (MUIC 168 μg/L; median Tg 13.0 μg/L) while the placebo group remained iodine deficient (MUIC 78 μg/L; median Tg 16.2 μg/L) (both p<0.001).

Conclusions: In mildly deficient adults, iodine supplementation improved iodine status (i.e. MUIC ≥100μg/L) and was associated with a concomitant decline in Tg to 13 μg/L by 24 weeks. This is the first randomised trial to demonstrate the efficacy of Tg as an index of iodine status in adults.

Keywords: (maximum 5): iodine
micronutrient

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biomarker
assessment
thyroglobulin

149/960. In vitro Mineral Biovailability from Sorghum Bicolor (L.) Moench

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Introduction: Sorghum bicolor (L.) Moench (sweet sorghum) was introduced in the Philippines in 2004. The Philippine variety SPV 422 is rich in minerals but has not been thoroughly studied for its calcium, iron and zinc contents. Calcium is essential to bone health; iron for metabolism and for red blood cells; zinc for its physiological functions. Mineral deficiencies are detrimental to health.

Objectives: The objectives of this study were to determine the calcium, iron and zinc of sweet sorghum and assess its in vitro mineral bioavailability.

Method / Design: Study samples are raw (RG) and boiled (BG) grains; and raw (RF) and baked (BF) flour. BG samples were soaked at 1:2 ratios; 24 hours; boiled for 60 minutes using a rice cooker. BF samples were cooked at 350 °C for 45 minutes using an electric oven. Proximate, mineral and total dietary fibers were analyzed using AOAC methods. In vitro mineral bioavailability was assessed by simulating the conditions in the small intestine.

Results: Results showed that sweet sorghum is a good source of Carbohydrates (37.76 to 84.2g/ 100g), Protein (3.2- 7.1 g/ 100g) and Dietary Fiber (4.6 to 7.3g/ 100g). Sweet sorghum grain and flour contains significant amounts of Iron (1.43 ± 0.04- 2.17 ± 0.03 mg/ 100g); Calcium (2.83 ± 0.34 - 8.94 ± 1.09 mg/ 100g) and Zinc (1.98 ± 0.07- 2.21 ± 0.05 mg/ 100g). In terms of its in vitro bioavailability, only Iron (2.65 ± 0.29%- 4.02 ± 0.61%) and Calcium (3.08 ± 0.18%- 8.41 ± 0.34%) are available for absorption. Zinc was not found to be available in vitro, which may be due to mineral- mineral interactions.

Conclusions: In conclusion, sweet sorghum is a good cereal food with calcium and iron contents that are available for absorption.

Keywords: (maximum 5): sweet sorghum
iron
calcium
zinc
in vitro bioavailability

149/962. Iodine intakes and status in the Irish population – is there cause for concern?

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Introduction: Iodine inadequacy still remains a global nutritional public health challenge. An important mineral for health, it has a key role in the production of important thyroid hormones which are essential for cellular metabolism, growth and physical development. Hence adequate iodine is crucial at all stages of life, but imperative during pregnancy for fetal brain development and in a child's early life for neurodevelopment.

Objectives: Within Ireland information is limited on population iodine intakes and status. Therefore the purpose of the current analysis was to estimate dietary iodine intakes and urinary iodine concentrations using the cross sectional Irish National Adult Nutrition Survey (NANS).

Method / Design: NANS assessed habitual food and beverage intake between 2008 and 2010 for 1500 Irish adults using a 4-day semi-weighted food diary, furthermore 79% also provided spot urine samples. Urinary iodine concentrations (UIC) were measured by a multiplate persulphate digestion method followed by Sandel-Kolthoff colorimetry.

Results: Median iodine intakes in the total population were adequate with only 10% of the population being classified as below the estimated average requirement. Milk consumption was the major source of iodine, with 45% of iodine being contributed from milk. Overall UIC indicated optimal iodine nutrition according to the WHO cut-offs, with the population median UIC at 107μg/L. However 46% of the population had a UIC classified as insufficient, with a UIC <100 μg/L. In the current cohort, 65% of women of child bearing age (18-50yrs) did not meet the EAR recommendation for pregnant women.

Conclusions: While iodine in the Irish population is deemed to be adequate, continuing monitoring should be of priority to ensure that all sub-groups of the population have an adequate intake and status.

Keywords: (maximum 5): Iodine, dietary intakes, status

149/969. The evaluation of the kindergarten meals by chemical analysis and dietary web-tool

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Introduction: Adequate nutrition in early childhood is essential for the normal growth and development of a child. Since a lot of children spend 8 and more hours daily in kindergarten, the diet there

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significantly affects the daily intake of energy and nutrients. In 2005 Slovenia adopted the dietary guidelines for educational institutions with the main focus on planning a healthy nutrition for different age groups of children in order to guarantee optimal dietary intake.

Objectives: The purpose of the research carried out in 2013, was to evaluate the nutritional value of meals for preschool children aged 4–6 years from a selected kindergarten and to compare the results with the national recommendations.

Method / Design: The chemical composition of kindergarten meals (breakfast, lunch, morning and afternoon snack from 5 consecutive days) was determined by analysing the content of proximate. The content of available carbohydrate and energy value were calculated. In addition all ingredients and their amounts from the recipes were introduced into dietary web-tool OPEN to assess the nutritional value of the meals.

Results: The average fat and protein contents in daily meals were in accordance with the dietary guidelines, while the carbohydrate content was inadequate, mainly due to too low content in lunches. The average energy value of daily meals was nearly 4.000 kJ and below the recommendations. The average energy value of breakfasts and snacks was adequate.

Nutritional assessment obtained with OPEN showed good correspondence with analytical values for total fat, dietary fibre, water and ash content, and energy value. Differences were obtained in protein and carbohydrate contents.

Conclusions: The energy value of lunches should be balanced with healthy sources of carbohydrates. The OPEN has proved to be a suitable tool for quick and cheaper assessment of energy and macronutrient contents in kindergarten meals.

Keywords: (maximum 5): dietary guidelines, nutrition, preschool children, kindergarten, energy and nutrient content

149/972. Food patterns and convenience foods: Association with nutrient intakes and household characteristics

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Introduction: Nowadays many households' lifestyles have led to a great demand for convenience foods. These products are often criticized for high contents of sugar, sodium, and fat. In recent years, however, a growing number of convenience foods with higher nutrient density and lower energy density became available. However, few studies have investigated the effects that convenience foods consumed at home have on a household's diet quality.

Objectives: The purpose of this study was to assess the extent to which German households integrate different types of convenience foods into their meal planning and to examine the effect of different types of convenience foods on the household diet quality.

Method / Design: The study used representative German consumption data from 2011. The data include 13,138 households who recorded about 12,000,000 purchases. Type of food (e.g. fruits, dairy) and degree of processing (e.g. unprocessed, ready-to-consume) were used to classify foods into groups. Based on the food groups, food patterns were identified by factor analysis. Nutrient and energy density were calculated for the patterns. Socio economic and attitude variables were associated with the patterns in regression analysis.

Results: Four food patterns were derived: An unprocessed foods pattern, a mixed pattern containing mostly unprocessed foods but a few high processed foods, and two high processed foods patterns. High processed food patterns are characterized by lower nutrient and higher energy densities, whereas the unprocessed foods pattern is characterized by higher nutrient and lower energy densities. Regression analysis showed that apart from household composition, attitude variables are significantly influencing affiliation to a food pattern.

Conclusions: This study has shown that convenience foods are an important part of German households' diet. Their influence on household diet quality, however, is negative. These results indicate that future dietary guidance should include recommendations on how to integrate convenience foods in the diet.

Keywords: (maximum 5): dietary patterns, convenience food

149/981. Dietary sources of sugars in adolescents´ diet: the Helena study.

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Introduction: The WHO recommends limiting non-milk extrinsic sugars (NMES) consumption to ≤10% of total energy intake.

Objectives: To describe dietary sugars consumption in European adolescents.

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Method / Design: The present research results from a multicentre study in adolescents, the HELENA-CSS (Healthy Lifestyle in Europe by Nutrition in Adolescence Cross-sectional Study).

A total of 1813 participants (52.6% girls) of eight survey centers aged 12.5 to 17.5 were studied. The participants were a subset of the original sample (n=3552) with complete data on dietary data obtained using 2 nonconsecutive 24-h recalls. Sugars intake was assessed as total sugars, NMES, intrinsic and milk sugars (IMS) and energy intake.

Results: The percentage contribution of total sugars to energy intake was 24%. NMES intake provided 19.5% of energy intake and 39.7% of carbohydrate intake. The main food contributors to sugars intake are shown in table 1. The daily percentages of food and drinks rich in added sugar in both sexes are shown in figure 1.Table 1. Mean daily intake of NMES, IMS and total sugars from food groups, according to the HELENA-DIAT (24 h recall)

Conclusions: Continued efforts are required to achieve consistent information on NMES intake by the adolescent´s population.

Keywords: (maximum 5): sugars, adolescents, intake, Europe, HELENA

149/982. Usage of Dietary Supplements among Infants of Mothers with Turkish Migration Background

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Introduction: Several German expert associations recommend the use of vitamin D and fluoride supplements during the first year of life. Vitamin D supplements serve to prevent rickets and fluoride has a caries-protective function. In children with Turkish migration background it was shown that caries prophylaxis is insufficient and that there is a higher risk for vitamin D deficiency. Data on supplement use among this population group is scarce.

Objectives: The study aimed at gathering data on the use of the dietary supplements vitamin D and fluoride in infants of mothers with a Turkish migration background in Fulda (Germany) to assess the specific need of health promotion measures among this population group.

Method / Design: 56 mothers of children up to two years participated in the cross-sectional study. After a pretest, data on socio-economic characteristics and supplement use were collected by standardized questionnaires in Turkish and German language during October and November 2014.

Results: 91.1% of the infants had been receiving supplements. The proportion of infants who had been receiving vitamin D daily for 12 months was 61.1%. In case of fluoride this proportion was 47.2%. With increasing age the use decreased. The most common reasons for incorrect use were: nutrients in food are sufficient (26.1%), dispensation was forgotten/not taken seriously (21.7%), infant was healthy (21.7%), excipients undesired (13.0%), doctor/midwife discouraged use of both supplements (13.0% respectively). No correlation with socio-economic data was found.

Conclusions: The usage of both dietary supplements in infants of families with a Turkish migration background should be optimised. Therefore, it is recommended to provide specific information for mothers with infants in both languages involving e.g. paediatricians and midwifes.

Keywords: (maximum 5): vitamin D, fluoride, infants, migration background

149/983. Prevalence and Determinants of Herbal Product Use in Older Persons - Results from the KORA-Age Study

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Introduction: Old age and multimorbidity may induce an increased intake of herbal products but information on the prevalence of herbal product use for the German elderly population is sparse.

Objectives: The aim of the present study was to investigate the prevalence and determinants of herbal product use in a population of older adults.

Method / Design: A cross-sectional analysis was conducted using data from the population-based Cooperative Health Research in the Region of Augsburg (KORA)-Age study which included 1079 men and women aged 65 years or older. Herbal product use during the previous 7 days was assessed in 2009 during a personal interview using a database supported computer software (IDOM: Instrument for databased assessment of medication). Participants were asked to bring product packages of ingested drugs and supplements to the study center. Herbal products were defined as orally consumed pharmaceutical products or dietary supplements containing herbs or herbal components. Determinants of herbal product use were identified using multivariable logistic regression models. Examined determinants included socio-demographic characteristics, the social network index, multimorbidity, self-perceived health, nutritional status, disability and BMI.

Results: About 23% of the study population used herbal products either in form of dietary supplements or drugs during the previous 7 days. Most "users" took the preparations regularly. The most frequently consumed herbal ingredients were ginkgo, hawthorn, garlic

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and saw palmetto which were used by 29.4%, 20.4%, 8.6% and 8.2% of regular herbal product users, respectively. Significant predictors of herbal product use were age with an odds ratio (OR) of 1.03 (95% CI 1.01, 1.06) per year, female sex (OR 1.59 [95% CI 1.15, 2.21]) and high level of education (OR 1.94 [95% CI 1.37, 2.75]).

Conclusions: About one quarter of older adults regularly consumed herbal products. Age, female sex and a high level of education were positively associated with herbal product use.

Keywords: (maximum 5): elderly, herbal products, prevalence, deteminants

149/985. Characteristics of British young adults underreporting dietary intake in comparison with adequate reporting counterparts

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Introduction: Underreporting is a key limitation to assessment of dietary intake. Evaluation of the extent of underreporting and characteristics of under-reporters (URs) is particularly important in assessment of nutritional status of young adults, the group previously reported as the most nutritionally vulnerable group of adults aged 18-65 years.

Objectives: to investigate the extent to which underreporting of dietary intake among young adults was related to gender and measures of nutritional status.

Method / Design: Laboratory and anthropometric measures including fasting capillary glucose and lipid markers, weight, percentage body fat (%BF), Body Mass Index (BMI), and Waist Circumference (WC) were obtained from participants (n 236) aged 18-25 years. Energy and macronutrient intake was measured using a validated 3-day diet diary. Underreporting was determined from the ratio of average daily energy intake to estimated Basal Metabolic Rate (EI:BMRest). In line with previous literature the ratios below 1.27 were classified as underreported.

Results: EI/BMRest was 1.25±0.46 for 102 males (M) and 1.21±0.39 for 134 females (F). Overall, 57.3% of males and 63.2% of females were classified as URs, demonstrating no statistical variation in phenomenon by gender (p=0.392). For both genders, the magnitude of underreporting was linked with the measures of central obesity. There was significant difference in weight (M 82.7 v 74.5kg; F 68.4 v 59.6kg), BMI (M 25.8 v 23.9kg/m2; F 24.8 v 22.4kg/m2), %BF (M 19.5 v 15.1%; 31.7 v 26.8%), WC (M 85.1 v 75.9cm; F 76.6 v 71.6cm) among URs and Non-URs respectively (p<0.05). There was no variation in lipid profile and glucose concentration and/or percentage contribution of nutrients to total energy intake.

Conclusions: In contrary to some previous studies, the dietary underreporting was not associated with gender or nutrient intake. The present study confirmed previous notion that individuals with higher measures of central obesity are more likely to be URs.

Keywords: (maximum 5): Underreporting, Young adults

149/986. Is the use of food labels associated with better diet and health outcomes?

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Introduction: Front of pack food labelling aims to provide nutrition information supporting consumers to make informed food choices. Previous studies indicated that an energy dense diet with high levels of sugar, total and saturated fat is associated with increased cardiometabolic risk.

Objectives: to examine whether the use of food label is associated with superior dietary and health measures of nutritional status among young adults.

Method / Design: Laboratory and anthropometric measures including fasting capillary glucose and lipid markers, percentage body fat (%BF), Body Mass Index (BMI), and Waist Circumference (WC) were obtained from participants (n 210, 97 males and 113 females) aged 18-25 years. Energy and macronutrient intake was measured using a validated 3-day diet diary. The questionnaire assessing the use of labels and the information most sought on food labels was used to determine food label readers (FLRs) and Non-FLRs.

Results: Overall, 34.8% were categorised as FLRs, 21.4% - Non-FLRs, and 43.8% - occasional FLRs. The FLRs had a statistically (p<0.05) higher HDL cholesterol (1.42 vs 1.29 mmol/d), lower triglycerides (TGs) (1.05 vs. 1.39 mmol/d) and lower percentage contribution of energy from saturated fatty acids (10.9 vs 12.6%). There was no variation in measures of central obesity between FLRs and Non-FLRs. Participants who checked total fat and saturated fat content of foods had lower TGs compared with non-FLRs (total fat: 1.00 vs. 1.19mmol/d; saturated fat: 0.99 vs. 1.16mmol/d). No variations were found in nutritional status of participants who checked for total energy, added sugar, macronutrients, fibre and salt content of foods.

Conclusions: Frequent use of food label was associated with better profile of fat intake and improved blood lipid profile among FLRs compared to non-FLRs. Although the findings should be treated with caution considering the observational nature of the study, they provide evidence for strategies encouraging the use of food labels.

Keywords: (maximum 5): Food labels, Diet Quality, Health

149/987. Quartile distribution of the Universal Mediterranean Diet Score in the Italian population.

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Introduction: Since the first studies in 1970s (Seven Countries Studies), the Mediterranean Diet (MD) has been recognized as a dietary pattern associated with decreased all-cause mortality and reduction in the cardiovascular risk factors level. Several indexes that attempt to evaluate the level of adherence to this pattern have been proposed. All these indexes are validated and oriented to a specific population, so this is a limit for application on the other population

Objectives: This work aims to define the quartiles of a UMDS (Universal Mediterranean Diet Score) based on general characteristic of MD that overcomes the limit above mentioned .

Method / Design: The UMDS questionnaire has been submitted to a sample of students from the University of Rome and to a sample of adults (aged from 30 to 78 years old), recruited to a general practitioner. The questionnaire, already validated, is composed by 23 questions with multiple choice answers and based on the MD Pyramid developed by CIISCAM. It has been conceived to investigate not only the eating habits but also other aspects of the Mediterranean model. Scores were assigned to highlight their different relevance in terms of adherence to the MD. The total score for each individual has been calculated as a percentage of the maximum score possible

Results: 320 subjects answered to the questionnaire. In the first quartile, the students show a lower adherence than the adults (60.2% vs 69.2%). Same as for the other quartiles (66.3% vs 74.5% in 2nd quartile, 72.1% vs 80.1% in the 3rd quartile). Overall the highest score has been recorded in the adult sample (90.9% vs 86.8%)

Conclusions: The comparison between the two samples under analysis shows that the adults have an higher adherence to the MD than the students.

Keywords: (maximum 5): Mediterranean Diet, Score, Questionnaire, Pyramid.

149/988. Starch digestibility of different experimental biscuit formulations

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Introduction: Recently, the "slowly digestible starch in starch-containing foods" health claim approved by the European Food Safety Autority (EFSA) has raised great interest. A new challenge for the food industry is modifying carbohydrate-containing foods to reduce the rate of starch digestion and, consequently, glycemic responses. Indeed, reducing the rate of carbohydrate digestion and glucose absorption might be associated to several health benefits, like reduced insulin demand, improved blood glucose control, and reduced blood lipid levels. All these factors may play an important role in the prevention or management of several chronic diseases, including diabetes, coronary heart disease and, possibly, specific cancers.

Objectives: The aim of this study was evaluating the starch digestibility of several experimental biscuits with two different in vitro digestion models.

Method / Design: The biscuits were prepared mixing, in different proportion and with different flour granulometry, wholemeal wheat flour, wheat flour, flours from other cereals and soluble fiber. Two different methods referred to in the EFSA Health Claim approval were used to assess in vitro starch digestibility.

Results: Only one sample showed a significantly lower starch digestibility rate when compared to the others. This was confirmed by its lower digestible starch content and higher slowly digestible starch (SDS) level. To a preliminary observation, one of the possible explanation for the observed difference could be attributed to flour particle size. Indeed, a preliminary chemical-physical analysis showed that this sample had the lower specific volume value compared to the others.

Conclusions: This study investigated and compared the starch digestibility of different biscuits applying two in vitro methods. The observed differences seem to be more linked to physical structure than to composition.

Keywords: (maximum 5): carbohydrate, in vitro digestibility, slowly digestible starch.

149/1000. A dose-response balance study to establish the daily dietary iodine requirement in infancy

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Introduction: Iodine is an essential nutrient for normal growth and development, particularly of the brain. Infants have low iodine stores at birth and are entirely dependent on the iodine intake from breast milk or infant formula, but iodine requirements at this critical age are poorly defined. The recommended adequate intake (AI) is based on the iodine intake in U.S. breast fed infants measured during a

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period when overall iodine intakes in the population were excessive. It sharply disagrees with the threshold for urinary iodine concentration, the conventional biomarker to assess iodine status. This discrepancy makes monitoring of iodine status at this age problematic.

Objectives: To estimate the daily amount of dietary iodine required to achieve iodine balance in infants.

Method / Design: We are conducting a metabolic balance study in 2-3 month old formula fed (n=10) infants. Infants are recruited in Zurich, Switzerland, and are randomly allocated to three cross-over periods of exclusive consumption of infant formula milk (IFM) providing 60 µg I/day, 110 µg I/day and 220 µg I/day over a total of 33 days. The iodine intake is monitored by keeping records of the amount of IFM fed; excretion is measured from complete collections of diapers for 3 x 4 days. The iodine content of IFM and diapers is determined by MC-ICP-MS.

Results: The results presented will be the physiological iodine retention, i.e. the calculated difference between iodine intake and iodine excretion.

Conclusions: The findings will provide data for the scientific evidence base needed to establish the estimated average requirement (EAR) for iodine during infancy. This will allow better monitoring of iodine status in young children worldwide.

Keywords: (maximum 5): Iodine, infants, metabolic balance study, formula milk

149/1004. Dietary sources of vitamin D elderly volunteers

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Introduction: Low vitamin D status is common worldwide, particularly in elderly people what is associated mainly with poor intake. Despite dissemination of nutritional knowledge and growth in market of fortified food and supplements the supply of vitamin D in elderly is insufficient.

Objectives: The aim of the study was to describe the intake and sources of vitamin D in a group of elderly.

Method / Design: Respondents (145 women, 57 men), aged 75-84, were recruited at the universities of the third age in a big city, small town and villages. Intake data was obtained by 3-day records. The use of fortified products and supplements contained vitamin D was assessed by FFQ and special photo-albums.

Results: Only 15.9% of women and 22.4% of men met Polish EAR for vitamin D (10 µg) and median daily intake was 4.79 µg/d in women and 5.48 µg/d in men. Among 161 respondents reporting consumption of fortified food these products supplied only 3.45±15.2µg vitamin D with the highest contribution of margarines (2.56±14.4µg). The intake of vitamin D from supplements/medicines in group of 34 users was 15.2 ±42.1µg. Of these respondents 60% women and 87.5% of men met EAR. In women regular food products contributed to total intake in 35%, fortified products in 34% and supplements/medicines in 31% while in men in 56.5%, 21% and 22.5%, respectively. Significantly higher amount of vitamin D came from fortified products in diet of elderly from big city than from small town and villages.

Conclusions: Increased intake of vitamin D, from foods and supplements is recommended in this population group.

Keywords: (maximum 5): elderly; vitamin D; diet; fortified products; supplements.

149/1006. Sugar-sweetened beverage consumption and risk of incident chronic kidney disease in the Tehran lipid and glucose study

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Introduction: High sugar-sweetened beverage (SSB) consumption is associated with cardio-metabolic disturbances, urecemia, and albuminuria in adults; however, there are currently limited studies on SSBs and chronic kidney disease (CKD).

Objectives: Our objective was to evaluate cross-sectional and longitudinal relationships between SSB, carbonated beverage, and fruit juice consumption and risk of CKD in a population based study.

Method / Design: At baseline, 2382 participants aged >27 years in the Tehran Lipid and Glucose Study with a completed valid food-frequency questionnaire and measurements of serum creatinine and cardio-metabolic risk factors included for cross-sectional analysis. After 3 years of follow-up, 1690 subjects who were free of baseline CKD included for longitudinal analysis. Estimated glomerular filtration rate (eGFR) was calculated using the Modification of Diet in Renal Disease (MDRD) Study equation and CKD was defined as eGFR<60 mL/min/1.73m2. Dietary carbonated beverage and all kind of fruit juice were combined to estimate the daily intake of SSBs. Consumption of SSBs were divided to three categories of <0.5, 0.5-4, and >4 serving/week. To assess the association of SSB and CKD, logistic regression adjusted for age, sex, energy intake, smoking, physical activity, BMI, sodium, diabetes, and hypertension was used.

Results: Compared to participants who drank <0.5 serving/week, consumption of over 4 servings of SSB and carbonated beverage per week was associated with increased odds of prevalent CKD [odds ratios (ORs) were 1.77 and 2.14, respectively]. In longitudinal analyses, the risk of incident CKD increased by consumption of four servings/week compared to <0.5 serving/week of SSBs (OR: 1.96; 95% confidence interval (CI): 1.23-3.15) and carbonated beverage (OR: 2.45; 95% CI: 1.55-3.89).

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Conclusions: Consumption of over four servings per week of SSBs and carbonated beverages was associated with higher prevalence and incidence of CKD.

Keywords: (maximum 5): Chronic kidney disease; Carbonated beverage; Sugar sweetened beverage; Fruit juice

149/1009. Estimation of Na and K intake and measurement of Na and K in 24h urine samples

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Introduction: Strong and consistent evidence suggests that the combination of a diet high in Na and low in K is associated with increased blood pressure, a risk factor for cardiovascular disease.

Objectives: To estimate Na and K intake from 7 day diaries and to compare these findings with Na and K excretion measured in 24h urine samples collected during 7 consecutive days.

Method / Design: The study was conducted in the framework of The European Hydration Research Study (EHRS) on 101 healthy men and women (40% females), age 39.5 y (SD=11.7 y) in Athens, from 5/2013 to 8/2014, in summer (n=59) and in winter (n=42) on a stratified sample of the general population. Participants entered all foods and drinks consumed in a 7 day diary which was analyzed for Na and K intake. Also participants collected 24h urine samples for 7 consecutive days. Urine samples were analyzed with atomic absorption spectrometry for Na and K.

Results: Mean Na excretion was 2207±643mg/d in men and 1839±851 mg/d in women. The respective values of K excretion were 2341±782 and 2267±938 mg/d. Mean intakes of Na and K were 1908(1546,2388) and 2368±623 mg/d, respectively. Mean Na in urine was correlated positively with mean Na intake. Na and K intake was not associated with BMI of the participants. However, a negative correlation was observed between Na intake and age ($p<<0.01$). Both mean Na and K intake were positively correlated with mean daily protein, fat, carbohydrates and energy intake ($p<<0.01$ in all cases). Only 4% of the subjects met WHO recommendations for K intake and 56% met WHO recommendation for Na intake.

Conclusions: These findings suggest that there is an urgent need for people to promote K and reduce Na intake with a more balanced diet.

Keywords: (maximum 5): Sodium, potassium, 24h urine, intake

149/1017. Dietary sources and sociodemographic, economic and lifestyle factors affecting vitamin D and calcium intakes in European adolescents: the HELENA study

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Introduction: Low calcium and vitamin D (VitD) intakes have been associated with health risks in both childhood and adulthood.

Objectives: As calcium and VitD intakes are shown to be marginal among European adolescents, this study aims to investigate dietary sources of calcium and VitD intakes, and its associated sociodemographic, economic and lifestyle factors among European adolescents.

Method / Design: Two non-consecutive self-administered 24-h recalls were used to estimate usual dietary intakes of 2330 European adolescents (12.5-17.5 years; 1253 females). Contribution of 44 food groups to calcium and VitD intakes were computed. Multiple linear regression was used to examine associations of calcium and VitD intakes with parental education, family affluent scale (FAS), diet quality index, physical activity, fitness calculated by maximal oxygen consumption (VO2max) and body fat percentage while controlling for age, gender, Tanner stage and energy intake.

Results: Milk and cheese were the main sources of calcium intake (23 and 19%, respectively). Fish products were the main VitD source (30%), followed by cakes, pies and biscuits (16%). Calcium (0.34; CI 9.71, 11.63) and VitD intakes (0.16; CI 0.01, 0.02) were positively associated with scores derived from the diet quality index. Calcium intake was positively associated with mother's education (0.13; CI 40, 65.73), father's education (0.12; CI 31.87, 57.89), FAS (0.05; CI 3.10, 17.13) and fitness (0.10; CI 2.79, 7.21). Boys had higher calcium and VitD intakes than girls ($p<0.05$).

Conclusions: Milk and cheese were the main food sources of calcium intake and fish, cakes, pies and biscuits the most important sources of VitD intake. Calcium and VitD intakes were positively associated with diet quality index. Calcium intake was also positively

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associated with parental education, FAS and fitness, while VitD intake was not.

Keywords: (maximum 5): calcium, parental education, family affluent scale, VO2max

149/1019. Preponderance of heavy metals in eroded farmland sites in Anambra State

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Introduction: Soil is an essential natural resources that provides very many important ecosystem functions especially medium for plant growth. Anambra State, a tropical rainforest within the South Eastern zone of Nigeria is besieged by a serious environmental degradation; soil erosion which concomitantly pollutes the agricultural farmlands with heavy metals.

Objectives: The specific objective of the study is to determine the extent of pollution of these farmlands with heavy metals and the degree of this pollution within the soil horizon of the gully profiles.

Method / Design: Several erosion sites located within three major soil zones of Anambra State farmlands and a control reflecting least erosion areas were used for the studies. Soil samples were collected from the profiles of selected agricultural farmland in Anambra State classified based on their geologic soil characteristics as erosion prone zones. The samples were collected for analysis after in-situ tests were carried out at the sites and heavy metal analyses were conducted with Varian AA240FS Atomic Absorption Spectrophotometer.

Results: The result of the investigation revealed that when the heavy metals (cadmium, nickel, chromium and lead) of the zones were compared using oneway ANOVA, f values of (1.488, 19.966, 1.197 and 0.513) and p values of (0.310, 0.002, 0.388 and 0.688) were obtained respectively. At 95% level of significance, there exist no significant difference between the heavy metals of the zones but a high significant difference was observed with the nickel content of the zones.

Conclusions: The presence of these heavy metals in soils of Anambra State is a health risk to the community. Since metals do not degrade, the only method to protect the land from contamination is prevention of pollution. It therefore becomes necessary for government agencies as well as NGO's to create awareness on the dangers of increasing heavy metal pollution.

Keywords: (maximum 5): Farmland, heavy metals, soil-erosion, gully-profile, environmental-degradation

149/1021. High presence of circulating folic acid after mandatory fortification of flour with folic acid in Sao Paulo-Brazil

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Introduction: High oral doses of folic acid have been shown to bypass the normal folate absorption mechanism, resulting in circulating form of the vitamin. Several potential adverse health outcomes have been associated with exposure to high intakes of total folate and folic acid. Existing levels of circulating folic acid (FA) increased after fortification of foods with folic acid adopted as a public strategy to prevent folate deficiency. In Brazil, fortification of flour with FA is mandatory since 2004.

Objectives: To investigate the circulating FA and predict the circulating FA concentrations in the population related to dietary intake, vitamins concentrations, and interaction with the genetic variants involved in folate metabolism.

Method / Design: A cross-sectional population-based survey was conducted in Sao Paulo City-Brazil. The participants (n=750) provided fasting blood samples and food intake. Folate, homocysteine, B6 and B12 vitamins were assayed. DNA was isolated and the genotypes for polymorphisms involved in folate metabolism were determined. Generalized linear model was used to predict circulating FA.

Results: Circulating FA was detected in 79.8% of the population with a mean concentration of 2.4pmol/ml (95% CI: 2.1-2.7). An increase of one ng/mL in folate concentrate was associated with increased of 3% in circulating FA. Effects of total folate concentration ($p<0.001$), age ($p<0.001$), current smoker ($p=0.002$), race ($p<0.000$) and vitamin B6 ($p<0.001$) as well as interaction between folate concentration and 19-base pair deletion polymorphism in DHFR ($p=0.003$) were found in the model to predict the circulating FA.

Conclusions: Higher levels of folate are associated with higher levels of circulating FA. This find points that the mandatory fortification with folic acid has resulted in high exposure to circulating FA. Further research is needed to elucidate these complex relationships, and to guarantee the safety of exposure to folic acid.

Keywords: (maximum 5): Dietary Intake, Folic Acid, Mandatory Fortification, Genetic Variants, Biomarkers.

149/1023. Analysis of some chemical and nutritional properties of leaves of Gnetum spp from Cameroon

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Introduction: With growing of world population in developing countries, protein ,energy and micronutrients demands must be sustainably available to reduce malnutrition.

Objectives: Evaluation nutrtional value and proteins quality of leaves of G. buchholzianum and G. africanum, two leafy vegetables commontly consumed in Center and West africa

Method / Design: A nutritional survey was conducted to investigate consumption styles of these vegetables. Total organic compound and minerals were measured by AOAC methods. Fatty acids were analysed using gaz chromatography, aminoacids composition were performed by HPLC followed by measurements of in vitro and In vivo digestility in male rats Wistar albinos

Results: Nutritional survey showed that consumption style of Gnetum leaves varies with cultural habits. Both species were rich in crude fibers (40,10% dry matter), poor in minerals (Na,K, Ca, Mg, Fe and K) and have elevated levels of crude total phenolic compound (507,19 mg/100g), tannins (298,09 mg/100g) and phytates (298,09 mg/100g). Significant differences where found in or between harvesting areas. All essential amino acids were present and were in a satisfactory chemical balance but sulfur aminoacids were the most limiting. Insaturated fatty acids were more than 50% with predominance of linoleic and linolenic acids. In vitro digestibility of raw vegetable which was about 32% increased with cooking duration. In vivo study showed that rats' weight and serum proteins increased when fed with a diet containing 5% proteins of this vegetables. Digestibility Coefficient (DC), Biological Value (BV) and Net Protein Utilisation (NPU) corrected by aminoacid chemical index showed that nutritional quality of Gnetum proteins were below 50%.

Conclusions: Gnetum vegetables are good sources of proteins of some essential aminoacids, unsaturated fatty acids and fibers. They are poor in mineral and can therefore been used in hypomineral diets. Their nutritional value increases with cooking

Keywords: (maximum 5): Gnetum, vegetable, proteins, nutritional properties

149/1025. A novel association between dietary patterns and cardiometabolic risk: results from exploratory structural equation modeling

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Introduction: Associations of dietary patterns with cardiometabolic risk factors have long been addressed. However, no conceptual model for the complex net of biological interrelationships of the risk factors was considered, which makes difficult to understand the real role of dietary patterns on cardiometabolic diseases.

Objectives: To develop a conceptual model using exploratory structural equation modeling for the association between dietary patterns and cardiometabolic risk factors.

Method / Design: Participants were 417 adults and elderly, both sexes, evaluated in a cross-sectional population-based study performed in Brazil. Two non-consecutive 24-hour dietary recalls were collected per individual. Exploratory structural equation model was used to derive dietary patterns and examine their associations with a conceptual model for cardiometabolic risk factors (body weight, waist circumference, high-sensitivity C-reactive protein, serum leptin, systolic and diastolic blood pressures, total cholesterol/HDL-cholesterol ratio, triacylglycerol/HDL-cholesterol ratio, and fasting plasma glucose).

Results: A number of three dietary patterns were derived: 'Traditional', 'Prudent' and 'Modern'. The 'Traditional' pattern (composed by rice, beans, red meats, eggs, whole milk, butter and margarine, and sugar) showed a direct negative effect on serum leptin and negative indirect effects on body weight, waist circumference, systolic and diastolic blood pressures, total cholesterol/HDL-cholesterol ratio, triacylglycerol/HDL-cholesterol ratio, and fasting plasma glucose. The 'Prudent' pattern (composed by vegetables, fruits, juices, fish and poultry, low-fat and skim-milk, whole breads, olive oil, and seasonings) had negative and direct effect on systolic blood pressure. No association was observed for the 'Modern' pattern (composed by soda pop, alcoholic beverages, red meats, seasonings, cold cuts, mayonnaise, sandwiches, and salty snacks) and cardiometabolic risk factors.

Conclusions: The 'Traditional' and 'Prudent' dietary patterns were negatively associated with cardiometabolic risk factors among Brazilian adults. Their supposed protective effects on leptin, adiposity and blood pressure may be important non-pharmacological strategies for prevention and controlling of obesity-related metabolic disorders.

Keywords: (maximum 5): DIETARY PATTERNS: CARDIOMETABOLIC RISK FACTORS: MULTIVARIATE ANALYSIS

149/1026. Dietary patterns among school children in Morocco

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Introduction: INTRODUCTION: In the last decades, Morocco has been experiencing a nutritional transition in food choices from the typical Mediterranean diet to the fast food pattern. As a consequence, the dietary patterns of children's have been affected.

Objectives: OBJECTIVE: The purpose of this study is to examine dietary patterns of a sample of children's from public schools.

Method / Design: METHODS: A cross-sectional survey of 207 children's (52.17% boys and 47.82% girls), were chosen randomly from 5 public schools in 2 cities of Morocco. Weight, height, hemoglobin, fasting glucose and body mass index (BMI) were measured. Dietary patterns were evaluated using a structured questionnaire.

Results: RESULTS: Median age 9.58 (8.83–10.33) years; mean z-score BMI (-0.15±1.31) kg/m2. Low Hemoglobin levels were found among 28.2% of children and 1.5% had abnormal glucose levels. The prevalence of overweight was more common among boys compared to girls 13.9% vs. 3% respectively (p=0.0113). The prevalence of obesity was respectively 4.6% and 1% (p=0.2579). Dietary patterns of children showed that the majority (61.4%) reported taking breakfast regularly. Girls showed healthier eating habits compared to boys in terms of consumption candies, sweet beverages and fast foods. 84.3% of boys reported taking sweet beverages daily or three times per week compared to 73.7% of girls (p=0.0879). There was a significant gender difference in the frequency of eating fast foods (p=0.0248). Intake of vegetables and fruits was common among children's (60.6% girls vs. 59.3% boys). A total of 50.5% reported daily intake meals in front of TV with no gender differences.

Conclusions: CONCLUSION: Children have some inadequate dietary patterns that may have resulted in the poor nutritional status observed i.e., prevalence of obesity and low levels of hemoglobin. Our results indicate that children should benefit from a nutrition and health promotion program to improve their dietary patterns especially for boys.

Keywords: (maximum 5): KEYWORDS: Dietary patterns; Moroccan children.

149/1029. Food security and nutrition status of mothers in nutritionally vulnerable regions of Tanzania.

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Introduction: Malnutrition remains a global concern and women and children in developing countries are particularly vulnerable given their low socioeconomic status and high dependence on agriculture for food and income. Research shows that maternal nutrition and health status impacts child food intake and subsequent health. In addition, several studies report strong links between household food security, diet quality and nutrition status in vulnerable populations.

Objectives: To examine the relationship between food security and nutrition status of mothers in two agriculturally diverse nutritionally vulnerable regions of Tanzania.

Method / Design: A subset of mothers that fulfilled the inclusion criteria such as non-pregnant with their youngest children aged 0-24 months were selected from a larger cohort of households for this research. Household food security was measured using the Household Food Insecurity Access Scale (HFIAS) tool, Individual Dietary Diversity Scores were calculated based on 24-hour dietary recall data, anthropometric measurements were recorded and iron status was estimated based on finger prick hemoglobin concentrations. Data was collected during the pre-harvest season. Statistical analysis was performed using SPSS.

Results: A total of 220 mothers aged 17-44 years, with a mean BMI of 22.1±3.2 kg/m2 were included in this study. The majority of households were classified as food insecure (81%). There was a significant associated between agricultural regions and food insecurity status. Severity of food insecurity had an impact on food intake and diet diversity. BMI (p=0.016) and MUAC (p=0.035) were significantly different across food security status groups.

Conclusions: There is a relationship between food insecurity, food intake, diet diversity and nutrition status of mothers living in nutritionally vulnerable regions of Tanzania. Improving household food security has the potential to impact maternal nutrition status and subsequently child health. Further research is required to fully understand the potential link between agricultural practices and food security.

Keywords: (maximum 5): Undernutrition
Household food security
Agriculture
Maternal nutrition status
Diet diversity

149/1039. Stage of disease and endogenous biochemical factors rather than nutrient intakes influence total antioxidant capacity in lung cancer patients.

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Introduction: In lung cancer, decreased total antioxidant capacity (TAC) and depletion of particular elements of the system has been reported. Growing evidence points to the fact that some dietary factors may improve TAC level, especially among healthy subjects. However little is known about these relations in lung cancer patients.

Objectives: The aim of this study was to investigate the influence of stage of disease, some endogenous factors and dietary intakes on TAC in lung cancer patients

Method / Design: Research was conducted among 59 lung cancer patients (64,3 ± 7,7 years). Dietary intakes by subjects were assessed at the time of diagnosis, using three-days 24-hour diet recalls. The levels of TAC (ATBS method), albumin (bromocresol green method), uric acid (oxidation by uricase), bilirubin (diazocoupling method) and C-reactive protein (immunoturbidymetric method) were measured automatically in sera of participants. Correlation analysis between concentrations of albumin, uric acid, bilirubin, C-reactive protein and TAC level as well as between nutrient intakes and TAS level were performed by Pearson or Spearman`s rank correlations.

Results: We found positive correlations between serum albumin, uric acid and TAC and negative correlation between CRP and TAC. The stage of disease significantly negatively influenced TAC. Among all analyzed nutrients only niacin and iron positively correlated with TAC.

Conclusions: TAC of lung cancer patients results rather from disease stage and endogenous factors than nutrient intakes. Lack of important effect of diet on TAC in lung cancer patients could result presumably from disturbed homeostasis in which cancer developing could determine the redox state to a greater extent than dietary factors.

Keywords: (maximum 5): lung cancer, dietary intakes, total antioxidant capacity

149/1041. Vitamin and mineral intakes in relation to superoxide dismutase activity in lung cancer patients

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Introduction: Emerging evidence indicates that well-balanced diet can improve in some extend the treatment, quality of life and survival rate of cancerous patients, however little is known about the impact of particular nutrients on biochemical factors related to cancer. Superoxide dismutase (SOD) activity is an antioxidant enzyme regulating intracellular (MnSOD, CuZnSOD) and extracellular (ECSOD) redox state. Increased activity of SOD in lung cancer may serve as diagnostic and prognostic tumor cancer.

Objectives: The aim of this study was to investigate the influence of vitamin and mineral intakes on superoxide dismutase activity (SOD) in lung cancer patients.

Method / Design: Research was performed among 38 lung cancer patients (64,2 ± 8,1 years). Nutrient intakes by subjects were assessed at the time of diagnosis, using three-days 24-hour diet recalls. The serum SOD activity was measured using superoxide dismutase assay kit (Cayman, Ann Arbor, MI). Correlation analysis between SOD activity and nutrient intakes among lung cancer patients were performed by Pearson or Spearman`s rank correlations.

Results: The median (min-max) serum activity of SOD was 1,76 (1,26 – 5,41) U/ml. The activity of SOD was not differed by histological type of lung cancer, stage of disease and smoking status of lung cancer patients. No significant correlations were found between vitamin, mineral intakes and SOD activity.

Conclusions: Vitamin and mineral intakes did not influenced SOD activity in lung cancer patients. However further, more in-depth research on larger patient samples are needed to carefully explore dietary and non-dietary factors influencing the activity of SOD under lung cancer condition.

Keywords: (maximum 5): superoxide dismutase, lung cancer, nutrient intakes

149/1045. Beverages consumption and their contribution to total daily energy intake in toddlers

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Introduction: Consumption of sugar-sweetened beverages (SSB) has consistently been associated with increased energy intake and is thought to play a role in the aetiology of obesity. Lately, the number of studies about the excessive intake of sweetened beverages, as a source of empty calories in toddlers, is increasing.

Objectives: The aim of this study is to identify beverages intake pattern and their share in total daily energy intake in toddlers.

Method / Design: Data from three non-consecutive food records were used to assess average dietary pattern among 96 toddlers (aged 1-3 years, 46 females and 50 males). For the purpose of this analysis, beverages were classified into 5 main groups: water, hot tea (no added sugar), non-flavored milk, fruit juice (100%) and sugar-sweetened beverages. SSBs were further categorized into carbonated soft drink + fruit-drink, hot tea (sweetened) and flavored milk.

Results: Analysis of data showed that milk was mostly consumed beverage in toddler's diet (225.43 ± 165.52 ml/day). The second and

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the third most consumed beverage groups were water and carbonated soft drink + fruit-drink, while fruit juice (100%) was the least consumed beverage. Approximately 22% reported no SSB consumption on either study day and about 78% of toddlers were SSB consumers. Out of 96 participants, 45% of participants reported SSB consumption in each of the three food records. There was statistically significant difference in sweetened beverages consumption between younger (12-24 months) and older (24-36 months) toddlers ($p < 0.001$).

Conclusions: SSB contributed a substantial amount of energy to the diet of participants in our study. For that reason, interventions such as education and setting national guidelines about beverages consumption are necessary since current Croatian dietary recommendation doesn't include any recommendation about beverages intake pattern.

Keywords: (maximum 5): obesity, toddlers, sugar-sweetened beverages, energy intake

149/1049. A dietary pattern score and risk of developing type 2 diabetes in the sun project

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Introduction: Numerous diabetes risk models and scores have been developed, but most are rarely used or are not focused on diet or do not fully capture the overall dietary pattern.

Objectives: To develop a friendly, plausible, self-administered, and complete diabetes dietary score (DDS), emphasizing the powerful role of optimal food patterns to decrease the risk of developing type 2 diabetes (T2DM).

Method / Design: We assessed 17,292 participants of the prospective SUN cohort initially free of diabetes. They were followed-up for a mean of 9.2 years. A validated 136-item FFQ was administered at baseline. Vegetables, fruit, whole cereals, nuts, coffee, low-fat dairy, fiber, PUFA, and alcohol in moderate amounts were positively weighted (assumed to be beneficial to decrease the incidence of T2DM). Red meat, processed meat and sugar-sweetened beverages were negatively weighted (assumed to be detrimental). Energy-adjusted quintiles of each of the 11 items (except moderate alcohol) were used to build the score. For alcohol consumption a point was given to those participants with moderate amounts (score range: 11–56 points). Incident T2DM was confirmed by an endocrinologist using blind revision of clinical records and an additional detailed questionnaire.

Results: We observed 143 cases of incident T2DM during follow-up. Better baseline conformity with the DDS was associated with lower incidence of T2DM (multivariable-adjusted HR for intermediate (26-40 points) vs. low (<26) category 0.45 [95%CI: 0.22-0.93]; and for high (>40) vs. low category 0.34 [0.15-0.75]; p for linear trend: 0.032).

Conclusions: A simple score exclusively based on dietary components, may be applicable in clinical practice and/or be self-administered. It may well be an educational tool for laypeople while self-assessing their risk of diabetes.

The SUN Project has received funding from the Spanish Ministry of Health and European Regional Development Fund (FEDER) (Grants: PI10/02993,PI10/02658,PI13/00615,PI14/01668,PI14/01798, PI14/1764,RD06/0045,G03/140), and the Navarra Regional Government (45/2011,122/2014).

Keywords: (maximum 5): diabetes, diet, cohort, prospective

149/1054. Impact of a sugary beverage on body weight goes up with initial BMI in children

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Introduction: Substituting sugar free for sugar-sweetened beverages reduces weight gain. It has been speculated that this effect is more pronounced in children with a high body mass index (BMI) because their sensing of calories is compromised.

Objectives: We investigated the impact of sugar-free versus sugary drinks separately in children with a higher and a lower initial BMI z score, and calculated the degree of caloric compensation in the two groups.

Method / Design: We conducted an 18-month double-blind trial involving 641 children aged 4 to 11. Participants were randomly assigned to receive 250 ml per day of a sugar-free beverage (sugar-free treatment) or a sugar-containing beverage (sugar treatment). We designated children with an initial BMI z-score (standard deviations of the BMI distribution per age and sex group) below the median as 'lower BMI' and above the median as 'higher BMI'. We used mathematical modelling of growth and energy metabolism to calculate the degree of caloric compensation.

Results: The sugar-free treatment reduced the BMI z-score by 0.05 SDunits within the lower BMI group and by 0.21 SD within the higher BMI group, both relative to the sugar treatment. Thus the

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sugar-free treatment reduced the BMI z-score by 0.16 SDunits more in the higher BMI group than in the lower BMI group (90%CI -0.28 to -0.04). Children with a lower BMI had compensated 65% of the covertly removed sugar calories, whereas children with a higher BMI compensated only 13%.

Conclusions: In children, a higher BMI betrays an increased susceptibility to the fattening effect of sugar-sweetened beverages due to a reduced ability to compensate for changes in caloric intake. Cutting down on the intake of sugar-sweetened drinks may benefit a large proportion of children, especially those who show a tendency to become overweight, but also those in whom overweight is not yet evident.

Keywords: (maximum 5): sugary beverages
BMI
body weight
children

149/1059. Nutritional rehabilitation of under five years malnourished children in Douala, Cameroon

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Introduction: Worldwide, malnutrition causes about 50% of morbidity and mortality in the under-five age group. In Cameroon, its frequencies have been increasing in this target group during the past three decades. The actual prevalences are respectively of 38% for stunting, 58%; anemia; 69% Zinc and 38% for vitamin A.

Objectives: To assess the effect of Spirulina platensis on moderate and mild malnutrition on 7 children under five years old.

Method / Design: A prospective study was carried for the nutritional rehabilitation of those children during 25 days. Each child received 8g of supplement daily. Anthropometric and haematologic parameters were measured before and after rehabilitation.

Results: Mild and moderate malnutrition, wasting and underweight was seen in 4 children anthropometrically and haematologically in all 7 children before rehabilitation started. The children weight at enrollment (W1) increased significantly at the end (W4) of the rehabilitation, varying from 17.21 ± 2.00Kg (W1) 18.67 ± 1.93Kg (W4) (P= 0.04 for W1&W4). Calcium levels increased from 73.91 ± 16.89mg/L to 88.41 ± 14.83mg/L (p = 0.03), mean cell volume from 86.14 ± 4.38 fl to 83.86 ± 4.83 fl (p = 0.04) and haemoglobin concentration from 32.10 ± 0.38 g/dL to 34.27 ± 3.35 g/dL (p = 0.03) respectively, after rehabilitation. Other biomarkers protein, haemoglobin, haematocrit, platelets, red blood cells, white blood cells, neutrophiles, eosinophiles, basophiles, monocytes and lymphocytes had also increased but not a significant.

Conclusions: Spirulina platensis positively influenced malnutrition by improving weight and raising the blood content of biomarkers due to its high content of protein (60-70%) pigments and other nutrients.

Keywords: (maximum 5): Malnutrition, Spirulina-platensis, Supplementation, Rehabilitation, Biomarkers, children.

149/1069. Lifestyle and dietary habits of school children 11-14 years old in Morocco

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Introduction: Lifestyle factors in childhood have a profound impact on health during mid- and late-adulthood. Healthy eating habits of children which are the basis for the health should be monitored to ensure children`s correct physical and psychological development. In Morocco, the assessment of dietary habits of school children can help to develop intervention programs to reduce the problem of obesity and its health outcomes.

Objectives: the purpose of the study is to examine the dietary habits of the school children

Method / Design: children were recruited from two different schools. Information on body weight, height, fasting glucose, blood pressure and diet were collected on sample of school children aged 11-14 year.

Results: 107 children (mean age = 11.67±0.67 years; 45.7% girls, 54.3% boys ; mean z-score BMI = -0.2171± 1.4330 kg/m2 ; mean systolic BP =105.6 ±12.97 , diastolic BP =69.12 ±9. 28 mmHg) participated in this study . 1.86 % of children had abnormal glucose levels. The prevalence of overweight and of obesity was respectively (19.6% , 6.48%).63.5% reported taking breakfast, 5,60 % consuming vegetable and fruit≥4 time/day , 57.94 % reported taking fast-food ≥1 times/week. 84.11% spend more than an hour/day watching TV , 57.94 % eat in front of TV/Computer.

Conclusions: This study has provided more evidence to enhance our understanding on some of the factors that influence children's weight. Unfortunately, Moroccan children are leading unhealthy lifestyles. There are a high percentage of children that do not have breakfast . Children are abandoning the "mediterranean Diet" in favour of industrial products and fatty foods. Furthermore, a high proportion of children eat in front of TV/Computer which is particularly alarming,

Nutrition education sessions must be dedicated to children, teaching them that one key to a healthy adult life is good nutrition, starting in childhood

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Keywords: (maximum 5): Obesity, eating habits, Moroccan schoolchildren.

149/1070. Nutritional state of critical patients on enteral nutritional therapy

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Introduction: The elevated levels of malnutrition in hospital environments are directly associated with nutritional depletion, what compromises the immunological response and the healing process. Therefore, A Enteral Nutritional Therapy (ENT) has specific goals in the attempt to avoid bad nutrition and to control the loss of lean muscle mass, which directly act as co-variables of mortality. The improvement of the nutritional state of critical patients that are treated with ENT depends on evaluation and on control, from the prescription to the administration of the related support.

Objectives: objective of this study was to evaluate, by the means of anthropometric and biochemical indicators, the nutritional state of hospitalized patients who used Enteral Nutritional Therapy (ENT), in two hospitals at the city of Aracaju, Sergipe, Brazil.

Method / Design: The nutritional state of patients was evaluated with anthropometric and biochemical data, during the period they received ENT.

Results: It was analyzed 31 patients, with average age of 45,96 + 18,96 years old, and 54,8% of them were male. The main diagnostics of hospitalization were Craneo-Encephalic Trauma (35,5%) and cerebrovascular accident (29%). It was found an elevated proportion of malnourished patients, with values smaller than the reference for CC, AC and BMI.

Conclusions: The study showed that, on the initiatory evaluation, ENT reached only 76,2% of total energetic needs of patients of the sample; it evolved to 83,5% on the final evaluation. This is, probably, one of the main reasons for the maintenance of malnutrition, as observed on the studied samples.

Keywords: (maximum 5): Enteral Nutritional Therapy, Critical patients, Nutritional Evolution

149/1083. Tef (Eragrostis tef) whole consumption mode and antinutritional concerns

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Introduction: Tef [Eragrostis tef (Zucc.) Trotter] is, a small kernel, cereal crop that was originated and diversified in Ethiopia. It is consumed as a whole cereal, implicating a higher content of minerals, but as well as different antinutritional factors.

Objectives: To assess the antinutritional factors of tef flour in order to optimize food processes so that the bioavailability of minerals in tef food products is improved

Method / Design: Seven well-characterized tef varieties, varying in color from white to red, were studied for their mineral content, antinutritional content (phytic acid, condensed tannins, total phenolic and flavonoid content) and profiles of individual phenolic compounds by ICP-OES, spectrophotometry and HPLC. All analysis were done in triplicate.

Results: The Fe, Zn, Ca, Mg, Mn and Cu content of the tef varieties ranged from 9-30, 2-2.6, 128-188, 187-239, 3.5-5.8, and 0.58-0.88 mg/100g dry matter (DM), respectively. Phytic acid (PA), condensed tannins, total phenolic and total flavonoid contents of the varieties ranged from 18-23, 0.7-3, 2.7-4.5, 4.8-10 mg/g DM, respectively. The lowest and highest PA/mineral molar ratios, as an indication of mineral bioaccessibility, were 6.46 and 21, 80 and 93, 0.75 and 1 for PA/Fe, PA/Zn and PA/Ca, respectively. The profile of the individual phenolic compounds were highly different between the varieties.

Conclusions: The PA/mineral ratios are extremely higher compared to the recommended ratios for Fe (<1) , Zn (<15), and Ca (<0.24), an indication of a low bioaccessibility of the minerals. Besides, the higher phenolic content and differences in the phenolic profile may also contribute to a lower mineral bioaccessibility of tef food products. A dark red variety, called Zezew, showed a 3 times higher Fe content compared to the other varieties, also contained 2-3 times higher content of the antinutritional factors (condensed tannins, phenolic and flavonoid content).

Keywords: (maximum 5): tef, phytic acid, tannins, phenolic compounds, minerals

149/1084. Postmenopausal dietary glycemic index, glycemic load, carbohydrate intake in relation to body mass index

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Introduction: Research studies have suggested that chronic consumption of high glycemic load (GL) and glycemic index foods may lead to increased risk of developing cardiometabolic disorders (diabetes, overweight and high blood pressure). Postmenopausal women are more susceptible to cardiometabolic disases related to declining estrogen concentrations

Objectives: The aim of this study was to assess food intake, glycemic index and glycemic load related to body mass index (BMI) in postmenopausal women.

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Method / Design: The study was conducted in 56 postmenopausal women (55±4 years).They were 18 women with normal BMI <24.9 (BMI mean 22,21±2,12) and 38 on overweight with BMI >25 (BMI mean 29,81±3,06). Food intake was assessed by 24h Record and Recall dietary survey method, repeated during 3 days. Glycemic index was determined using the Brand-Miller tables. The average daily dietary glycemic index was calculated by multiplying the glycemic index of individual foods by the percentage of total energy contributed by carbohydrate. Dietary GL was calculated by multiplying the daily glycemic index of each food by the amount of carbohydrate consumed and dividing the product by 100

Results: Similar total energy intake (TEI), proteins and lipids intakes were noted in the two groups. However, high carbohydrates intake (p<0,05) was noted in overweight group (339±109) compared to normal BMI group (281± 52g). The daily glycemic index and glycemic load were more higher in overweight group (156,04±2,31 and 120,73±4,2, respectively) than normal BMI group (120,73 ± 4,2 and 83,12 ± 2,99, respectively). Moreover, dietary glycemic load values were more elevated for breakfast, lunch, snack and dinner in overweight group than normal BMI group (p<0.05)

Conclusions: High glycemic load was associated with an overweight in postmenopausal women. A dietary management based on a balanced diet with low glycemic load associated to physical activity could prevent obesity and cardiometabolic disease

Keywords: (maximum 5): Glycemic index
Glycemic Load
Carbohydrate intake
Menopause

149/1090. Determination of calcium and vitamin D levels in the Moroccan population

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Introduction: The following research aligns with the Moroccan National Program for the Fight against Micronutrient Deficiencies and the National Nutrition Strategy of 2011-2019. According to the World Health Organization (WHO) vitamin D and calcium deficiencies are among the most significant of all micronutrient deficiencies. However, the levels of these two micronutrients in the Moroccan population are not well known.

Objectives: The aim of this study is to determine the prevalence of Vitamin D and calcium deficiencies in children and adults.

Method / Design: A population of 300 pre-school children (ages 2 to 5) and of 300 women of childbearing age was chosen. A questionnaire concerning anthropometric, socioeconomic and nutritional information was distributed. In addition, serum analyses of calcium and vitamin D as indicated by the WHO (radioimmunoassay) were administered along with a 24 hour urine calcium test. The nutritional intake of calcium was evaluated as indicated by the 24 hour recall of the Moroccan table of food composition (edition 2014)

Results: The results of this study, which will serve the Moroccan government and the WHO Eastern and Mediterranean Regional Office (EMRO), will be available June 2014.

Conclusions: The results of this study, which will serve the Moroccan government and the WHO Eastern and Mediterranean Regional Office ‹EMRO), will be available June 2014.

Keywords: (maximum 5): vitamin D, calcium, adults, children, Morocco

149/1093. Sugar intakes in 10 European countries

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Introduction: There is a growing concern about sugar intakes and whether it could be associated with the worldwide epidemic of non-communicable diseases like obesity or type 2 diabetes.

In order to develop efficient initiatives to improve diet quality, it is crucial to have accurate data on sugar intakes and to identify the main contributors within the different food groups.

Objectives: To gather information on sugar consumption (intakes & contributors) across 10 European countries (France, Spain, UK, Poland, Italy, Portugal, Germany, Belgium, Netherlands, Luxembourg, Romania).

Method / Design: Danone Research developed "NutriPlanet", an analysis including an extensive literature review enriched with the view of local experts to describe in each country, the nutritional recommendations, the nutritional situation and its impact on public health. We obtained an overview of the European foods & nutrients intakes and made a specific focus on sugar, comparing the levels of intake in population groups and identifying the major contributors.

Results: In most countries, the observed total sugar intakes were higher than the national recommendations and even reach twice this value in some populations.

The level of total sugar intake depends on population characteristics (age, sex, income level, education…) and varies from a country to another: from 87g in Italy to 114g in Germany for 2-9 years-old children. The main contributors are often the same (soft drinks, fruits,

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sweet products, cakes & pastries…) but their rank and level of contribution are also specific to country & population groups.

Conclusions: A precise knowledge of the sugar intake and the main food contributors is a mandatory pre-requisite to identify and develop relevant actions to optimize sugar intake, taking into account countries specificities & targeted population. These actions could ideally combine public health policies, products reformulation and education programs, adapted to the different European cultures and food habits.

Keywords: (maximum 5): nutrition, health, sugar

149/1099. Breakfast consumption: associations with food-related and lifestyle patterns in a sample of Italian adolescents.

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Introduction: Breakfast has been recognized as essential for a healthy diet and several interesting associations with this meal have been found in children and adolescents.

Objectives: The present study aimed to explore possible associations of breakfast consumption with dietary and lifestyle patterns in a sample of Italian adolescents.

Method / Design: A representative cluster sample of 369 adolescents attending the second class of secondary school in the Lazio region was investigated. Dietary habits and lifestyle were assessed by the KIDMED test (administered through an interview to each subject by a nutritionist) and questionnaires. Body weight and height were measured.

Results: Among the adolescents who had breakfast every day (68.3%), the following findings were shown: higher percentages of subjects eating a second fruit daily, in total sample (34.5% vs. 30.4%), and among males (33.6% vs. 28.4%); higher percentages having dairy products and cereals for breakfast in total sample (82.5% and 58.7% vs. 74.8% and 50.4% respectively), and also in males and females; a higher rate of no hard liquors consumers in total sample (71.8% vs. 67.5%) and males (67.2% vs. 61.7%); a better adherence to the Mediterranean diet in females, males and in total sample; more subjects defining their dietary patterns as Mediterranean among females (57.3% vs. 51.7%); a lower number of overweight/obese subjects in females; a lower amount of subjects on a diet; higher rates having breakfast together with family in total sample and in both genders; lower percentages having meals in "pizzeria" more than once a week in total sample and in males; a higher rate of subjects spending <2hr using a PC on weekdays.

Conclusions: These results support previous findings regarding the importance of breakfast and the associations with food related and lifestyle patterns in this age group. Breakfast consumption should be promoted early in life involving all the family.

Keywords: (maximum 5): Breakfast adolescents Mediterranean diet Italy

149/1111. Clinical Nursing Practice Guideline for Self Care Ability Development of Dietary Intake and Exercise for Older Adults with Dyslipidemia

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Introduction: Dyslipidemia is a health problem causing cardiovascular and cerebrovascular diseases.

Objectives: This study aimed to develop Clinical Nursing Practice Guideline (CNPG) for self care ability development in older adults with dyslipidemia.

Method / Design: The CNPG was developed based on synthesis of 13 existing research studies and by adopting supportive-educative nursing systems. The CNPG was validated by experts for correctness, content coverage, and clinical practicality. The experts' opinion revealed that the CNPG for self care ability development older adults with dyslipidemia is clinically practicable. Only slight modification and revision was needed for further clarification, including questions used to assess older adults with dyslipidemia and adding content in the nurse's booklet and self care booklet.

Results: This CNPG consists of four steps: 1) nurses initiate relationships with patients and their relatives; 2) nurses perform the first assessment for baseline of patients' knowledge and nutrition literacy; 3) nurses educate the patients and their relatives, and 4) nurses perform re-assessment of the patients' knowledge and nutrition literacy.

Conclusions: The CNPG including the booklets for self care ability development of dietary intake and exercise could be applied for older adults with dyslipidemia.

Keywords: (maximum 5): Dyslipidemia, Self care ability, Older adults, Clinical Nursing Practice Guideline

149/1113. Validity of a Mexican-diet-score to assess food patterns, sodium intake and oxidative-stress in healthy adults

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Introduction: Dietary scores are based on the analysis of relationships between consumption of foods-nutrients and diseases outcomes. In Mexico there is a high prevalence of non-communicable-diseases related to low-quality diets. High sodium intake is a condition that could be increasing levels of bio markers of oxidation in the body.

Objectives: To evaluate diet-quality in healthy adults; to assess construct validity of a diet score determined by a food-frequency-questionnaire and multiple 24-hour recalls related to sodium and oxidative stress.

Method / Design: Validation study analyzing food-patterns, nutrients and sodium intakes derived from a food-frequency-questionnaire and multiple 24-recalls. A specific Mexican-diet-score was calculated considering foods in accordance with their contribution of sodium to the diet. Food-groups with less sodium were considered «positive» for health. Validation was derived from the association between the consumption of sodium in the diet, with the presence of sodium and carbonylated proteins as biomarkers of oxidative stress.

Results: Food and nutrient consumption were calculated. Correlations were adjusted by sex, physical activity and abdominal circumference in 102 healthy adults. Adherence to nutritional recommendations was assessed. The Mexican-diet-score was calculated considering diet sodium consumption by tertile distribution. Mean of dietary sodium intake was 1854.3 milligrams per day; mean of serum and urinary sodium were 177.5 and 245.3 milligrams /dL respectively. Subjects with higher consumption of fruits and vegetables showed higher score ($P < 0.005$); those who consumed more cereal-rich-in fat, dairy and canned-foods had lower diet quality and higher intake of sodium ($P<0.001$). There were no significant differences in sodium consumption by sex or abdominal circumference. The Mexican-diet-score correlated ($P < 0.001$) with the presence of carbonylated proteins ($r=0.72$) and high amounts of sodium in serum ($r=0.62$) and urine ($r=0.78$).

Conclusions: In this population, high sodium consumption and low-diet-quality are risk factors for subclinical kidney damage.

Keywords: (maximum 5): Validation, diet-quality, sodium, oxidative-stress

149/1115. Dietary intake of children living in one Australian remote community: a pilot study

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Introduction: The few studies collecting dietary intake at the community level indicate that the quality of the diet has been very poor in remote communities in the last 30 years with high intakes of sugars, low intake of fruits and vegetables, excessive sodium intake and limited availability of several key micronutrients.

Objectives: This exploratory study aimed to provide some insight on the dietary quality of young children living in one Australian remote community.

Method / Design: A convenient sample of mothers living in a remote community of the Northern Territory were asked to take pictures or video record all meals and drinks consumed by their children over a 4-day period. The foods and drinks were entered into food records and analysed using Foodworks.

Results: Comprehensive food records were collected for five children over four days and three over one day. The four youngest children (aged 11 to 31 months) were partially breastfed. There was large variation in the reported types and amount of foods consumed as well as in the energy, macro- and micro- nutrient consumption in those children having dietary intake data collected over the 4-day period. The energy requirements were not met by most children no longer breastfed (aged 36 to 96 months) and only 48% of the percentage energy to energy requirements was met for an 11-month child suggesting high reliance on breastmilk.

Conclusions: No conclusions can be drawn from this study due to the small number of participants. However, a good estimative of the foods usually consumed from these children suggest that there is large variation on the amount and type of foods consumed day-to-day. Further studies including a larger sample of participants examining dietary intake of young children living in remote communities of Australia are warranted.

Keywords: (maximum 5): MACRONUTRIENTS, MICRONUTRIENTS, VITAMINS, MINERALS, INDIGENOUS

149/1131. Food supplements as an important source of iodine in the diets of pregnant women in Poland

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Introduction: Polish territory has been classified as an iodine-deficient area. In 1997 the national programme of obligatory iodisation of household salt was implemented. Low iodine intake during pregnancy may be cause of thyroid dysfunction in pregnant women and their newborns. The Polish model of iodine deficiency prophylaxis is based on obligatory iodisation of household salt and additional supplementation for pregnant women with 150-200 μg of iodine per day.

Objectives: The aim of this study was to access iodine intake including food supplements in the group of pregnant women.

Method / Design: The study was carried out in 2011, among 93 pregnant women with the use of one-day dietary recall method with regard to the questions about the frequency of food supplements use. The results of iodine intake were compared to the recommended dietary allowance (RDA 220 μg), and estimated average requirements

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(EAR 160 µg) and upper level - UL (600 µg). The losses of iodine in household salt (30%) were taken into account.

Results: Among studied pregnant women the average dietary iodine intake was 100,6 µg (±62.63). The comparison of individual iodine intake to RDA and EAR values showed that 96 % diets were below RDA and 89 % diets were below EAR. Among 93 pregnant women 71 % declared the use of food supplements containing iodine (iodine in one tablet: from 150 to 200 µg). Daily iodine intake from food supplements ranged from 86 to 400 µg.

Conclusions: The study shows that the most diets of pregnant women without supplementation were deficient in iodine. Additional supplementation for iodine should be continuing by pregnant women in Poland.

Keywords: (maximum 5): pregnant women, diet, supplements, iodine intake

149/1138. Preconception women's dietary intake of nutrients from one-carbon metabolism pathway: has it effects on birth weight?

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Introduction: The one-carbon metabolism pathway is important to health maintenance and your imbalance is associated with pregnancy complications, including inadequate birth weight (BW).

Objectives: To investigate the relationship between preconception women›s dietary intake of dietary folate equivalents (DFE), folic acid, vitamins B6, B12 and polyunsaturated fatty acids (PUFA) and BW of their newborn in the ProcriAr Study.

Method / Design: The ProcriAr Study is a cohort of pregnant women from West region of São Paulo-Brazil. The recruitment occurred between March/2011 and December/2013 in three primary health care units. Of the total selected, 201 participants completed a questionnaire covering items on sociodemographic and lifestyle factors, a 110-item food frequency questionnaire that regards to the last year before the pregnancy and remained in the study until the child's birth. Nutrient intakes were adjusted by total energy.

Results: The daily medians of preconception women's dietary intake was 613.1mcg (P5-P95: 444.6-823.5) of DFE, 150.7mcg (P5-P95: 72.5-255.2) of folic acid, 2.7mg (P5-P95: 1.8-3.9) of vitamin B6, 7.2mcg (P5-P95: 3.6-13.2) of vitamin B12 and 28.7g (P5-P95: 21.0-42.3) of PUFA. The simple linear regression analysis identified the factors related with BW ($p<0.20$) eligible to the multivariable modeling: age (years), maternal height (centimeters), gestational age (weeks), educational level (0=<8years/1=≥8years of education), ethnicity (dummy: I-Northeast in relation to Southeast; II-others regions in relation to Southeast), having a partner (yes/no) and DFE dietary intake (mcg). In this population, the multivariable linear regression demonstrated that the determinant factors to BW was gestational age ($\beta1=54.0$, $p=0.015$), independently of educational level ($\beta2=125.1$, $p=0.062$) and maternal height ($\beta3=9.4$, $p=0.089$).

Conclusions: In the ProcriAr Study, the preconception women's dietary intake of nutrients from one-carbon metabolism pathway measured by a 110-item FFQ did not affected the birth weight.

Keywords: (maximum 5): Pregnancy, Birth weight, One-carbon metabolism pathway, Folate, Neural tube defects

149/1141. Composition of morning eating meals during childhood is related to body fat mass in early adolescence.

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Introduction: Chronobiological disruptions are associated with adverse health outcomes, but little is known about the influence of circadian eating pattern in childhood.

Objectives: Therefore, we investigated the relevance of macronutrient distribution in morning (before 11am) and evening meals (after 6 pm) during childhood for body composition in early adolescence.

Method / Design: Analyzed data were collected within the DONALD study using annual weighed 3- day dietary records and skinfold measurements to estimate body fat. Sex-specific life course plots were performed to evaluate the influence of the macronutrient content in morning and evening meals [Energy% of fat, carbohydrates, protein] at potentially critical periods during childhood (3-4, 5-6, 7-8 years) on fat mass index (FMI [kg/m^2]) and fat free mass index (FFMI [kg/m^2]) in early adolescence (10-11years) with data at all three exposure periods and the outcome time point (N(-)=192, N(-)=183). Additional multivariable regression models were performed for exposures in periods identified as consistently critical for later body composition.

Results: Life-course plots revealed consistent results only for relations of lower fat and higher carbohydrate intakes in morning meals at age 7/8 years with higher FMI and FFMI at age 10/11 years among boys. Sex-specific adjusted regression models confirmed prospective associations with FMI among boys only. Mean predicted FMI values by tertiles of morning fat intake were 3.38 [95% CI 3.05-3.75], 3.06

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[2.77-3.38], 2.90 [2.63-3.21], ptrend 0.01, values by tertiles of morning carbohydrate intake were 2.93 [2.65-3.24], 2.98 [2.69-3.30], 3.42 [3.09-3.79]; ptrend 0.009. Associations with FFMI among boys were not confirmed in multivariable models (morning fat intake: ptrend 0.7, morning carbohydrate intake: ptrend 0.8).

Conclusions: Among boys, the habitual consumption of low fat, high carbohydrate morning meals during primary school may be detrimental for their fat mass at the end of primary school.

Keywords: (maximum 5): chronobiology, circadian eating pattern, body composition, childhood

149/1144. Breakfast consumption and weight loss maintenance

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Introduction: Daily breakfast consumption is a common eating behavior among weight loss maintainers. This finding is based on what participants perceive as a breakfast meal. However, there is not a precise definition for breakfast in the literature.

Objectives: To investigate potential associations between breakfast consumption (based on several definitions) and weight loss maintenance and to explore differences in breakfast quality between individuals who managed to maintain part of the weight loss (maintainers) and in those who regained weight loss (regainers).

Method / Design: Study sample consisted of 257 maintainers (loss ≥10% of initial body weight and maintenance ≥1 year) and 97 regainers (loss ≥10% of initial weight and regaining), aged 32 ± 10 years, of which 61% were women. Participants completed questionnaires on the study website. In addition, volunteers reported on two 24hour dietary recalls. Breakfast was evaluated using 12 different definitions. Finally, dietary intake at the first eating episode was analyzed in terms of food groups.

Results: Breakfast defined as the first eating episode at home or as the first eating episode before daily activities, yielded a 1.583 (p=0.013) and 1.594 (p=0.002) odds ratio of being a maintainer respectively. The results did not change even after adjusting for potential confounders (sex, age, total energy intake, adherence to Mediterranean diet). Breakfast quality, in terms of food groups consumed did not differ between maintainers and regainers

Conclusions: Having breakfast meal at home or before daily activities was found as an eating behavior adopted by weight loss maintainers, whereas breakfast quality was not related to weight loss maintenance status. Public health strategies for the promotion of breakfast as the first at-home meal of the day may support primary and secondary obesity prevention.

Funding: The MedWeight study is financially supported by the Coca-Cola Foundation.

Keywords: (maximum 5): weight loss maintenance, breakfast, meal patterns

149/1148. Energy drinks - high consumption related to additional risk factors

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Introduction: Short-term high consumption of energy drinks (ED) in combination with risk-increasing factors such as physical activity, alcohol or lack of sleep, is suspected of posing a health risk. Hardly any data on high consumption in connection with the above-mentioned risk factors are available up to now.

Objectives: The goal of the study was to conduct an event-related survey of high consumers of ED in order to close this data gap.

Method / Design: High consumers of ED or energy shots were questioned about their consumption behaviour. Field work was conducted by market research company on behalf of the BfR in clubs, at music festivals, LAN parties and sports events.

Questionnaire was complemented by gathering information on factors potentially increasing risks, on motivation, knowledge and acceptance of consumption.

Results: Combining consumed quantities of straight ED and ED mixed with spirit drinks an average of 1,133 ml and a 95th percentile at 2,750 ml result at discos. Consumption at music festivals and sports events was slightly below and at LAN parties above these values.

Besides considered events 25-55 % of the respondents consumed ED several times a week. Reasons for consumption are given as ability to stay awake, taste and enhancement of sporting performance. Most of the interviewed persons indicated that they do not read or follow warning signs on beverage containers.

Among different statements widest acceptance was to the statement that ED should be consumed with caution depending on physical conditions. But a lot of respondents also agreed that ED can be consumed without hesitation.

Conclusions: ED are consumed in larger quantities than has been assumed up to now, especially on certain occasions. As expected ED are consumed in circumstances associated with potentially risk-increasing factors. Future risk assessments should consider these facts and not only focus on long-term consumption.

Keywords: (maximum 5): Energy Drinks, Consumption, Risk assessment, alcohol, physical activity

149/1151. Body composition and nutritional status of female Gaelic football players in comparison to soccer players

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Introduction: Gaelic football is one of the fastest growing female sports in Europe; however, the research on physiological characteristics, fitness level and nutritional status of female Gaelic football players is scarce.

Objectives: to investigate the dietary intake, anthropometric measures and fitness in semi-professional female Gaelic football players in comparison to semi-professional soccer players aged 18-25 years.

Method / Design: Anthropometric measures including weight, height, percentage body fat (%BF), percentage fat free mass (%FFM), Body Mass Index (BMI) and Basal Metabolic Rate (BMRBIA) using Bioelectrical Impedance Analysis , standardised fitness tests and dietary intake through validated three day weighed food diary were obtained from semi-professional female Gaelic (n 20) and soccer (n 13) players.

Results: There was no statistical variation in height, BMI, %FFM, BMRBIA and fitness scores. Weight and %BF was significantly higher in Gaelic players compared to soccer players (69.1 v 66.4kg; 32.9 v 31.0%, respectively, $p<0.05$). Dietary analysis revealed that energy intake of Gaelic players was statistically lower than soccer players (1190 v 1637kcal, $p<0.05$); while the groups consumed similar proportion of foods from carbohydrates (47.6% of energy intake in Gaelic v 47.9% Soccer). There were significant variations in fat (27.6 Gaelic v 32.8 % Soccer) and protein (24.9 Gaelic v 19.3% Soccer) contribution to energy.

Conclusions: Variation in measures of body composition might reflect the shorter duration of Gaelic football match in comparison with soccer. Future studies should consider the components of macronutrients (e.g. sugar and saturated fat), dietary habits pre, during and post-exercise and underreporting; as well as positional analysis of players and analysis of lifestyle and physical activity. The similarities in estimated basal metabolism and physical fitness may support the notion that until further imperial and experimental evidence become available, estimation of energy requirements and nutritional advice in soccer can be extrapolated for female Gaelic footballers.

Keywords: (maximum 5): Gaelic football, nutrition

149/1165. Food-based Diet quality indices: concepts, applications & validity

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Introduction: The original Diet Quality Index (DQI) was developed for US populations and included food- and nutrient-based recommendations. An adapted version, existing out of four subscores (dietary diversity, quality, equilibrium, meal index and physical activity index), was exclusively based on Food Based Dietary Guidelines (FBDG). An important advantage of this latter DQI is that no linking with food composition tables is required which is time saving and avoiding bias due to errors in food composition.

Objectives: To test and validate this FBDG-based DQI in several populations, including children, adolescents and adults and using different dietary assessment methods.

Method / Design: The Flanders preschool dietary survey, the HELENA study and the Asklepios study were used to investigate reproducibility and validity of the FBDG-based DQI score and its subscores in respectively preschoolers, adolescents and adults. The validity was investigated via correlation and regression analyses between diet scores and nutrient/food intakes, and nutritional biomarkers.

Results: Evaluation and validation studies of the FBDG-based DQI score and its subscores revealed good reproducibility and validity of the concepts in different populations. Negative associations were found with low nutritious but high caloric foods, while positive associations were found with fruits & vegetables. Negative associations were also found with energy intake and the intake of mono- and disaccharides, while positive associations were found with most of the vitamins and minerals. Negative associations were also found with serum trans-fatty acid levels while positive associations were found with serum vit D, vit B12, omega-3 fatty acids and plasma folate.

This FBDG-based DQI was also shown to be applicable on different dietary assessment instruments (e.g. short FFQs and dietary records).

Conclusions: FBDG-based DQI scores are a valid tool to compare and monitor dietary changes in populations and could serve as an effective evaluation tool for intervention studies focusing on FBDG.

Keywords: (maximum 5): Food-based guidelines, diet quality, indices, concept, validity

149/1173. Evaluation of the criteria for the front of pack logo 'Vinkje' in the Netherlands

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Introduction: The front of pack logo 'Vinkje' provides consumers information on the composition of a food (http://www.hetvinkje.nl/). The logo is a private initiative that is endorsed by the Minister of Health, Welfare and Sport of The Netherlands. Its purpose is twofold: to stimulate producers to make more healthy products and to stimulate consumers to choose for these healthier products.

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Objectives: Foods can get the logo if the producer is a member of the Foundation 'Ik Kies Bewust' and the food conforms to a set of criteria.

Method / Design: The National Institute for Public Health and the Environment (RIVM) has identified that these criteria coincide with the criteria of the Netherlands Nutrition Centre. Over the years, the criteria have been tightened.

Results: The logo was introduced after a call by the World Health Organisation to make foods healthier. There are two types of the logo. The logo with the green circle is for basic foods with a healthier composition, such as whole grain bread, skimmed and semi skimmed dairy, and fresh fruit and vegetables. The logo with the blue circle comprises foods from categories that are not in the Dutch dietary guidelines, such as powdered soup, chocolate sprinkles, bread toppings, jam, soda and pasta sauces.

Conclusions: To date ca 100 producers are a member of the Foundation and more than 7000 foods carry the logo: 5000 have the logo with the green circle and 2000 have the logo with the blue circle.

Keywords: (maximum 5): food products, healthy diet, logo, front of pack, nutrient profiles

149/1176. Relationship between employees' psychological wellbeing, eating behaviour and nutritional status: A self-determination theory perspective

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Introduction: Reducing workplace stress has positive impact on employees' wellbeing and productivity. Stress is known to affect wellbeing, in particular, via its association with unhealthy eating behaviour and poor nutritional status. This association has been investigated in physiological terms, yet limited research addressed it from a psychological perspective.

Objectives: To explore a relationship between psychological wellbeing, workplace stress, eating behaviour and nutritional status, in the framework of self-determination theory, in employees of a Higher Education institution

Method / Design: University employees (N=34; 28 females), including academics (N=18) and non-academics (N=16) participated in the study. Psychological wellbeing was assessed using measures of Workplace Basic Need Satisfaction (WBNS). Validated questionnaires were used to assess stress (acute, chronic and burnout), vitality, and eating behaviour. In addition, based on employees' 3-day diet diaries, their energy (kcal), eating behaviour and nutrient intake were estimated. Anthropometric indices of nutritional status, including body mass index (BMI) and percentage body, were measured.

Results: WBNS was positively associated with vitality and fruit and vegetable intake, and negatively with stress (acute and chronic) and burnout, as well as unhealthy eating behaviour, nutrient intake and physical markers of nutritional status. Stress (acute, chronic and burnout) was positively associated with unhealthy snacking, saturated fat and sugar intake, but not with energy intake. Academics reported higher acute stress and greater saturated fat intake than non-academics. Relationship between WBNS and unhealthy snacking was mediated by stress and vitality.

Conclusions: The findings, discussed in the framework of the self-determination theory, indicate that raising WBNS of employees has a potential for improving their eating behaviour, by increasing quality rather than quantity of nutrient intake, – and, hence, nutritional status via reducing stress and increasing vitality.

Keywords: (maximum 5): Stress, nutritional status, eating behaviour, self-determination theory, Higher Education institution

149/1180. Commercial complementary food and added sugar intake in infants and children in the DONALD Study

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Introduction: Sensory properties of foods given early in life and repeated exposure to specific flavours can shape later taste preferences. Given that commercial complementary food (CF) occasionally contains high levels of (added) sugar, a high consumption of commercial CF may predispose to a strong preference for sweet taste later in life.

Objectives: This study examined the cross-sectional association between commercial CF consumption and added sugar intake in infancy as well as its prospective relation to added sugar intake in preschool and school age.

Method / Design: The study sample included 288 children of the DONALD Study with 3-day weighed dietary records at 0.5 and 0.75 (infancy), 3 and 4 (preschool age), 6 and 7 years of age (school age). Individual commercial CF consumption as percentage of total CF (%cCF) was averaged at 0.5 and 0.75 years. Individual total added sugar intake (g/d, En%/d) was averaged for all three age groups. The associations between %cCF and added sugar intake were analysed by multivariable linear and logistic regression models adjusting for early life and socioeconomic factors.

Results: Total added sugar intake increased from 4g/d or 2.3 En% in infancy to 50g/d or 13.4 En% in school age ($p<0.0001$). In infancy, a higher %cCF was associated with higher added sugar intake from

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CF (p<0.002) and higher total added sugar intake (p<0.003). Prospectively, a higher %cCF was related to higher added sugar intake in both preschool (p<0.037) and school age (p<0.048). These prospective associations were attenuated in models adjusting for total added sugar intake in infancy (p>0.097).

Conclusions: A higher %cCF in infancy may predispose to higher added sugar intake in later childhood by virtue of its added sugar content. Hence, infant feeding guidelines should encourage parents to (at least occasionally) offer homemade CF or to choose commercial CF products without added sugar.

Keywords: (maximum 5): infants, complementary food, commercial, homemade, added sugar

149/1181. Dietary Fiber in a Diet of Young Polish Women

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Introduction: Dietary fiber intake provides many health benefits and protects against not only cardiovascular and metabolic disorders, but also certain gastrointestinal diseases. The results of numerous studies indicate that average fiber intakes for Polish people are less than recommended levels.

Objectives: The main purpose was to evaluate the quantity of fiber in a typical diet of young Polish women. The additional purpose was to examine the influence of additional factors (place of living, degree of education, kind of work, physical activity) on dietary fiber consumption.

Method / Design: 24-hour dietary recall was applied in order to assess food and supplement intake - the face-to-face interview was conducted by a dietitian and then all food, beverages and supplements were entered to food computer program DietaPro2015. One hundred of Polish students (dietetics-43%, other, not associated with nutrition faculties-57%) were under examination; age 21.5±1.3; BMI 23.7±4.7.

Results: Diet of young Polish women is poor in dietary fiber. Average intake of fiber in all examined women was 18.2g/day and 10.9g/1000kcal. Consumption of rich in fiber food was significantly higher in students of dietetics (+7g/day) whereas supplements were more often taken by other examined women. In multivariate analyses, an increase in dietary fiber intake was inversely associated with BMI (P for trend < 0.0001). Level of education and sedentary life style were inversely related with fiber consumption. No associations were observed between place of living and fiber supplements consumption.

Conclusions: In examined women dietary fiber intake is below recommendations and depends on education – being of student of Dietetics correlates with good knowledge about benefits from dietary fiber. The role of dietary fiber in maintaining of healthy body weight is significant. More effective education is required to enhance fiber consumption.

Keywords: (maximum 5): dietary fiber intake, 24-hour recall, diet, women

149/1182. Dietary Vitamin D and Calcium Intake in Young Adolescents Living in Poland

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Introduction: Calcium and vitamin D are is essential for normal growth and development. An appropriate, rich in calcium and vitamin D diet allows to achieve high peak bone mass and to reduce the risk of osteoporosis - calcium is required for maintenance of skeleton and Vit.D plays a central role for calcium homeostasis and skeletal integrity.

Objectives: Assessment of dietary vitamin D and calcium intake in junior high school students from urban and rural settings and analysis of the frequency of dairy products consumption.

Method / Design: 180 students (46 girls and 40 boys from rural areas of Lesser Poland and 50 girls and 44 boys from Krakow, Poland; aged 13.81± 0.47; BMI 21.41±1.93) were under examination. Qualitative (FFQ- Food Frequency Questionnaire) and quantitative (24-hour dietary recall) methods and food computer program DietaPro2015 were applied; U Mann- Whitney, Kruskal-Wallis and t-Student tests.

Results: The average consumption of both calcium and vitamin D was lower than recommended levels (RDA) (calcium 740.71±258.42, vit.D 1.64±0.62). Milk and dairy products were consumed every day by 73.3% of examined students; 79.3% of boys did not get used to eat fish at all;. Hard cheese was the most frequently consumed dairy product regardless of the place of living and sex. Non-dairy calcium rich food was consumed once a week. Calcium and vitamin D intake were inversely associated with BMI. Milk was significantly more often consumed by students from rural settings– for fish was inversely.

Conclusions: Since adequate intake of both micronutrients during adolescence may improve bone mineral density and reduce the risk of osteoporosis in adult life, consumption of a variety of calcium and vitamin D rich foods, including fish and non-dairy products should continue to be encouraged.

Keywords: (maximum 5): calcium, vitamin D, fish, adolescents, dairy products

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149/1184. The effectiveness of dietary intervention in children aged 5-10 years with simple obesity

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Introduction: In the comprehensive obesity treatment which includes low-energy diet, appropriate physical activity, as well as specialist help and encouragement in lifestyle changes, diet modification is the method most often accepted by older children.

Objectives: The assessment of the dietary intervention effectiveness in obese children aged 5-10 years.

Method / Design: The study covered 125 children aged 5-10 years, with diagnosed simple obesity (BMI exceeding 2SD) and the control group of 97 aged-matched normal weight healthy children. Obese children had to follow a low-energy diet of 1200-1400 kcal per day for 12 weeks.

Results: The average energy value of daily food rations of obese children was higher in comparison to control group (1918 vs 1515 kcal, p<0,001) but during the intervention period average energy supply was significantly decreased (1918 to 1336 kcal; p<0,001) and the daily food rations were modified by increasing amount of vegetables and fruits and lowering the consumption of products rich in fat and sugar including whole-fat dairy products, juices and sweet beverages.

On the basis of cluster analysis (k-means method) we identified 3 groups of obese children with different pace of body weight reduction: –0,46 (SD=0,11) kg per week in 27% of children (group I with average energy intake during the intervention 1106 kcal); –0,17 (SD=0,07) kg per week in 47% of individuals (group II with average energy intake 1367 kcal) and +0,07 (SD=0,12) kg per week in 26% of subjects (group III with average energy intake 1396 kcal).

Conclusions: The dietary intervention based on a low-energy diet of 1000-1200 kcal/day is effective in reducing body weight in pre-pubertal obese children, whereas the lack of treatment effects may be related to the excessive consumption of products rich in sucrose (beverages, sweets) and fat that results in higher energy intake than recommended 1200-1400 kcal per day.

Keywords: (maximum 5): obesity, pre-pubertal children, dietary intervention, low-energy diet

149/1189. Mineral components intake in daily nutrition ratio among elderly people with diagnosed cardiovascular system diseases

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Introduction: A proper nutrition plays a special role in primary and secondary prevention of cardiovascular diseases but mineral components intake is not appreciated. Among them iron, copper and zinc are important and their role in the pathogenesis of these diseases is increasingly investigated.

Objectives: Estimation of chosen minerals content in daily nutrition ratio of elderly people with confirmed cardiovascular system diseases.

Method / Design: Study included 128 persons (66 women and 62 men), aged: 73.2±6.9 years hospitalized in the Institute of Cardiology in Krakow. Actual food consumption was assessed using a 24-hour dietary recall. The computer program DietaPro 2015 was used for calculation. The results calculated individually were compared to the norms recommended by National Food and Nutrition Institute in Warsaw.

Results: The intake of calcium was insufficient (379,2±264,7mg) in all examined persons. Additionally in men group the shortage of zinc (7,72± 2,7mg) and potassium (2485,5± 875,2mg) was stated. Women consumed too much of phosphorus (862,2±450,7mg) and iron (7,3±3mg) and men too much of natrium (1424,7± 633,2mg), phosphorus (961,1± 433,4mg) and copper (0,85± 0,2mg).

Conclusions: The intake of minerals including iron, copper and zinc was not in accordance with the nutritional recommendations. Both shortages and too big amounts of consumed micronutrients are a risk factor of progression of existing cardiovascular system diseases.

Keywords: (maximum 5): elderly people, cardiovascular system diseases, minerals

149/1199. Nutritional values in sous vide ready meals vs. homemade meals

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Introduction: The consumption of ready meals has increased evenly during the last years. Such meals are used by large groups in the community, with an overweight in the older part of the population. A

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documentation of the nutritional value in ready meals compared to homemade meals has been requested in order to evaluate nutritional intake.

Objectives: The aim was to analyze four sous vide ready meals for nutritional values and compare this with the values theoretical expected from equivalent homemade meals.

Method / Design: The analyzed meals were i) cooked salmon with herb sauce, ii) roast pork with sauerkraut, iii) meat balls with mushy peas and iv) beef Stroganoff. The meals were stored chilled for 15 days and reheated as recommended by the producer. They were then analyzed for nutrients as protein, fat and several carbohydrates and fiber. Vitamins analyzed were vitamin A, vitamin D, vitamin E, several vitamin B, folate and vitamin C. Further, the minerals calcium, iron, sodium, potassium, magnesium, zinc, copper, phosphorus, iodine were determined.

Results: One important test parameters of a healthy meal is the level of nutrients in the food on the plate just before it is eaten. The greatest variation was found within the non-energy elements. Variations in weight, commodities and analysis can contribute to this, in addition to the selection of raw materials as the basis for calculating the food database. With some exceptions (vitamin C, Vitamin A) the nutritional levels were comparable with homemade meals.

Conclusions: The levels of nutrients analyzed in the ready meals are comparable with similar nutritional values in Food Database, i.e. the levels calculated for an equivalent home-cooked dinner. The sous vide ready meals in this study contain the nutrients one would expect from a normal dinner.

Keywords: (maximum 5): Sous vide ready meals, homemade meals, nutrients.

149/1201. Effect of fish intake on vitamin D status: meta-analysis of randomized controlled studies

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Introduction: Fish, especially fatty fish, is the major natural source of vitamin D in the diet. However, it is unknown which contribution to the vitamin D status can be expected from fish intake. Therefore, this meta-analysis investigated the influence of fish consumption in randomized controlled trials (RCTs) on serum 25(OH) D concentrations

Objectives: it was the objective to analyse in a quantitative manner the contribution of different types of fish to the vitamin D status in healthy volunteers,

Method / Design: A literature search was carried out in Medline, Embase, Web of Science and The Cochrane Library (up to end of February 2015) for RCTs that investigated the effect of fish consumption on 25(OH)D concentrations in comparison with other dietary interventions. The fish intervention had to be at least two meals per week, for a minimum period of 4 weeks.

Results: Nine studies with 640 subjects and 14 study groups met the inclusion criteria and were included in this meta-analysis. Compared with controls, consumption of fish increased 25(OH)D concentrations on average by 4.4 nmol/L (95% CI 1.7,7.1; $p < 0.0001$; $I2 = 25\%$).

Fatty fish resulted in a mean difference of 6.8 nmol/L (95% CI 3.7,9.9; $p < 0.0001$; $I2 = 0\%$, 7 study groups), lean fish in a mean difference was 1.9 nmol/L (95% CI -2.3,6.0; $p < 0.38$; $I2 = 37\%$, 7 study groups). Short-term studies (4-8 weeks) gave a mean difference of 3.8 nmol/L (95% CI 0.6,6.9; $p < 0.02$; $I2 = 38\%$, 10 study groups) while in long-term studies (approx. 6 months) the mean difference was 8.3 nmol/L (95% CI 2.1,14.5; $p < 0.009$; $I2 = 0\%$, 4 study groups).

Conclusions: Fish consumption, and especially fatty fish, can increase the 25(OH)D concentrations, though the recommended amount of fish intakes cannot optimize the vitamin D status.

Keywords: (maximum 5): randomized controlled trial, vitamin D, fish

149/1202. A food frequency questionnaire for assessing iron bioavailability based on enhancers, inhibitors and consumption time.

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Introduction: Low iron intake and low bioavailability of dietary iron are crucial in the development of iron deficiency anemia. Food frequency questionnaires compared to detailed food records are easier to use and to analyze. In addition, recommendations in terms of food items are understandable for the general population.

Objectives: To design a food frequency questionnaire (FFQ) to know the consumption of enhancers and inhibitors of iron absorption in the context of the usual diet in a group of menstruating young woman, and to associate food intake items with iron status assessed by serum ferritin.

Method / Design: One hundred eighty five non-anemic menstruating women (hemoglobin>12 mg/dL), aged 18-35 years were recruited. Hemoglobin and serum ferritin were analyzed. Women were asked to fulfill a 28-item FFQ. Questions included time of consumption, breakfast and lunch/diner for 10 items. Spearman correlation tests were performed between variables.

Results: Positive correlations between serum ferritin and red meat ($p=0.01$), and alcoholic beverages ($p=0.02$) were found. Negative correlations between serum ferritin and citrus fruits ($p=0.049$) and nuts ($p=0.026$) both consumed with the main meals were found. Citrus fruit consumption was positively associated with legumes, fish, salad, vegetables, fiber fortified products, other fruits ($p<0.001$, for all) and brown bread ($p<0.05$), and was negatively associated with red meat ($p<0.05$).

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Conclusions: Red meat consumption was confirmed to be the main dietary component associated with iron status in menstruating women. However, the unexpected negative association of citrus fruit consumed with the main meals shows the importance of food combinations in iron bioavailability and prevention of iron deficiency. Therefore, guidelines regarding combinations of foods which contain highly bioavailable iron with enhancers and avoiding inhibitors in the same meal should be promoted to improve iron status in population at risk of iron deficiency anemia.

Keywords: (maximum 5): IRON DEFICIENCY; FOOD FREQUENCY QUESTIONAIRE; DIET; DIET IRON BIOAVAILABILITY; RED MEAT

149/1206. Minerals intake may predict the discordance between minerals density in lumbar vertebrae and femoral neck

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Introduction: In previous studies were shown discordance between the femoral neck (hip) and vertebrae lumbar (spine) in osteopenia and osteoporosis patients .minerals intake are effective on bone mineral density (BMD) But they have different effects on trabecular and cortical bones and need to be evaluated

Objectives: To determine the effect of minerals intake on the discordance between the femoral neck and vertebrae lumbar in subjects with osteopenia 22-50 years old, secondly Due to bone discordance in the osteopenia patients, which minerals are needed to prevent the progression to osteoporosis and fractures.

Method / Design: A total of 325 obese subject, body mass index ≥ 30; age, 22-50; were included in the current cross-sectional study. We assessed the body composition with the use of Body Composition Analyzer and BMD measurements by dual energy X-ray absorptiometry of the lumbar (vertebrae L2-L4) and femoral neck. Dietary data were collected through a 3 food record. Statistical analyses were performed using SPSS and Nut4 software.

Results: We found BMD significance correlation between calcium intake and hip ($p = 0.03$) and between fluoride intake and lumbar BMD ($p=0.01$), potassium intake with hip T-score ($p = 0.01$), manganese and selenium intake with hip Z-score ($p = 0.04$, 0.03 respectively).

Conclusions: In this study it was shown that there is a relationship between minerals intake and discordance between femoral neck and vertebrae lumbar. We found significance correlation between selenium, manganese intake and hip z-score and this relationship was observed between the potassium and hip t-score. An interesting result is deficiency of calcium in the hip is more effective than the lumbar But the lack of fluoride has the reverse effect. We have generalized the results to variations in distribution of osteoclasts and osteoblasts so effects of minerals on the two types of bones are differently.

Keywords: (maximum 5): Bone discordance, Minerals intake, femoral neck, Vertebrae lumbar

149/1209. Energy contribution patterns from drink and food in Riksmaten:

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Introduction: Since appetite control works differently in fluid and solid intake we wanted to analyse the energy contribution from those two types of energy sources.

Objectives: The objective of this study was to investigate the beverage contribution of energy in Swedish meals, according to data from the National Survey (Riksmaten 2010-2011).

Method / Design: Around 1800 adult Swedes reported dietary intake data for four consecutive days - specified by portion size, type of meal, time point, day of the week and venue. The intake was reported in a web-based food diary. Energy contribution from drinks and food respectively was analysed, by weekday and type of meal, in regards to sugar containing drinks and those containing alcohol.

Results: The results show that the reported consumption of alcohol was highest at home on weekends. The contribution of energy from drinks could be rather high, especially at dinner on Friday and Saturday night. The mean energy contribution from drinks in the daily intake was 235 kcal ± 231 (SD). This corresponds to 11.8 ± 10.8 (SD) energy percent (E%), varying from 9.1 (Wednesday) to 17.1 (Saturday) E%. Problems in the interpretation of the data that need to be closely monitored are for example portion size, reluctance to report sweet and alcohol-containing drinks, difficulties in estimating dilution of different types of cordial and alcohol content in wine and beer.

Conclusions: Drinks were contributing substantially to the total energy intake over the day. The sweet and alcoholic drinks are important in this regard, but also juices and coffee drinks. The problems in regards to the increased alcohol content of beer and red wine on the Swedish market will be further discussed with the Swedish Food Administration, to encourage development of a more comprehensive set of alternatives in the database.

Keywords: (maximum 5): Swedish Food Administration, alcohol, food and beverage combination, meal design

149/1211. Effect of changing the type of fat on markers of cardiometabolic risk in obese rat

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Introduction: Margarines have long had an image «healthy» because they are lower in saturated fats and cholesterol than butter. However, some margarine was high in trans fatty acids that can promote the development of cardiovascular disorders.

Objectives: The purpose of this study is to verify if replacing margarine by sardine oil attenuates lipid peroxidation and improves reverse cholesterol transport in obese rats.

Method / Design: Obesity was induced by feeding a high-fat-diet during 3 months. At 400±10g the obese rats (n=24) were divided into 2 groups and consumed during 1 month (d30) 20% margarine or sardine oil. At d30, 6 rats from each group were sacrificed and the remaining rats were then subjected to a change in diet for 1 month (d60): margarine was replaced by sardine oil and inversely.

Results: The substitution of sardine oil by margarine enhanced cholesterol -very low density lipoprotein (C-VLDL) (+21%) and C-low density lipoprotein (LDL-HDL1) (+17%) and decreased C-high density lipoprotein (HDL2 and HDL3) subfractions by 38% and 15%, respectively. Indeed, lipid peroxidation was enhanced in LDL-HDL1 (+26%) and HDL2 and HDL3 (+41%). When margarine was replaced by sardine oil, C-VLDL, C-LDL-HDL1, C-HDL2 concentrations were deceased by -58, -81 and -35%, respectively and lecithin:cholesterol acyltransferase (LCAT) activity was significantly higher (+74%). Indeed, HDL2 and HDL3 lipid peroxidation was decreased respectively by 28% and 14%.

Conclusions: In obese rats, the replacement of sardine oil by margarine seems to increase atherogenic markers and lipoperoxidation and consequently seemed to enhance cardiovascular diseases. However, the substitution of margarine by sardine oil can reduce lipid peroxidation and improves reverse cholesterol transport by increasing the activity of LCAT and thus ensuring a fortification in HDL2 cholesteryl esters. Sardine oil compared to margarine may have a protective effect against cardiovascular risk by improving the anti-atherogenic metabolic pathway of cholesterol.

Keywords: (maximum 5): Rat: obesity: sardine oil: margarine: atherogenic risk

149/1212. Reformulation of pizza products and modeled nutritional intake shifts, results from the NHANES 2011-12 survey

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Introduction: Food reformulation has the potential to improve nutritional intakes of the general population. The Nestlé Nutritional Profiling System (NNPS) was designed specifically for food reformulation, setting category-specific nutrient targets. In the US, Nestlé initiated reformulation of its pizza portfolio in 2010 using the NNPS.

Objectives: To model the effect of pizza reformulation on the nutritional intake of NHANES 2011-12 participants.

Method / Design: Observed dietary intakes of 6708 participants aged 4+ years were derived from two 24hr-recalls. In two reformulation scenarios, the nutritional composition of all 68 pizzas declared to be eaten by participants were modified to reflect either the average composition of the 15 most purchased Nestlé pizzas in 2014 in the US (R-Top); or the nutritional targets as defined by the NNPS (R-NNPS) if these were not achieved. Nutritional intakes were compared between scenarios using paired Student T-tests.

Results: Observed mean pizza intake accounted for 3.9%, 5.8%, 4.6%, 5.4%, and 0.9% of energy, saturated fat, total fat, sugar, and sodium total daily intake. In the R-Top scenario, total intake reduced by approximately 0.5% for all analysed nutrients except sugar; intake from pizza of all nutrients was reduced by approximately 10%. In the R-NNPS scenario, total energy and sugar intake were stable; total intake of saturated fat, total fat, and sodium was reduced by 2.8%, 1.7%, and 1.3% respectively; nutrient intakes from pizza were reduced by 49%, 37%, and 23%, respectively. All modeled changes were significant ($p<0.001$).

Conclusions: This modeling case study showed that food reformulation may improve nutritional intake of the general population. Results need to be confirmed including reformulation efforts in other food categories and in other countries. Further research needs to assess which population could benefit most from food reformulation (e.g. consumers only vs. general population, age groups) and which food categories should be prioritized.

Keywords: (maximum 5): Food reformulation, nutritional intake, nutrient profiling

149/1215. Korean adolescents' milk intake, recognition and nutritional knowledge on milk by participation in school milk program

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Introduction: Milk provides proteins, calcium, phosphate, and magnesium which favor growth and bone health during adolescence. It has been reported that low milk intake hampers bone mineral acquisition in adolescents.

Objectives: The purpose of this study was to investigate Korean adolescents' milk intake, recognition and nutritional knowledge on milk by participation in school milk program in order to increase milk intake.

Method / Design: This cross-sectional survey was conducted using a questionnaire. The subject was 461 middle school students (225 males, 246 females) in Incheon metropolitan city, South Korea. Data were analyzed with SPSS 12.0 program.

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Results: As for milk intake, 90.3%of the participants and 64.7% of the non-participants in school milk program drank milk, respectively. There was a significant difference in frequency of milk intake between participants and non-participants in school milk program; participants drank milk more frequently. There was a very significant difference in amount of milk intake per once between participants and non-participants in school milk program; 74.8% of the participants drank 1 cup of milk and 12.5% of the non-participants drank milk 1/2 cup of milk. As for scores of recognition and nutritional knowledge on milk, those of the participants in school milk program were significantly higher compared to non-participants. As for types of their favorite milk, 53.2% of the male participants in school milk program preferred regular white milk and 40.2% of the female participants in school milk program preferred strawberry or chocolate taste-added milk.

Conclusions: The participants in school milk program drank more milk and showed higher scores of recognition and nutritional knowledge on milk. Therefore, It is necessary that school milk system based on their preference of milk provides diversity of milk type, amount, and serving frequency, etc. for increasing adolescents' participation in school milk system.

Keywords: (maximum 5): Milk intake, adolescents, recognition, nutritional knowledge, school milk system

149/1216. Delayed food allergies (Type III) in patients with gastro-intestinal problems

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Introduction: Food intolerance or delayed allergic reaction type III manifests as incompatibility reaction against food may cause various symptoms in human organism and this disturbance is manifested in the immune system by the formation of specific immunoglobulin IgG4. Statistics show that 60% of the population suffer from intolerances against at least one foodstuff, which may cuse clinical symptoms or enhance them.

Objectives: The aim of this study was to determine the frequency of antigen causing a delayed allergic reaction type III in order to improve the health of patients who complain of chronic gastrointestinal symptoms (constpation, diarrhoea, stomach ache, winds, irritable bowel syndrome, colics, bloated or sick feeling, Crohn's diseasae). For this purpose are made and analyzed tests for food intolerance to 90 allergens from serum in patients with gastro-intestinale problems. Foodstuffs (allergens) in 17 main groups (fruits, vegetables, spices and herbs, fish and seafood, seeds and nuts, grains with gluten, wheat gluten, meat, legumes, milk and dairy products, salads, sweeteners , thickeners, eggs, mushrooms, beverages, yeast).

Method / Design: Patient serum were analyzed enzyme immunoassay methode (ELISA).The test theoretical basis for the determination of specific IgG and IgG4 for diagnosis of food intolerance. The Nutritional ELISA test kits has been designed for detetcion and quantitative determination of specific IgG4 antibodies against food antigens in serum and plasma.

Results: The results of tests for food intolerance have shown that most patients with gastrointestinal problems (n=120) intolerant to gluten and grains with gluten (68%), where the average concentration of immunoglobulins IgG4 was for gluten 25.74 ug / ml which is equivalent to a high degree of intolerance and for cereals with gluten (wheat 19.58 ug / ml, barley 13.2 ug / ml which is equivalent to a moderate degree of intolerance, spelled 25.42 ug / ml of the equivalently high degree of intolerance).

Conclusions: The results suggest an association between specific antigen (gluten, wheat gluten) with gastrointestinal complaints.The patient can avoid eating the problematic foods listed (gluten, wheat..) in the findings and replace them with foods he tolerates.

Keywords: (maximum 5): food intolerance, gastro-intestinal problems, ELISA, gluten

149/1219. Nutritional knowledge, dietary attitude and behavior by vegetables intake in Korean adolescents

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Introduction: Adolescence is a critical period of growth, and appropriate diet intake of this period is very important for good long-term health and productive adult life. It has been reported that vegetables intake and preference for vegetables are low in adolescents.

Objectives: The purpose of this study was to investigate nutritional knowledge, dietary attitude and behavior by vegetables intake in Korean adolescents for nutrition education in order to increase vegetables intake.

Method / Design: This cross-sectional survey was conducted using a questionnaire. The subject was 356 middle school students (154 males, 198 females) in Incheon metropolitan city, South Korea. Data were analyzed with SPSS 12.0 program.

Results: The subject had no experience of nutrition education for adolescents to increase vegetables intake. The subject ate significantly more vegetables at home by mother's persuasion compared to at school lunch. The subject who ate more vegetables intake showed significantly higher nutritional knowledge level, better dietary attitude and behavior related to health. Most preferred taste and color of vegetables dish were sweet taste and green color, respectively. As for cooking type of vegetables dish, the subject preferred stir-fried dish, fried dish, salad, Korean pan-cake, steaming dish, soup, etc. in order.

Conclusions: Home availability of vegetables and mother's persuasion is very important for increasing vegetable intake in adolescents. Also nutrition education for adolescents and cooking vegetables based on their preference are necessary at school.

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Keywords: (maximum 5): Vegetables intake, adolescents, nutritional knowledge, dietary attitude and behavior

149/1221. Nutrition adequacy and endurance in semiprofessional athletes

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Introduction: Increased body energy requirements could result in exaggeration or restriction in energy intake and further establish changes towards metabolic unhealthy conditions.

Objectives: he purpose of the present study was to address the dietary adequacy in Greek semiprofessional athletes and examined biochemical and physiological parameters related to regular physical training.

Method / Design: Thirteen males, 15-47 years old, semiprofessional basketball and cycling athletes have been recruited in the study. Body size was evaluated using somatometric and skinfolds' measurements, as well as by total and visceral fat content using ViScan. Metabolic adaptations have been estimated in situ, before and after training sessions, by measuring glucose and lactate levels. Proper fluid was evaluated through questionnaire and urine specific gravity, and nutrient intake through a recall protocol.

Results: Classification based on body mass index (BMI) showed 4 pre-obese athletes and 9 within the normal range, and this classification was not changed by analysis based on total body fat percentage. Skinfold-based calculated body fat was 17.2%(SD ±4.5) and impedance based total fat was 15.2%(SD ±4.9). The average visceral fat rating was 6.16(SE±3.92), within the physiological range. When basketball players and cyclists followed an exercise course of a 7.8 and 7.7 METS intensity respectively, lactate and glucose levels were modified as of 1.5 mmol/L (SD ±1.8) and 1.6mg/dl(SD ±33.2) for basketball players and -0.65mmol/L(SD ±1.3) and 3mg/dl(SD ±13.5) for cyclists. Most of the athletes were severely dehydrated, as specific gravity in morning urine was found below 1.025 only for 2 of them. Practice-wise, weight-adapted carbohydrate and fluid uptake met the recommended consumption by 6 out of 13 athletes.

Conclusions: Our findings showed that athletes' choices may not agree with the recommended nutrient and fluid intake during exercise, and such approaches could influence endurance and mediate the establishment of obesity over age.

Keywords: (maximum 5): Sports' nutrition, athlete, hydration, lactate, body fat

149/1232. Association between taste perception, food consumption and cardiovascular risk factors in PREDIMED PLUS-Valencia participants

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Introduction: The taste of foods is an important factor in determining their consumption. However, as it is a time-consuming task to undertake taste perception tests, most epidemiological studies do not include direct measurements. Genetic polymorphisms have been used as indirect markers of their perception.

Objectives: To study the perception of 5 tastes (bitter, sweet, salty, sour and umami) by direct measurements, their relationship with genetic polymorphisms and the association of that perception with cardiovascular risk factors (CVRF)

Method / Design: Cross-sectional study of 64 men and 77 women in the PREDIMED PLUS-Valencia study (65±3 years and metabolic syndrome). Bitter, sweet, salty, sour and umami tastes was determined through laboratory tests on the perception of their intensity (from 0 to 5). SNPs in TAS2R38 (bitter taste), TAS1R (sweet), SCNN1B (salty), AS1R1 and TAS1R3 (umami) were determined. Anthropometric measurements, blood pressure (BP) and biochemical analyses were undertaken.

Results: Wide variability in perception of the 5 tastes was detected. Men had a lower perception of the salty taste than women (P=0.004). SNPs in TAS2R38 gene were strongly associated with bitter taste (P<0.001). The associations of the other SNPs with their tastes were much weaker. A higher perception of sweet taste was associated with higher vegetable consumption (P=0.002) Umami taste was associated with olive oil and wine intake. No associations for the bitter taste were found. Subjects with greater perception of salty taste had lower diastolic BP (p=0.037). Higher perception of bitter, sour and salty was associated with lower waist circumference (P<0.05). Bilirrubin was inversely related to sweet, salty and sour perceptions (P<0.05).

Conclusions: There is wide variability in taste perception. Only bitter taste have good genetic proxies.Taste perception is associated with the consumption of several foods and also, in a complex way, with various intermediate phenotypes of CVR.

Keywords: (maximum 5): Taste, polymorphism, food intake, Mediterranean diet, cardiovascular

149/1235. Will salt-reduction strategies increase iodine deficiency? A case study in the remote Indigenous Australian population

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Introduction: Excess salt intake is a global issue; however there are concerns that population-level salt-reduction strategies may increase iodine deficiency.

Objectives: This study examines the case of the remote Indigenous Australian population. We employed an innovative, objective method to assess sodium and iodine intakes against requirements and to model the potential effects of salt-reduction strategies on sodium and iodine intakes.

Method / Design: Apparent consumption data were collected on all foods and drinks purchased in 2012-2014 from 20 remote Indigenous community stores (representing the main source of food for >8000 individuals) and compared to population-weighted dietary recommendations (Australian nutrient reference values weighted by census data). Estimated average sodium and iodine intakes were calculated by multiplying sodium/iodine density from apparent consumption data (per MJ energy) by population-weighted energy requirements. Linear programming was employed to estimate potential effects of salt-reduction strategies on sodium and iodine intakes.

Results: Estimated average sodium intake was 2770 (range 2386-3533) mg/day, far exceeding the population-weighted recommendation of <2063 mg/day. Average iodine intake was 206 (187-248) µg/day, well above the estimated average requirement (94 µg/day). Nearly 50% of sodium came from discretionary salt, bread and processed meat. Bread, iodised salt, milk and eggs provided 80% of iodine. Salt intakes could be reduced to within recommendations by either 1) large reductions (50-60%) in usage of discretionary salt and sodium content of bread/processed meats, or 2) smaller salt-reductions (20-30%) in all processed foods. In all scenarios, modelled iodine intakes remained within recommendations.

Conclusions: Salt intakes of the remote Indigenous Australian population are far above recommended levels, likely contributing to the high prevalence of hypertension and cardiovascular mortality experienced by this population. These data indicate that it is possible to model salt-reduction strategies that can considerably reduce salt intake without increasing risk of iodine deficiency at the population-level.

Keywords: (maximum 5): salt-reduction; iodine; linear programming

149/1236. Excessive dietary intake of soybean oil but not oleic acid increase adiposity

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Introduction: It remains unclear how three of the most consumed oils: soybean oil (SO), oleic oil (OO) and coconut oil (CO) which vary in its content of polyunsaturated (PUFAs), monounsaturated (MUFAs) and saturated fatty acids (SFAs), change hepatic lipid composition and metabolism, since it is still controversial which dietary fatty acids (DFAs) best fit recommendations.

Objectives: Study the effect of different intake concentrations of SO, OO and CO on hepatic fatty acids composition and its metabolic outcomes.

Method / Design: Male C57BL/6 mice were fed for 3 months with 7% fat (recommended) and 21% fat of SO (70% PUFAs), CO (87.5% SFAs) or OO (74.9% MUFAs). We examined metabolic states by indirect calorimetry; serum biochemical parameters; hepatic lipid metabolic gen expression by RT-qPCR; hepatic fatty acid composition by gas chromatography; and liver histological analysis.

Results: In liver SO21 or CO21 increased SFAs, CO7 MUFAs and SO7 PUFAs; groups fed OO kept equal levels of MUFAs, SFAs and PUFAs. Groups fed SO21 had higher energy intake, gained more weight, and increased epididimal and perirenal fat depots compared to all groups. Groups fed 21% fat had higher HDL/LDL and low SREBP1 expression, compared to 7% groups (P<.05). Triglycerides were higher in SO21 and CO21 (non-significantly). Indirect calorimetry indicated greater lipid oxidation in OO21 than SO21 or CO21, and carbohydrates oxidation in 7% groups. SO21 showed defective lipogenesis and lipid oxidation (low FAS, SREBP1 and ACOX expression). Contrary, CO elevated FAS and ACOX expression, and induced hepatic steatosis. While O21 rise lipid oxidation (high CPT1 and ACOX expression) (P<.05).

Conclusions: Type and amount of DFAs modulate hepatic lipid composition and metabolism. High amounts of ω-6 linoleic through SO favors obesity, and lauric acid through CO hepatic steatosis, whereas OO regulates better metabolic outcomes.

Keywords: (maximum 5): Dietary fatty acids. Lipid metabolism.

149/1244. Socio-economic differences in dietary patterns in the EPIC-NL cohort

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Introduction: Socio-economic inequalities in health may result from differences in dietary patterns. However, it is unclear whether different dietary patterns exist among groups with different socio-economic status (SES).

Objectives: The aim of this study was to derive SES-specific dietary patterns and to investigate whether these patterns result in different nutrient intakes.

Method / Design: We used data of 39,137 men and women, aged 20-65 years, who participated in the EPIC-NL cohort between 1993 and 1997. Self-reported educational level, divided into 3 groups, was used as a measure of SES. Dietary intake was estimated using a validated 178-item food frequency questionnaire and nutrient intakes were calculated using the Dutch Food Composition Table. Dietary patterns were derived using Principal Component Analysis (PCA). Nutrient intakes were compared across quartiles of the dietary pattern scores.

Results: Three largely similar dietary patterns were obtained at all educational levels, i.e. a 'prudent', 'western' and 'traditional' pattern. However, the intake of several nutrients differed according to educational level. For example, the intake of mono- and polyunsaturated fatty acids and fibre in low educated participants who adhere to the 'prudent' pattern (highest quartile) was similar to the intake of high-educated participants who did not adhere (lowest quartile). Additionally, the difference in alcohol intake between the lowest and highest quartile was larger in the high educated group than in the low-educated group (17.5 vs 10 grams/day). Moreover, while in the low educated group consumers of a 'prudent' diet had a significantly higher prevalence of diabetes (+3.6% $p<0.05$) and hypertension (+7.3%, $p<0.05$) than non-consumers, these differences were much smaller in the high educated group (+0.8%, $p<0.05$ and -1.2%, p=ns, respectively).

Conclusions: In general, similar dietary patterns exist among groups with different educational levels, but nutrient intake may differ.

Keywords: (maximum 5): dietary patterns: education: nutrient intake: principal component analysis

149/1247. Russians' paths of economic, nutritional and epidemiological transitions

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Introduction: Russians have witnessed a dramatic increase in chronic diseases, which contribute significantly to the worrying morbidity and death rates in Russia.

Objectives: Given the fact that diet-related diseases are of major concern to Russian authorities, this study aims at elaborating whether there have been major shifts in Russians' nutrition patterns in the sense of an ongoing nutrition transition.

Method / Design: Since the analysis of a nutrition transition has to represent an array of economic, nutrition, and epidemiologic transformations, data of phase II of the Russian Longitudinal Monitoring Survey for the time period 1996-2008 is employed to: (i) provide an overview of Russia's economic transition; (ii) outline various aspects of an ongoing nutrition transition in Russia; and (iii) link these shifting nutrition patterns to the respective health outcomes of the Russian population.

Results: Besides increasing Laspeyres price indices for eight food aggregates, we identify tremendous changes in real total expenditures and food expenditure shares during the observed period of economic transition, with highest food expenditure shares in the year of the financial crisis in 1998. Further, we show inter alia that the consumption of total fats, (processed) meat products, dairy products, and fruits/vegetables increased, indicating a more adequate intake of vitamins and minerals but at the same time more excessive intakes of fats. In this line, the prevalence of overweight or obesity increased significantly during the observed transition period, reaching its highest level in 2008. Finally, our results show that Russians' BMI is significantly positive associated with worse overall health states and the incidence of hypertension and diabetes after a minimum time lag of five years.

Conclusions: Despite the short interruption by the financial crisis in 1998, the observed nutrition transition and its accompanying growth of nutrition-related chronic diseases requires considerable changes in Russia's nutrition policies.

Keywords: (maximum 5): Russia, nutrition transition

149/1249. European reference food baskets, markers for European food-based dietary guidelines and eating patterns

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Introduction: The European discourse on poverty emphasizes its relative aspect and defines poverty with respect to national standards of living. In practice, the poverty line is generally defined as a percentage of the national median income. Reference budgets offer a way to define more empirically what constitutes an adequate minimum in society. Reference budgets are priced baskets of goods and services that reflect what is a socially acceptable standard of living for specific household situations. Currently, the European Commission is supporting a pilot project for the construction of cross-country comparable reference budgets in Europe.

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Objectives: To develop full reference budgets for ten countries and giving information on the minimum needed for healthy food in all 28 EU member states.

Method / Design: Food baskets in all member states have been constructed using a well-defined methodology, and are based on national and international food based dietary guidelines, advice by nutritionists, survey data and focus group information. The fact that all food baskets are constructed in a highly comparable way, makes it possible to compare them cross national and with European food based dietary guidelines.

Results: This research yields results at two levels: (1) insights into European eating patterns and cross-national differences in eating habits, (2) patterns of the costs of and access to essential foods across Europe.

Conclusions: This research yields results at two levels: (1) insights into European eating patterns and cross-national differences in eating habits, (2) patterns of the costs of and access to essential foods across Europe.

Keywords: (maximum 5): Reference budgets
European eating patterns
Cost of healthy food
Food-based dietary guidelines

149/1252. Pregnancy and breastfeeding food product category in Singapore: Evaluation of nutritional values and its opportunities

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Introduction: Health and nutrition status of the mother during pregnancy and breastfeeding periods (P&BF) plays a crucial role in children's optimal growth and development. Micronutrient deficiencies are still prevalent in Southeast Asia during these periods. Food industries have developed mainly micronutrient-fortified food products to complement the maternal diet during P&BF periods. There are some differences in the recommended daily allowance (RDA) values between these two periods, e.g. vitamin A, folic acid, protein.

Objectives: Create an overview of the nutritional values of P&BF products and check against P&BFs incremental RDA values of Singapore's Health Promotion Board (HPB).

Method / Design: Nine commercial milk-based products for P&BF in Singapore were analysed, 7 products are marketed for P&BF combined, 1 product for pregnancy and 1 for breastfeeding.

The incremental RDA values are calculated based on the RDA for P&BF women minus RDA for women in general assuming that they continue to consume healthy diet during these periods. Ideally the P&BF products could fulfil 100% of these incremental nutrient needs.

Results: For pregnant women, based on daily serving suggestions, all of the studied products met the incremental RDA for folic acid and protein, however only 1 product met the incremental RDA for vitamin D. For breastfeeding period, only five products met the incremental RDA for vitamin A. The RDA for vitamin A is twice during breastfeeding as compared to pregnancy which could be one of the reasons to develop products specific to address different incremental RDAs during P&BF periods.

Conclusions: Product compositions based on incremental RDA cannot equally well meet the requirements during pregnancy and lactation and thus should target to only one period. A more sophisticated approach is to consider actual dietary intakes of pregnant and lactating women, relate those to RDA and formulate P&BF-tailored food products to fill the nutritional gap.

Keywords: (maximum 5): Pregnant, breastfeeding, nutrition, Singapore

149/1262. The contribution of fruit juice to "5 a day" guidelines and diet quality

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Introduction: 100% Fruit juice (FJ) provides many of the nutritional benefits of fruit in a convenient and palatable form. FJ counts as one portion in the UK "5 a day" fruit and vegetables (FV) scheme. However, concerns about sugars intake from beverages and potential effects on energy intake and diet quality have led to conflicting views about FJ consumption. More understanding of dietary behaviours of FJ consumers is needed to evaluate the role of FJ in the diet and provide appropriate dietary advice.

Objectives: To explore dietary behaviours of FJ consumers and non-consumers and evaluate contribution of FJ in UK diets.

Method / Design: Analysis of original data from the National Diet and Nutrition Survey (NDNS 2008-2012) using 4day dietary records (n=4156).

Results: 42% of the all-age sample consumed FJ during the survey. Mean consumption (including non-consumers) was 58g/d (total population), highest among 4-10year olds (mean 91g/d). 35% of consumers drank more than 150ml/d. FJ consumers had higher energy and sugars intake than non-consumers (as % energy) but lower BMI ($P<0.05$ for adults and 11-18s). FJ provided more than 10% of folate and potassium in the diets of consumers and half their vitamin C, resulting in significantly higher intakes of potassium, folate, and vitamin C overall. FJ consumers ate more whole fruit and vegetables (not counting FJ) than non-consumers and were more likely to achieve the recommended 5-a-day FV servings (39% vs. 23%). Benefits were greatest for 11-18's, who had lowest folate intakes compared with RNI.

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Conclusions: Dietary advice could encourage moderate FJ consumption to facilitate achievement of 5-a-day targets, subject to guidance on calorie control for individuals who need to manage body weight. There is no evidence from these data that FJ consumption has a detrimental impact on food choice, micronutrient intake or body weight for most consumers.

Keywords: (maximum 5): juice, diet, quality, micronutrients

149/1264. A pilot study for implementing Dutch Eating Behaviour Questionnaire (DEBQ) on the population of Romania

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Introduction: DEBQ (first used in 1986) was based on three theories on eating behavior. Each theory corresponds to a particular therapeutic protocol, so it is necessary to include the person involved in a class before starting the protocol. The main purpose of the questionnaire is to identify improper eating patterns in people who have problems with weight, and to optimize their treatment.

Objectives: The present paper aims to investigate whether DEBQ can be applied to the population of Romania.

Method / Design: In order to validate the questionnaire on a population of Romania a pilot study of 40 people, speaking English has been constituted, who completed both language versions of the questionnaire.

DEBQ was applied to 40 people: a control group (medical students, non- obese people - 10 women and 10 men) and a group of obese patients from the Clinical Center of Diabetes, Nutrition and Metabolic Diseases Iasi - 10 women and 10 men. Besides completing the questionnaire itself, people were asked to state their height and current weight, if their weight had fluctuated in the previous 6 months, the maximum weight ever gained (except for pregnancy in women), and the minimum weight as an adult. Such data help fitting the individual in a particular group in order to properly interpret the score obtained in completing the questionnaire.

Results: The interpretation of results started from the external scale scores achieved. Non- obese individuals obtained values that fall in the average range. According to the available data, the predominant emotional scale can be clearly seen in obese people (men and women), with scores above average.

Conclusions: This pilot study shows the usefulness of the questionnaire validation and it's use on the population of Romania.

Keywords: (maximum 5): behaviour questionnaire

149/1275. The effect of dietary selenium on antioxidative status in rats

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Introduction: Selenium (Se) is a trace mineral that is essential to good human and animal health mostly because of its antioxidant activity and the role in the balance of several hormones. Se is incorporated into proteins and various organoselenium compounds differing in their biological activity. Oilseed rape (Brassica napus L.) is an important crop for biofuel production and extracted meal from the seeds can be used in animal diets, where it can replace imported soybean meal.

Objectives: The project follows in complex selenium uptake and speciation in whole plant and seed of oilseed rape after Se biofortification. Subsequently, uptake and transformations of Se compounds in rat organism are monitored. Various biochemical and physiological properties of the animals were investigated to optimize Se uptake via the experimental diet.

Method / Design: The content of selenium and selected heavy metals in liver of experimental animals was determined by atomic absorption spectrophotometry. The activities of selected selenoenzymes (glutathione peroxidase and thioredoxin reductase) and other antioxidative enzymes were measured spectrophotometrically in plasma, liver extracts and erythrocyte lysates of rats that were fed with the diet containing different portions of oilseed meal.

Results: Increasing Se uptake via the experimental diet was monitored by the following enzymes. Catalase exhibited decreasing activity in erythrocytes, while increasing activity in plasma. Glutathione peroxidase showed decreasing activity in plasma. Thioredoxin reductase had increasing activity in plasma. Glutathione reductase exhibited increasing activity both in plasma and liver. Glutathione S-transferase showed the biggest differences among groups and its activity was increasing in plasma and erythrocytes.

Conclusions: The selected antioxidative enzymes, first of all glutathione S-transferase, were affected by selenium present in rapeseed meal that was added to the diet.

This work was supported by GACR 13-04580S.

Keywords: (maximum 5): selenium, oxidative stress, selenoenzymes, antioxidative enzymes, oilseed rape

149/1280. Evaluation of food intake amoung hospitalized paediatric patients

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Introduction: The main cause of hospital malnutrition is related to the increased energy needs associated with decreased food intake during hospitalization.

Objectives: Several studies in hospitalized adults have shown that the actual food intake is lower than recommended, and there are few studies on the assessment of food intake in hospitalized children and youth.

In this way, our objective was to assess food intake of children and youth during the stay at hospital.

Method / Design: We assessed food intake in the 3 main meals daily by weighing each constituent food meal before and after it, and also the reasons of inadequate food intake over a period of 3 consecutive days, in children and young residents in a tertiary hospital.

Results: During the 3 days of the study were analyzed a total of 128 hospital meals and it was provided 74.264 kg of food, of which 29.601 kg (40%) was missed. The three main meals provide an average of 1576 ± 530 kcal, 96 g of protein ± 46 and 199 ± 68 g carbohydrate per day, however, only an average of 987 ± 597 kcal, 61 g of protein ± 46 and 124 ± 71 g carbohydrate was consumed per day. Furthermore, the main reason reported by patients to inadequate dietary intake is related to factors associated with its own hospital meal.

Conclusions: Children and young people hospitalized have a food intake below the prescribed due not only to the clinical aspects of the disease, as well as exogenous factors. These preliminary data emphasize the need for more scientific evidence in hospitalized children and youth, with a potential impact on the approach and optimization of their nutritional intake.

Keywords: (maximum 5): Intake, children and young, hospital meal.

149/1283. Food sources of energy, dietary fats and free sugars among children: the GRECO study

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Introduction: Dietary habits in Greek children have changed over the past decades. Recent studies demonstrate very high overweight rates, associated with low adherence to the Mediterranean diet scheme and detrimental lifestyle habits. However, data regarding diet quality and macronutrient intakes are limited.

Objectives: To identify the major food contributors of energy intake [EI], saturated fats [SF] and free sugars [FS], and to record the proportion of children that exceeds the recommendations for the aforementioned nutrients intake.

Method / Design: A stratified sampling by regions of Greece was used to obtain a representative sample. A subsample of 3089 children was included in the analysis (mean age 10.9±0.7 years, 53% girls). Dietary assessment was based on a validated semi-quantitative picture-aid food frequency questionnaire. To obtain lifestyle and dietary patterns, factor analysis (principal components method) was applied.

Results: The top five food groups contributing to total EI were starch, olive oil, cheese, white milk/yogurt, and whole fruits. Among participants, 44.2% had FS intake above 10% of total EI with the main food contributors being 100% natural fruit juice, sweets, nectar fruit juices, chocolate milk and soft drinks. One of the extracted lifestyle patterns revealed that frequent ordering out, consuming fast-foods, and having meals in front of a screen was associated with increased consumption of foods high in FS. Concerning SF intake, 82.0% of children exceeded the cut-off of 10% of total EI. The main sources of SF were white cheese, milk, yellow cheese, ice cream, and sweets.

Conclusions: A large percentage of children exceeds the recommendations for FS and SF intakes. However, the food sources in Greek children were different than those identified in other populations. Additionally, intakes were associated with lifestyle patterns, highlighting the need for public health initiatives to focus on the right pattern to be more efficient.

Keywords: (maximum 5): Free sugars; saturated fats; dietary patterns, children, food sources

149/1284. Nutritional knowledge and dietary patterns in adults, including cancer cases from Warmia and Mazury

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Introduction: Knowledge regarding nutrition is an important social determinant of food consumption. There are no adequate studies on nutritional knowledge in relation to the dietary patterns (DPs) of adults, including cancer patients.

Objectives: The aim of this study was to assess the association between nutritional knowledge and DPs in adults, including cancer cases.

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Method / Design: It was a case-control study on 217 subjects aged 23-80 years from Warmia and Mazury in Poland, including 122 woman (17 breast cancer cases) and 95 man (54 lung cancer cases). The nutritional knowledge was evaluated using a set of 25 questions of the Questionnaire of Eating Behaviors (QEB) confirmed in the Cronbach's alpha analysis. The food frequency consumption for selected 21 foods was collected. Three DPs were identified in Principal Component Analysis: 'Dairy&fruit&vegetables', 'Processed&fast-food', and 'Traditional Polish', characterized by higher consumption of meat, fried foods and potatoes. Multiple logistic regression analysis was used, and the odds ratios (ORs) were calculated.

Results: The ORs for the upper tertile of 'Dairy&fruit&vegetables' DP in comparison to the bottom tertile of the DP (OR=1.00) were: from 3.95 (95%CI:1.06-14.76;p<0.05 with adjustment for sex and age) to 7.27 (95%CI:2.67-19.77;p<0.0001 without adjustment) in subjects in the upper tertile of nutritional knowledge and from 3.81 (95%CI:1.41-10.27;p<0.01 with adjustment for sex, age and cancer diagnoses) to 4.72 (95%CI:1.84-12.10;p<0.001 without adjustment) in subjects in the middle tertile of nutrition knowledge. The ORs for the upper tertile of 'Processed&fast-food' DP were: 0.20 (95%CI:0.08-0.49;p<0.001 without adjustment) in subjects in the upper tertile of nutritional knowledge. The ORs for 'Traditional Polish' DP were not significant.

Conclusions: A higher nutritional knowledge level was positively associated with pro-healthy pattern characterized by dairy, fruit and vegetables consumption, but inversely related to the non-healthy pattern characterized by processed and fast-food consumption in Polish adults including cancer cases from Warmia and Mazury.

Keywords: (maximum 5): nutritional knowledge, dietary patterns, cancer, adults

149/1285. Determination of relationship between dietary glycemic index, glycemic load and obesity in women with PCOS

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Introduction: Polycystic ovary syndrome (PCOS) is a common endocrine disorder in adolescents and reproductive age women.

Objectives: The aim of this study was to compare the nutrition habits of the subjects and assess the relationship between dietary glycemic index (GI) and glycemic load (GL) and obesity.

Method / Design: This study was conducted on 65 female premenopausal patients, aged over 18 years who were diagnosed with PCOS and on 65 healthy control women, having similar features. The questionnaire designed to assess general characteristics, anthropometric measurements and 3-days food record was performed face to face to the subjects by the investigator. Dietary GI and GL were calculated from food records.

Results: The variance of groups into body mass index (BMI) was different for group, however most of the women with PCOS were overweight or obese, most of the control groups were underweight or normal weight (p- 0.05). Waist circumference and waist/hip ratio were evaluated according to the women with PCOS compared with women in the control group in terms of obesity-related chronic diseases were found to be have a higher risk (p- 0.001). Average GI (PCOS: 59.6±8.0; control: 59.7±4.61) was not statistically different between both two groups (p- 0.05). The dietary GL of control group was higher than PCOS group (PCOS: 136.2±52.9; control: 156.4±40.2) (p- 0.05). The relationship between dietary GL and anthropometric measurements were assessed and BMI, waist circumference and waist/hip ratio of females whose GL was <120 was found higher than the females whose GL was ≥120 in PCOS group (p<0.05). There was no statistical difference between dietary GL and anthropometric measurements in control groups (p- 0.05).

Conclusions: Women with PCOS had a greater risk of overweight, obesity and central obesity. Clinical management of PCOS should include the weight management, adequate and balanced nutrition and healthy food choices

Keywords: (maximum 5): polycystic ovary syndrome, nutrition, obesity, glycemic index, glycemic load

149/1287. Iodine intakes in Irish preschool children

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Introduction: Iodine deficiency still remains a global nutritional public health challenge. An important mineral for health, it has a key role in the production of important thyroid hormones which are essential for cellular metabolism, growth and physical development. Hence adequate iodine is crucial at all stages of life, but imperative in a child's early life for neurodevelopment.

Objectives: Within Ireland no current information exists on iodine intakes in preschool children. Therefore the purpose of the current analysis was to estimate dietary iodine intakes using the cross sectional Irish National Preschool Nutrition Survey (NPNS) 2010-2011.

Method / Design: NPNS assessed habitual food and beverage intakes between 2010 and 2011 for 500 Irish preschool children using a 4-day semi-weighted food diary (www.iuna.net). Nutrient intake was analysed using updated iodine food content data obtained from the Irish Total Diet Study.

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Results: The median daily intake of iodine was 144µg/d (IQR 97-205µg/d). Intakes decrease as age increased, ranging from 173µg/d (IQR 113-244µg/d) in one year olds to 128µg/d (IQR 97-184µg/d) in four year olds. In the total population intakes were wide-ranging, with 10% failing to meet the estimated average requirement, whereas 23% fell marginally above the tolerable upper level (TUL). Of those that fell above the TUL 40% were one year olds compared to only 4% of four year olds. The major food source in all age groups was milk, with it contributing to 65% of iodine intakes. A significant decrease in the contribution of milk was observed across the age groups (p>0.001).

Conclusions: Iodine intakes in the Irish preschool population are adequate. High intakes were observed in one year olds which then decreased with age; higher intakes in this age group seem to be driven by milk consumption. Future research should consider assessing urinary iodine concentrations, a better indicator of iodine status

Keywords: (maximum 5): Iodine, dietary intakes, preschool children.

149/1296. Associated factors for inadequate enteral intakes of zinc, selenium, cholecalciferol and thiamine in critically ill children

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Introduction: Micronutrients are provided to critically ill patients as part of nutritional support to prevent deficiencies and associated complications. Although its deficiency is being increasingly recognized as a contributory factor for increased morbidity and mortality, data are scarce on the pattern of micronutrient intake in children receiving enteral nutrition.

Objectives: Based on the hypothesis that micronutrients enteral intake does not meet the recommendations, we sought to identify risk factors for inadequate intake of zinc, selenium, cholecalciferol and thiamine in critically ill children receiving enteral tube feeding during their ICU stay.

Method / Design: Prospective study in patients admitted to ICU who received enteral tube feeding for ³ 3 days. The analysis of micronutrients intake was done both on individual basis and by age groups during the first 10 days of ICU stay and compared with the Dietary Reference Intakes (DRI). The outcome variable was defined as 'not reaching the recommendations of micronutrients', using a 98% cutoff as probability of adequacy or an intake < AI (Adequate Intake) values. Potential explanatory variables were age < 1 year, malnutrition (WHO), clinical severity as measured by PIM 2 and PELOD scores, heart disease, use of vasopressors and dialysis. Univariate and multivariate logistic regression analyses were used to evaluate the effect of explanatory variables on the outcome.

Results: 260 admissions to ICU were included. The micronutrients intake was below the DRI in most patients. Age < 1 year, malnutrition, heart disease, use of alpha-adrenergic drugs and dialysis were independently associated with inadequate intake of at least one of the micronutrients studied.

Conclusions: The micronutrients intake was below the DRI in most patients. The risk factors associated with inadequate intake were age < 1 year, malnutrition, heart disease, use of vasopressors and dialysis.

Keywords: (maximum 5): intensive care unit, micronutrients, nutrition support, enteral nutrition, Dietary Reference Intakes

149/1309. Inadequate dietary and hygiene practices and knowledge of school-aged children in Burkina Faso

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Introduction: The present study was undertaken in the framework of the Swiss Development Cooperation (SDC)-funded Project "Vegetable Go to School" (VGtS).

Objectives: The present baseline survey aimed to assess school children's dietary and hygiene practices and knowledge in two regions of Burkina Faso, namely the Plateau Central and Centre-Ouest.

Method / Design: 446 school-aged children (8-14 years) were randomly selected in four intervention and four control schools to participate in the cross-sectional survey in February 2015. A tablet-based questionnaire on nutrition and health-related knowledge, attitudes and practices (KAP) was conducted using the Open Data Kit software. A standardized, individual dietary diversity score was calculated by counting the food groups consumed over the past 24 hours. Additionally, the children's caregivers (n=404) answered to a questionnaire survey on household socio-economic status, nutrition- and health KAP and food security.

Results: The mean individual dietary diversity score with 4 points out of maximal 9 points was low. Children reported to mostly eat starchy foods, very few vegetables in form of accompanying sauces and almost no fruits. Children's food consumption patterns were partly explained by the accompanying household questionnaire outlining the local availability of foods and a lack of nutritional knowledge. Hygiene practices were also very poor according to self-reported key indicators; most of the school-aged children did not use the latrines at the school premises for defecation and did not wash their hands after.

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Conclusions: The study showed that school-aged children's dietary and hygienic behaviours are far from optimal. Complementary nutrition and health interventions should be tailored to address the underlying factors in order to impact on these behaviours, thereby reducing dietary inadequacies and addressing poor hygiene practices.

Keywords: (maximum 5): dietary diversity, hygiene, children, Burkina Faso

149/1310. Introduction of complementary foods to Danish infants.

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Introduction: In Denmark, infants are recommended to be introduced to complementary foods around 6 months of age, or between 4-6 months if the child shows physiological readiness to eat solid food and no longer obtains satiety by breastfeeding or infant formula alone. New data from The National Dietary Survey 2014/15 enables detailed examination of current practices in Denmark.

Objectives: To describe the introduction of complementary foods in relation to age, birth weight and duration of full breastfeeding.

Method / Design: Parents of young children (6-36 months of age) completed a personal interview and parent-administered 7-days diet records. The interview included questions about duration of breastfeeding and time for introduction of selected foods and drinks in first year of life.

Results: The preliminary results, incl. 467 infants and 500 toddlers, show that 95% started breastfeeding, 74% reported full breastfeeding at 1 month, 55% at 4 and 10% at 6 month. Only 5% began the complementary feeding before 4 months of age while 15% began at 6 month or later. Veg/potato mash or porridge/gruel was introduced by 52% at the 4th month of life, increasing to 82% at 5th and 97% at 6th month. Meat and fish in mash was introduced by 3% at 4th month, 12% at 5th and 51% at 6th month. Sweets and sweet drinks were introduced by 39% at 10 month. Birth weight was not associated with age of introduction to complementary foods ($p > 0.4$) but full breastfeeding for at least 1 month was associated with delayed introduction (10 days, $p<0.001$).

Conclusions: Preliminary data show high compliance to recommended introduction time. But only half of the children were introduced to meat or fish at the 6th month of life. Full breastfeeding for at least 1 month seems to be associated to delayed introduction time.

Keywords: (maximum 5): breastfeeding; complementary foods; introduction age; weaning; birth weight

149/1317. Selenium and mercury intake by fish from Polish market

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Introduction: Humans are exposed to different xenobiotic as a result of environmental pollution, lifestyle, and dietary habit. Mercury (Hg) is one of the most harmful element, and toxicity of Hg strongly depends on its chemical forms. Selenium, (Se) is regarded as an beneficial of human health, and now known as an antioxidant, and co-factor of Se-enzymes and proteins. Humans exposure to Hg and Se from many sources, and one of the important source include diet, especially fish and seafood.

Objectives: Se and its derivatives are known to have protective effect against Hg toxicity in mammals. The aim of the present study is to evaluate Se and Hg content in fresh and after heat treating (cooking, grilled, fry) fish from Polish market.

Method / Design: Mercury content was determined by Thermal Decomposition Amalgamation Atomic Absorption Spectrometry method (TDA-AAS) using DMA 80, Milestone analyzer. Se analysis was conducted by Inductively Coupled Plasma Mass Spectrometry (ICP-MS)(Elan DRCE-e, Perkin Elmer).

Results: Mercury concentration in fresh fish samples (expressed in mcg/g wet weight) varied from 0.033 to 0.120, while Se content varied from 0.11 to 0.400 mcg/g wet weight. Differences in Hg and Se content was proved after heat treating. We found that Se concentration is much higher than Hg content.

Conclusions: The results indicate that Hg concentration in fish samples available from Polish market have been well below the permissible FAO/WHO limit for those toxic metal.

Keywords: (maximum 5): mercury, selenium, fish, toxic metals
Acknowledgement: This study was supported by Ministry od Science and Higher Education; grant No. 2013/11/B/NZ7/04934.

149/1318. Protective effect of grewia bicolor on the variation of some obesity makers in wistar rats

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Introduction: Obesity is a critical and growing problem throughout the world. Its worldwide prevalence has doubled between 1980 and 2014. Dietary management is one of the best options to prevent and manage obesity. This can be done by consuming edible plants rich in dietary fiber like Grewia bicolor.

Objectives: The aim of this study was to evaluate the protective effect of an aqueous extract (AE) of Grewia bicolor on some parameters of obesity in Wistar rats.

Method / Design: The AE of G.bicolor at a dose of 400 mg / Kg BW were administered to rats feed with high fat/high fructose diet. The rats were weighed and glycemia were measured every three days from the beginning to the end of experiment. After 21 days of treatment, the rats were allowed to twelve hours of fast and sacrificed. The abdominal fat was removed; plasma was used for the lipid profile.

Results: This study revealed that, the simultaneous administration of experimental diet and AE was observed to significantly decrease weight gain (variation of weight: 13,627 ± 0.001g), weight of abdominal fat (242, 19 ± 0.001g), triglycerides (202,224 ± 1.752mg/dL), total cholesterol (108,474± 12.633mg/dL) and glycemia (variation: 6,25 mg/dL).

Conclusions: These results suggest that the aqueous extract of the stems of G. bicolor could be effective in delaying obesity and its associated complications evolution.

Keywords: (maximum 5): Obesity, Grewia bicolor, body weight, lipid profile, glycemia.

149/1319. Could a smoothie, rich in nutrients and bioactive substances, improve school performance?

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Introduction: Fruits and vegetables contain vitamins, minerals and other bioactive substances, which are important for intellectual performance. In a previous study it was shown that approximately two third of the pupils were hungry the last lesson before lunch. The average fruit and vegetable intake at lunch was much lower than the recommendations.

Objectives: The purpose of this pilot study was to investigate effect on attention and school performance of a vegetable smoothie, rich in berries, fruits and vegetables, served at the mid-morning brake.

Method / Design: In total 250 Swedish children aged 10-12 years participated. The study was designed as a cross-over trial with two study periods of ten schooldays. The children were randomly divided into two groups and were administered either an active smoothie (smoothie 1; group A) or a fruit-based placebo with the same energy content (smoothie 2; group B). Both smoothies were designed to provide 5% of the daily energy. After a three week wash-out period, group A was administered smoothie 2 and group B, smoothie 1. Statistical tests were performed using SPSS package, version 22.0, using Independent-Samples T test. Analysis included processing speed (PTO), concentration performance (CP) and percentages of error (Ep) as assessed by the D2-test

Results: Preliminary analyses indicate that PTO and CP increased during the intervention period, whilst Ep decreased, for both groups. The effect was stronger in the group drinking the active smoothie, than in the group drinking the placebo. The effect might partly be caused by the addition of water and energy

Conclusions: Attention, and thereby also school performance, may be improved by mid-morning consumption of a smoothie containing water, energy and preferably nutrients and other bioactive substances.

Keywords: (maximum 5): School performance, fruit and berries

149/1328. Sports nutrition case-control study in the community pharmacy throughout a multidisciplinary approach

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Introduction: Currently there is a large population practicing sports as amateurs but highly demanding physically: runners, cyclists… The community pharmacists are healthcare professionals that have the closeness and availability of seeing them on a regular basis and with enough education and tools can do food counseling and provide personalized food supplements for better a physical performance.

Objectives: conduct a pilot study with an intervention group of runners where food counseling, advice on food supplementation and other lifestyle habits are provided. The results of their improvement

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in physical performance is compared to a control group where no specific counseling is provided besides leaflets.

Method / Design: case control study in the community pharmacy throughout a multidisciplinary approach during a 3 months intervention. Within the community pharmacy a questionnaire is provided at t0 and t3. Some measures of muscle mass with bioimpedance, self-perception of fatigue and recovery, and time performance are conducted. And competition ranking performance figures are recorded. Several follow-up interviews during the 3 months intervention are provided and a referral to a sports doctor for a stress test (exercise test).

Results: a significant better performance in the measured parameters are observed in the intervention group versus the control group. Individuals are excluded if changes in frequency, intensity or even resting training times and in dietary habits are declared.

Conclusions: amateurs in sports training more than 3 times per week are sometimes misinformed. Some following unhealthy habits that may be ineffective or harmful at long term. Thus, actions to science based guidelines for food counseling such as the present one are good strategies for health professionals.

Keywords: (maximum 5): sport, nutrition, food supplements, physical performance, ergogenic

149/1329. Age and gender differences in vitamin D saturation and lipidemia

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Introduction: Lower serum concentration of 25-hydroxy vitamin D has been linked to several health problems, it has been associated with an unfavourable lipid profile nad its risk increases with age. Differences between 25(OH)D concentration in diverse groups and relations between vitamin D serum levels and lipids serum levels have received so far only little attention in Slovakia.

Objectives: The aim of our study was to evaluate the saturation of vitamin D in two age and sex groups and to analyse the correlation between the 25(OH)D and total cholesterol (TC) and triglycerides (TG).

Method / Design: 328 subjects were involved (183 (55 %) women and 145 (45 %) men) and venous blood samples were taken during the winter period from January to March 2014. EpiInfo was used for statistical analysis.

Results: The mean levels of vitamin D were 16.52±1.03 mg/l in 85 young adults (up to 35 years); in women 17.26 ± 1.52 mg/l, in men 15.51±1.2 mg/l; (p=0.39). In 243 older participants (more than 35 years) the levels of vitamin D were lower in females (18.99 ± 0.86 mg/l) compared to males (21.35 ± 1.20 mg/l); (p=0.10). Comparing the mean values of vitamin D in young and older men we found statistically significant differences (p~ 0.001), that was not confirmed in women (p=0.31).The average TC and TG levels were 4.86 ± 0.05 mmol /l and 1.34 ± 0.04 mmol /l, respectively. We have found a significant correlation between levels of vitamin D and TC and TG (p~ 0.05).

Conclusions: We have shown the lack of vitamin D saturation in all studied groups, lower serum 25 [OH] D we have observed in younger adults, especially in men. Our findings have indicated a possible relationship between the concentration of 25 (OH) D levels and lipidemia.

Keywords: (maximum 5): 25(OH)D, total cholesterol, triglycerides

149/1344. The development of food-based dietary guidelines for the population living in Greece: The "Ef…Diatrofin" project

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Introduction: Unfavorable changes in the diet of the Greek population have been observed during the last decades, while chronic, diet-related, diseases are the main causes of morbidity and mortality.

Objectives: To develop country-specific, food-based dietary guidelines (FBDG) for: a) the general adult population, b) infants, children and adolescents, c) women in pregnancy, lactation and menopause, and d) the elderly.

Method / Design: The following aspects were reviewed and considered:

a) The latest scientific evidence regarding the relationship between diet and health. Evidence-based reports from international agencies and/or organizations (e.g. WCRF/IACR, WHO) and national scientific Committees and/or Agencies (e.g. NHMRC) were collected and additional extensive literature reviews (in PubMed) were conducted exploring specific hypotheses. The level of evidence and the strength of the recommendation for each explored hypothesis were graded using the grading system developed by the European Society of Cardiology, with some modifications.

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b) Existing FBDG established by: (i) international and national health Organizations/Agencies and/or scientific professional societies, (ii) European and other Western countries, by population group were available.

c) The current dietary habits of the Greek population and their secular trends.

d) The importance to preserve and promote the traditional Greek diet and the local cuisine.

e) The availability and cost of food products in the market.

f) The preservation of the environment.

For each population group, Dietary Reference Values were taken into consideration, in order to meet their nutritional needs, as well as, socio-cultural and behavioral issues that influence their diet.

Results: FBDG, qualitative and quantitative, were launched in October 2014. Two documents, for the general public and for health professionals, were created for each population group.

Conclusions: FBDG, used as a policy tool, could contribute in improving dietary habits and health of the Greek population.

Keywords: (maximum 5): Food-based, dietary guidelines, Greece, development

149/1346. Dietary Patterns in Students of the Metropolitan Autonomous University of Mexico

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Introduction: Dietary patterns assesse is essential for research reporting nutritional adequacy in a given student population. Data is essential to determine the prevalence of adequate or inadequate diet, or excessive intake of food, reliable estimates, habitual nutrient consumption, which is also important to improve possible derivation of incorrect dietary patterns in order to obtain a better nutritional status of students and general welfare

Objectives: The aim of this study was to assess the daily variation in food and nutrient intake of students and to design a dietary pattern, adequate for them

Method / Design: A sample of 400 students at the Metropolitan Autonomous University, of 200 male and 200 female, age 18 to 25 were randomly selected for a longitudinal study provide for a year at 2014. Seven days dietary intake was recorded to assess, for macronutrients: proteins, lipids, carbohydrates, and fiber, K/calories and micronutrients: Na, K, Ca, P, Fe, and drinks.

Results: Data obtain for both sexes across all age groups with significant daily variation ($p < 0.01$) was observed in very low vegetables consumption, excluding potatoes and potatoes products during the whole week. Beverages and alcoholic drinks consumption was higher on weekends. No consistent variation occurred for cereal and cereal products, milk and milk products, meat, fruit, sweets and soft drinks for any of the sex-age groups. Fish intake was very seldom

Conclusions: Students from this study, diet quality was very poor in vegetables and fish, variation on beverages and alcoholic was observed on Saturday and Sundays but not vary substantially week days with respect to energy and nutrient intake. Suggestion was to increase vegetable consumption and low alcoholic beverages

Keywords: (maximum 5): Dietary intake, Students, Mexico

149/1347. Influence of drinking knowledge and behaviour on hydration status; The European Hydration Research Study (EHRS)

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Introduction: Hydration status is linked with total water intake from food and beverages, but also individual water requirements. It is unclear if drinking behaviour and knowledge influences hydration status in population groups.

Objectives: To explore the association between drinking knowledge and hydration status based on total water intake (TWI), urine osmolality (Uosmo) and urine volume (UV) in a free living large European sample.

Method / Design: Data on food and fluid intake and 24h urine samples was collected during 7 consecutive days by 590 men and women from Spain, Greece and Germany. On day 1 nutrition knowledge and drinking behavior questionnaire was filled in. Total water intake was calculated using nutrition software. Daily UV and Uosmo were used to assess urinary output and hydration status, respectively. Results of valid questionnaires (n=465) were evaluated regarding hydration status and knowledge. Data are presented as mean±sd or in percentage.

Results: Subjects who acknowledged thirst as a good indicator for dehydration (60%) have significant lower TWI (2.6±1.0L vs. 2.9±1.0L; p=0.003), lower UV (2.0±0.6L vs. 1.8±0.1L; p=0.006) and higher Uosmo (620±221 mosmol/kg vs. 553±210 mosmol/kg; p=0.013). Almost

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all (97%) subjects confirm that dehydration can affect concentration. 57% feel that their concentration becomes affected if they do not drink. This is different among countries (Germany 71%, Greece 52%, Spain 33%;p<0.001). Caffeinated beverages were ranked to dehydrate by 51%. This statement was different between countries (Germany 35%, Spain 43%; Greece 76%; p<0.001).

Conclusions: Perception concerning relevance of thirst shows significant differences in hydration status. Country specific differences were observed regarding the feeling that drinking affects concentration and the classification that caffeinated beverages have an effect on hydration status.

Keywords: (maximum 5): water intake, hydration status, drinking behaviour, drinking knowledge, thirst

149/1364. Determination of relationship between dietary Glycemic index, Glycemic load and gestational Diabetes Mellitus

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Introduction: Maternal nutrition, particularly dietary glycemic index (GI) and glycemic load (GL), influences maternal blood glucose concentrations and may contribute to occurrence of gestational diabetes mellitus (GDM).

Objectives: The purpose of this study was to determine the possible association between dietary glycemic index, glycemic load during pregnancy and the development of gestational diabetes mellitus.

Method / Design: The study conducted on 40 women with GDM as case group and 40 healthy women as a control group recruiting from the Department of Gynecology of Gulhane Military Medical Hospital in Ankara. Exclusion criteria were polycystic ovary syndrome, kidney disease, thyroid disease, pre-GDM, multiple pregnancy. GDM was diagnosed with two-step oral glucose tolerance test. Dietary information was obtained by mean intakes of a 3-day food record on 2 weekdays and 1 weekend day. Dietary GI and GL were calculated with using food records and International Tables of Glycemic Index and Glycemic Load Values: 2008.

Results: The average maternal age was 32.1±4.9 years among cases and 28.7±4.9 years among controls. The average dietary GI (80.2±9.97 versus 62.3±9.70, p<0.0001) and GL (253.8±8 versus 145.0±34.59, p<0.0001) were higher in the case group than in the control group. All of the women with GDM and 69.9% of healthy women consumed high dietary GL (GL≥120) meal and the difference between the two groups was statistically significant (p<0.05). In this study, we found that women with a consumption of high dietary GL had a 2.23 fold greater likelihood of gestational diabetes mellitus.

Conclusions: There is a significant relation between components of diet, especially dietary glycemic index, glycemic load and improving GDM. Healthy nutrition and medical nutritional therapy are feasible for preventing and management of GDM.

Keywords: (maximum 5): gestational diabetes mellitus, nutrition, glycemic index, glycemic load

149/1382. The nature and extent of food poverty/insecurity in Scotland: preliminary results.

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Introduction: The rise in food banks use in Scotland is a health and social policy concern since it could hide a larger food poverty (FP) problem. Poorer households are more at risk of FP as they have larger food income shares, than do more affluent households. However the extent of food poverty prevalence in Scotland has not been studied.

Objectives: This study explores the nature, extent and current prevalence of FP in Scotland,

Method / Design: There is no accepted definition of FP; the research uses the widely accepted definition of UK poverty, defined as a household below average income (HBAI), with equivalized income < 60% of the national median. Using existent data from the most updated and well established population surveys (Living Costs and Food Survey, Scottish Health Survey) the study identifies the consumption frequency of food indicative of diet quality (starchy-food, protein, fruits and vegetables) between HBAI and Non-HBAI and the differences in food income expenditure ratio between the two groups.

Results: 12% of the survey population were considered as HBAI. Results from the quantitative analysis suggest little evidence of a food intake frequency gap (starchy-food and protein) between HBAI and Non-HBAI. Alternatively, results indicate that a larger share of Non-HBAI reach the 5-a-day fruits and vegetable target (22% vs 12% in 2012). Other results indicate HBAI's food income share (23%) is twice as large as Non-HBAI (11%).

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Conclusions: Whilst food consumption frequency is similar between HBAI and Non-HBAI, the difference is noticeable regarding fruits and vegetables consumption. HBAI also have a larger food income share. The implications for diet quality need to be explored. Future primary research is needed to avoid the limitations of secondary-data sources.

Keywords: (maximum 5): 149/1387. Low Dietary diversity associated to Stunted Child Overweight Mother in Aguata LGA of Anambra state, Nigeria

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Introduction: Dietary diversity and pattern is a good measure of nutrient intake and proxy for nutritional status. Stunted Child Overweight Mother is the most prominent type of double burden of malnutrition found at household levels

Objectives: This study evaluated individual dietary diversity of mother-child pairs and its occurrence of stunted child overweight mothers, and the consumption of specific food groups and the syndrome

Method / Design: A total of 455 households were selected for the study using multi-stage sampling. In the study population, each woman (aged 15 – 49 years) and her youngest under-five child was selected to ascertain the level of individual dietary diversity score (IDDS) and its relationship with anthropometric status. 14-item FAO individual dietary diversity questionnaire was used for mothers and children above 36 months, 22-item Demographic Health Survey dietary diversity questionnaire was employed for children aged 6 – 36 months. The IDDS was assessed on food groups consumed during last 24 hours and score accordingly. Other relevant socio-demographic data were also collected.

Results: Sixty-four percent of the mothers were overweight/obese. The proportion of children stunted, wasted and underweight was 27.3%, 14.8% and 14.5% respectively. Mean number of food groups consumed was 5.5±1.3 and 5.2±1.1 by mothers and children older than 36 months respectively. Children aged 6 – 36 months old consumed 4.8±2.0 food groups. Children less than 36 months who consumed less than 5 food groups/day were 2.3 times more likely to be stunted than those children who consumed more than 5 food groups (CI = 1.4-3.8). Further analysis revealed that the food groups consumed by the women and children were same.

Conclusions: The results of the study shows that stunting in children and maternal overweight/obesity had a common denominators of small Individual dietary diversity score. To effectively combat double burden of malnutrition at these households, diets must be diversified.

Keywords: (maximum 5): Stunted Child Overweight Mother, Aguata LGA, Dietary diversity

149/1395. Fluid intake of children and adolescents training combat sports

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Introduction: Fluid intake is one of the important dietary habits influencing the total energy intake.

Objectives: The aim of the study was to assess the fluid intake of children and adolescents training combat sports.

Method / Design: Nutritional data of 61 children and adolescents, 20 girls and 41 boys, (under the supervision of parents) and anthropometric data of 57 participants (height, weight, body mass index - BMI) were collected in 2014. BMI was rated using norms for age and gender published in textbook „Praktyczny podręcznik dietetyki" by M. Jarosz et al.

Results: Boys were significantly older than girls (11,3 ± 2,7 vs 10,0 ± 2,3 yrs, P<0.05). Normal BMI had 75,0% girls i 64,9% boys , overweight were 25,0% i 29,7% respectively (P<0,05). Over 90% participants declared 120 minuts of sports training per week; over 82% - daily consumption of the first and second breakfast, lunch and supper. Daily fluid intake under 1,0 l was declared by 30% participants, 1,0-1,5 l – up to 50,0%, over 1,5 l – less than 20%. Still water was the most often declared beverage (over 90,0% participants), followed by juices (over 82,5%) and tea with sugar (over 61,0%). Questions regarding the consumption of beverages with main meals showed different trends in the fluid intake. Still water was the main beverages drunk at the second breakfast or between meals (over 50,0% participants), while the most popular beverages were: at the first breakfast and supper – tea with sugar (over 60% participants), at lunch – compote (over 40,0%). These data were statistically insignificant between genders.

Conclusions: According to pediatric societies water is the recommended beverage for children and adolescents. Despite declaring it as the main beverage it was the main fluid consumed only with one meal. There is the need of education about proper hydratation.

Keywords: (maximum 5): fluid intake, children, adolescents

149/1402. Prevalence of Malnutrition and Associated Factors Among Children Aged 6-59 Months at Hidabu Abote District, North Shewa, Oromia Regional State

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Introduction: Malnutrition continues to be a major public health problem in developing countries. It is the most important risk factor for the burden of diseases. It causes about 300, 000 deaths per year and responsible for more than half of all deaths in children. In Ethiopia, child malnutrition rate is one of the most serious public health problem and the highest in the world. High malnutrition rates in the country pose a significant obstacle to achieving better child health outcomes.

Objectives: To assess prevalence of malnutrition and associated factors among children aged 6-59 months at Hidabu Abote district, North shewa, Oromia.

Method / Design: A community based cross sectional study was conducted on 820 children aged 6-59 months from September 8-23, 2012 at Hidabu Abote district. Multistage sampling method was used to select households. Children were selected from each kebeles by simple random sampling. Anthropometric measurements and structured questioners were used .Data was processed using EPi-info soft ware and exported to SPSS for analysis. Then after, sex, age, months, height and weight transferred with HHs number to ENA for SMART 2007software to convert nutritional data into Z-scores of the indices; H/A, W/H and W/A. Bivariate and multivariate logistic regressions were used to identify associated factors of malnutrition.

Results: The analysis this study revealed that, 47.6%, 30.9% and 16.7% of children were stunted, underweight and wasted, respectively. The main associated factors of stunting were found to be child age, family monthly income, children were received butter as pre-lacteal feeding and family planning. Underweight was associated with number of children HHs and children were received butter as per-lacteal feeding but un treatment of water in HHs only associated with wasting.

Conclusions: From the findings of this study, it is concluded that malnutrition is still an important problem among children aged 6-59 months. Therefore, especial attention should be given on intervention of malnutrition.

Keywords: (maximum 5): malnutrition, children, Hidabu Abote district

149/1404. Pattern of macro and micro-nutrient intake among Bangladeshi type-2 diabetic and non diabetic subjects

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Introduction: Diet plays an important role in the management and preventing complication of Diabetes Mellitus and dietary intake of nutrients very substantially between population to population. Very little is known about intake of macro- and micronutrients among non-diabetic and diabetic population in Bangladesh. The aim of this study was to assess the macro and micronutrient intake and compare those with a standard recommendation.

Objectives: Method / Design A cross-sectional study was done among 18697 individuals (diabetic 11917,non-diabetic 6780) in 16 diabetic hospitals in the capital and northern part of Bangladesh. Data were collected using a pre-tested, semistructured questionnaire by face to face interview. Anthropometric measurement and biochemical analysis were done by standard techniques. Dietary data was collected using a 3 days food frequency questionnaire. Under-consumption, adequacy, and over consumption of nutrients were compared to the standard of the WHO reference intakes.

Results: 42% of the subject were male and 58% were female. The mean age (±SD, years) of the non diabetic and diabetic subjects were 39±14 and 50±12, respectively. The corresponding BMI values were 23.7± 3.8 and 25.4±3.9. Mean Carbohydrate, protein and fat intake (in gram) of the diabetic subjects were 176 ±143, 76 ± 64, 67 ± 16, respectively and the corresponding values for non-diabetic subjects were 275 ±71, 115 ± 34, 38 ± 12. Regarding micronutrients intake, Mean Calcium, Iron, Thiamin, Riboflavin, Vitamin C, beta-carotene and Vitamin A intake(in gram) of the diabetic subject were 1748 ± 560, 70 ± 24, 2.3 ± 0.7, 2.3 ± 0.9, 511 ± 165, 31184± 12020, 6113 ± 2541, respectively. Carbohydrate and fat intake were higher than the recommended value in both groups. On the contrary, iron, calcium and fiber intake were lower than the recommended dietary allowances (RDA) amounts (56%, 40%, 46% of RDA, respectively).

Conclusions: Although food habits of diabetic subjects differed from those of non-diabetic ones, these habits are not totally in line with nutritional recommendations. These results should be taken into account to adapt nutritional advice given to the diabetic population.

Keywords: (maximum 5): 149/1406. Micronutrient intakes by preschool children attending public and private kindergartens in Kosovo

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Introduction: Appropriate food intake by preschool aged children is important for their normal growth

Objectives: This study aimed to assess for the first time the micronutrient intake by children attending public and private kindergartens of Kosovo.

Method / Design: Between December- 2010 and December 2011, 469 out of 486 recruited preschool aged children from five randomly selected kindergartens of Kosovo, have participated in a dietary intake assessment through weighted dietary record method. The program PRODI and SPSS version 17 were used for calculation and comparison of micronutrient values with dietary reference values. The one - way analyses of variance (ANOVA) was used for determination of differences between the mean values according to age and gender as well as according to public and private kindergartens

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Results: The intake of several micronutrients was below recommendations (the iodine covered only 9.6% to 11%; the iron intake covered between 41.3 and 52.5% of RDI; folic acid intake was quite low covering only about 23% and the average intake of Vitamin B1, Vitamin B2 and Vitamin C by children attending public kindergartens was below 50 % of daily recommended allowances), while chloride and sodium intake was much higher than the RDI (the chloride covered between 217 and 219% and sodium intake covered between 291 and 306% of RDI).

Conclusions: Diets of kindergartens indicate deficits in micronutrient intake. Deficiencies in intake of several micronutrients should be addressed immediately.

Keywords: (maximum 5): Kosovo, Pre-school children, micronutrients

149/1408. Food and nutrient intake of lactating women (France): results of the first national dietary survey

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Introduction: Good nutrition during the lactation period is an important factor to optimal health for women and for their infant. As far as we can conclude there has been no nutritional assessment made on this population group.

Objectives: Evaluate the food and nutrient intake of lactating women in France, and assess the presence of nutritional gaps.

Method / Design: 486 lactating women were recruited between September 2014 and October 2014 using an online socio demographic questionnaire. Participants were asked to use an online food diary, with the SUVIMAX portion size tool to record food consumption for 7 consecutive days. The 2014 CIQUAL food composition table was used to estimate the nutrient intake. Data are reported as means, standard errors and standard deviations. The SAS 9.2 software was used for statistical analysis (SAS Institute, Inc, Cary, NC.). For methodological reason, misreporters were not excluded, except 1 participant with energy intake > 5000kcal/day

Results: 250 food diaries were analyzed (170 never filled and 65 excluded because they were filled on < 4 days). Mean total food intake was 2056.6g/day. Mean water and total liquid intake were 617.6+36.5g/day and 1168.4g/day, respectively. A low proportion of participants met the French nutritional Guidelines (fruits and vegetables: 11.0%, dairy products: 11.1%, bread, cereals potatoes and legumes: 20.8%). Mean energy intake was 1669.2+32.8kcal/day with 80% below the French recommendation. Mean protein intake was 1+0.03g/kg/day, with 67% below the French recommendation. Mean total lipids, alpha-linolenic acid, linoleic acid and docosahexaenoic acid intakes were 66.2+1.5g/day, 0.6+0.02g/day, 4.8+0.1g/day and 0.1+0.0g/day, respectively. Mineral and vitamins intakes were below the French recommendations

Conclusions: The study suggests that lactating women may be at risk of energy deficits and nutrient inadequacies. More focus should be placed on educating women about the importance of healthy eating habits during the lactation period.

Keywords: (maximum 5): food intake, lactating women.

149/1411. Effect of caloric restriction on Sirtuin-1 disorders associated with diabetes in male rats

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Introduction: : Type 2 diabetes mellitus (T2DM) is characterized by insulin resistance, hyperinsulinaemia and hyperglycaemia. Increased glucose production through abnormally elevated hepatic gluconeogenesis is central to the manifestation of hyperglycaemia in T2DM. Also,obesity is associated with hyperinsulinemia and insulin resistance (IR).So, the effects of caloric restriction (CR) on diabetes have been documented extensively . Even, in short term studies, CR exhibited improvement of hyperglycemia and insulin level before changes in body composition and fat distribution(Westman et al., 2007).

Sirtuin 1 (SIRT1) has been identified as regulator of gluconeogenic gene expression. The present study aimed to evaluate the effect of caloric restriction on SIRT1 level and activity in liver and pancreas of diabetic rats. Further, the possible role of SIRT1 on metabolic disorders associated with diabetes mellitus, including serum levels of glucose, insulin, triglyceride (TG) and high density lipoprotiens (HDL), will be explored.

Objectives: Method / Design Thirty two male albino rats were divided into control group (GpI), diabetic (DM) group (GpII), (CR+DM) group (GpIII) subjected to 30% caloric restriction program for 1 month before induction of diabetes

, (DM+CR) group (GpIV) subjected to 30% caloric restriction program for 1 month after induction of diabetes. At the end of the study, BMI%, serum levels of glucose, insulin, TG and HDL, HOMA, SIRT1 level and activity in liver and pancreas and pancreatic DNA ladder were assessed.

Results: Our results showed caloric restriction either before or after induction of diabetes was associated with significant improvement of (serum glucose, insulin, TG and HDL levels, HOMA-IR, SIRT1 level and activity in liver and pancreas, and pancreatic tissue). Although BMI% was significantly decreased in GpIV yet it did not show any significant change in GpIII when compared to GpII. Remarkably, we did not detect any significant difference between the effects of CR either pre or post diabetes.

Conclusions: lowered SIRT1 in diabetes was improved by 30% caloric restriction. Consequently, the pathophysiological disorders associated with T2DM were improved.

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Keywords: (maximum 5): DM – Caloric restriction - SIRT1- Pancreatic apoptosis.

149/1426. How do breast cancer survivors implement the nutrition guidelines?

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Introduction: The number of cancer survivors, especially those that are recovered, is growing steadily and is estimated at 3.5 million in Germany in 2005/2006. Evidence based nutrition and physical activity guidelines for cancer survivors from the American Cancer Society target on cancer risk reduction or on improving outcomes in cancer survivors. In Germany little information about nutrition and physical activity of breast cancer survivors is available.

Objectives: Method / Design The present cross-sectional study analyses the health status and quality of life, the nutritional status including a food frequency questionnaire and physical activity of breast cancer survivors by surveying self-help groups, gynaecological practices and private persons in different federal states. 236 questionnaires were evaluated.

Results: 75% of breast cancer survivors were diagnosed more than 4 years prior to the study.. 59% of participants were more than 60 years old. 78% of participants had not experienced a relapse. State of health and physical condition after the completion of treatment were mostly rated as good, quality of life was mostly rated even as very good. However, 58.5% of respondents stated to having difficulties being physically active in daily life. 44.9% of participants reported weekly sporting activities of 0.5 – 2 hours compared to recommendations of 30min. physical activity/d. Among the women aged 60–69 years, 33.6% were of normal weight, 49.0% were overweight, 16.3% obese and 1.0% underweight. 49.6% of women had experienced a mean weight gain of 8.6 ± 6.1 kg after treatment. Participants did not reach nutrition recommendations concerning the consumption of fruit and vegetables and whole grain products. 72.5% of participants had not been offered nutritional advice.

Conclusions: Nutrition guidelines for cancer survivors have not been met by the majority of breast cancer survivors who are disease free or who have stable disease. There is a high demand for nutrition and life style interventions.

Keywords: (maximum 5): cancer survivorship, breast cancer, nutritional status, quality of life, food frequency

149/1430. Disagreement of Intakes Estimated from a Food Frequency Questionnaire and 3-Day Diet Record in students

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Introduction: Accurate information about children's and adolescent's intake is necessary for national nutrition policy and for research and clinical activities.

Objectives: Evaluate the relative validity of nutrient intake using the Semi-Quantitative Food Frequency Questionnaire (SFFQ) developed for school and 3-day diet records (REC).

Method / Design: A total of the 103 students (6- to 14-year-old) participated in this study, and were recruited from the Ribeirão Preto's municipal school. We grouped the participants into a "Children" group (6-10 years) and an "Adolescent" group (10-14 years). Dietary intakes were measured using the SFFQ and 3-day diet records, in non-consecutive days with nutrient analysis of the 3-day diet records conducted using the Support Program for Nutrition (Nutwin). The SFFQ was completed by a trained interviewer and student. Food models and portion size pictures were used to increase reporting accuracy. To evaluate the agreement between methods, we used the graphical technique of Bland and Altman.

Results: The final number of subjects participating in the analysis was 58 (10 childrens and 48 adolescents). SFFQ overestimated intakes from 3-day diet records for both, children and adolescent : energy, fiber, cholesterol and macronutrients, vitamins A, C, E, thiamin (B1), riboflavin (B2), niacin (B3), pyridoxine (B6), and cobalamin (B12), calcium, iron, zinc, magnesium, sodium and potassium. The SFFQ overestimates all variables; percentile of the difference was less than 20% only for protein, magnesium, zinc, vitamin B6 and B12 for adolescents.

Conclusions: The SFFQ applied to children and adolescents in the city of Ribeirão Preto did not show good validity for all variables, overestimating the intake of energy, macro and micronutrients. These findings highlight the importance of additional research development, validation and reproducibility of food frequency questionnaires for adolescents.

Keywords: (maximum 5): food frequency questionnaire, dietary assessment

149/1440. Intestinal absorption of Amino Acids and Peptides from vegetal protein by an integrated gastrointestinal in vitro model

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Introduction: Food proteins are important nutrients that the body uses to build cellular structures that carry out vital functions. For this, first it is necessary their digestion in the gastrointestinal tract.

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Protein digestion begins in the stomach with the action of the enzyme pepsin. In the small intestine, pancreatic enzymes break down the polypeptides. The pancreatic and brush border enzymes continue the hydrolysis of the polypeptides into small peptides into amino acids, which are absorbed into the small intestinal epithelial cell and exported from the cell into blood.

Objectives: The aim of this study is to determine the in vitro bioavailability of the aminoacids present in the vegetable protein by an integrated in vitro model (Dynamic in vitro Digester and a cellular intestinal model).

Method / Design: A Dynamic Gastrointestinal Digester (DGD) was used to perform in vitro digestion. The dynamic in vitro digestion was conducted to simulate the human digestive system via a three-step digestion (mouth, stomach and small intestine). After digestion of the vegetal protein, the obtained sample was used to carry out the studies of the bioaccessibility and the bioavailability with Caco-2 cells of the free amino acids. Aminoacids content has been analysed at the beginning and at the end of the simulated gastrointestinal process and in the basal media of cell samples by HPLC.

Results: After the gastrointestinal digestion process it is produced a high percentage of hydrolysis of vegetal protein. The bioavailability of free amino acids is high and the bioavailability (measured as the efficiency of the amino acids transport) is more than 40% in the majority of amino acids.

Conclusions: Our results with the integrated in vitro model evidence the high hydrolysis of vegetal protein, resulting in a high bioaccessibility and bioavailability of amino acids from this protein.

Keywords: (maximum 5): bioaccessibility, absorption, amino acids, protein, peptides

149/1441. Bioaccesibilility bioactive compounds in new generation of fruit origin food supplements

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Introduction: Bioactive food compounds need to be bioavailable in order to exert any beneficial effects. The knowledge of the bioaccessibility of the compounds is a very important factor in evaluating the nutritional value of an enriched matrix with these compounds. Bioaccessibility has been defined as the fraction of a compound which is released from the food matrix in the gastrointestinal lumen and thereby made available for intestinal absorption. It is influenced by the composition of the food matrix, the synergisms and/or antagonisms of the different components and by the physicochemical properties.

Objectives: The aim of this study has been to evaluate the bioaccessibility of thymol, silicom and DHA in the new generation of fruit origin food supplements through utilization of a Dynamic in vitro Digester.

Method / Design: A Dynamic in vitro gastro-intestinal digestion has been performed, which has included an enzyme treatment in three stages: a first stage with amylase, a second stage with pepsine at pH2 (gastric digestion) and a third stage with pancreatic and intestinal enzymes at neutral pH (intestinal digestion). After digestion, bioactive compounds concentration was evaluated in the whole soluble fraction of the digestate (containing compounds supposed to be available for absorption).

Results: mastication process doesn´t affect to the thymol and silicom content, however this process produces a significant degradation of DHA. After in vitro digestion the thymol, silicom and DHA bioaccessibility were found as 82.13%, 54% and 45% respectively.

Conclusions: Our results evidence the high bioaccessibility of thymol. Furthermore, food supplements matrices affect the silicom and DHA bioaccessibility because the concentration of the bioactive molecule in the soluble fraction is much lower than in the not digested food. This confirms the need of the use of the in vitro system gastrointestinal digestion in order to evaluate the effective role of food supplement as carrier of bioactive compounds.

Keywords: (maximum 5): bioaccessibility, supplements, thymol, silicom, DHA

149/1442. Synergic effect of dietary bioactive compounds on insulin resistance in HepG2 cells

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Introduction: The abdominal obesity and insulin resistance are hallmarks of the metabolic abnormalities of the Metabolic Syndrome (MS). Recently, the research has focused on identifying dietary bioactive compounds to improve the glucose and lipid metabolism in the MS by increasing insulin sensitivity and modified lipid content.

Objectives: The aim of this study is to evaluate the effect on insulin resistance of the combination of three bioactive compounds: i.docosahexaenoic acid (DHA), a long-chain omega-3 fatty acid; ii. propionate (PRO), a short chain fatty acid deriving from the colonic microbiota fermentation of beta-glucans; iii. protocatechuic acid (PA), the main in vivo metabolite of anthocyanins.

Method / Design: In vitro cellular studies have been performed with HepG2 cells, as an established in vitro model of hepatocytes. Cells were supplemented with non-cytotoxic concentration of bioactives, DHA alone or in combination with PRO or PA to elucidate their function and their possible synergistic, antagonistic or neutral effects. After to times of treatment (6h and 24) with the compounds the insulin resistance was induced. As a metabolic end point of insulin

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action in the liver the glycogen synthesis was examined in the cells by the content of glycogen storage.

Results: DHA restores the glycogen storage a long time exposure (24h) at insulin-resistance induced HepG2 cells. Nonetheless, at both time of treatment a synergic effect of DHA and PA was observed in the restore of glycogen storage at insulin-resistance induced cells.

Conclusions: Our results show how bioactives are able to modulate the glycogen storage in HepG2, a key end-points in pathologies of MS. Acknowledgements. The authors participate in the FP7 EU Project PATHWAY-27 "Pivotal Assessment of the Effects of Bioactives on the Health and Wellbeing, from Human Genome to Food Industry" (grant agreement no. 311876).

Keywords: (maximum 5): insulin resistance, glycogen, bioactive, DHA, anthocyanin

149/1445. Computational modeling of diet-microbiota-host interactions

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Introduction: Lifestyle parameters, such as diet, are recognized as major modulators of human health and have an important contribution to onset, progression, and severity of various diseases. The effects of diet and dietary adjustments need to be considered on an individual basis, tailored to one's genomic context and health state, that is, a personalized nutriogenomics approach is required. A computational modeling approach of increasing importance is constraint-based modeling, which has been applied to numerous biomedical and biotechnical questions. A chief advantage of this modeling approach is that it is scalable

Objectives: The human metabolic model, assembled by the research community, accounts for more than 7400 metabolic and transport reactions, encoded by over 1700 genes. Hundreds of molecular dietary components are considered and their effect on human metabolism can be simulated. Moreover, we have assembled metabolic models for 321 gut microbes, commonly found in the human gut. Having these models at hand, we can now systematically investigate diet-microbiota-host interactions. For instance, modeling the interaction between the human metabolic model and representative gut microbes under three different dietary regimes revealed a global effect of microbial presence on host metabolic phenotypes. The in silico gut microbiota served as an endocrine organ as it produced important precursors of host hormone synthesis. Moreover, the synthesis of important neurotransmitters was elevated in the presence of the gut microbiota. Gut microbes also contributed essential precursors for glutathione, taurine, and leukotrienes.

Method / Design: Results The presented computational modeling approach is mechanism-based and as such has the potential to play an important role in advancing personalized nutriogenomics.

The presented metabolic models can be queried at http://human-metabolism.org.

This work was funded by an ATTRACT program grant from the Luxembourg National Research Fund (FNR/A12/01).

Conclusions: Keywords: (maximum 5): 149/46. Prevention concepts against the development of obesity and cardiovascular risk factors – the Austrian Eddy study

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Introduction: Diseases of the cardiovascular system correlate strongly with obesity and its consequences. For this reason, it is necessary to find concepts to combat obesity and prevent its origin. Few data regard the success and preventive effect of interventions in childhood and adolescence.

Objectives: The EDDY study as interventional cohort studies in Viennese pupils has the goal of earning an independent health literacy of the subjects through diet and exercise training intervention. The main issue relates to the effect of an intervention with education in nutrition and sports programs on body composition, metabolic factors, and nutrition knowledge.

Method / Design: The study population consists of 147 students aged 12-14 years which is scaled in an intervention group and a control group. The intervention group will receive a comprehensive, age-appropriate nutrition training and a physiological training as well as sport and exercise intervention. Subjects are physically measured (BIA, height) and blood samples are taken for determination of blood lipids and vitamin status. In addition, knowledge of nutritional issues and eating habits as well as psychological parameters are measured with adequate questionnaires.

Results: Preliminary outcomes show an improvement of nutrition knowledge and a significant reduction in the consumption of junk food, sweets and salty snacks.

Conclusions: Previous data from the running prevention project indicate that the intervention (based on both on nutrition knowledge and on stimulating daily physical activities) is able to improve the nutrition habits and possibly the physical performance.

Keywords: (maximum 5): LIFESTLYE PREVENTION: CHILHOOD OBESITY: SCHOOL-BASED INTERVENTION: CHRONIC DISEASES

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TOPIC 2: Advances in dietary studies, methodology and design.

149/62. Alternatives to principal component analysis to derive dietary patterns: the case for multiple correspondence analysis

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Introduction: The most commonly used method do derive dietary patterns from food consumption data is principal component analysis (PCA) which relies on assessing associations between food groups (FG) by correlation coefficients. These are only appropriate for linear or strongly monotonous relationships, which is quite restrictive to describe the complexity of food consumption.

Objectives: We demonstrate the use of multivariate correspondence analysis (MCA), an exploratory multivariate analysis method for categorical data related to PCA, to derive dietary patterns with fewer assumptions regarding the relationships between the FGs.

Method / Design: Cross-sectional survey in Tunisia in 2005, 1019 subjects 15-19y. from a clustered sample. Semi-quantitative food frequency questionnaire of 134 items, recoded in 43 FGs and in g/kcal. Input data for MCA was the 1019x(43x5) table of binary variables coding the quintiles of the FGs. Association between FGs was based on the chi-square metric. Singular value decomposition enabled deriving principal axes which best described the variability in a reduced number of dimensions. For each subject the score on the components was a weighted linear combination of the binary variables coding her/his categories of the 43 FGs. Associations of these components with the initial interval-scale 43 FGs were assessed using non-linear smoothing techniques.

Results: Two principal components (53.0% and 17.4% of total variability) were retained. For example the first component featured monotonous (though not all linear) increase of consumption of white bread, dairy products, soft-drinks, added fats, fresh fruits and eggs along with a monotonous decrease of legumes, vegetables, cereals and grains ("modernized" dietary pattern). But this "modernized" pattern also featured non-monotonous relationships e.g. with meat and fish.

Conclusions: To derive dietary patterns, MCA should be considered as an alternative to PCA: indeed if categorizing variables may imply some loss of information, enhancing the ability to capture non linear relationships can be a worthwhile trade-off.

Keywords: (maximum 5): dietary pattern

149/89. Evaluation of a method for an easy measurement of dietary intake in children and adolescents

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Introduction: Collection of high-quality data regarding quantitative and qualitative intake of food and nutrients is important but also a challenge, especially for younger people whose cognitive skills are limited.

Objectives: To develop a new photographic method (PM) to reduce participant burden and allow children to independently record their food consumption. It will provide various and valid data for analyzing dietary intake.

Method / Design: A pilot study with 28 adult subjects was undertaken to compare three prospective assessment methods (7d-weighed, estimated, photographic record) with regard to feasibility and satisfaction and to determine validity, comparing PM to the gold standard (kcal/day, Bland-Altman analysis & Spearman correlation). Inter-rater-reliability was calculated (Intraclass Correlation Coefficient). Pictures were evaluated by 3 independent evaluators.

Subsequently, the PM was exclusively tested with 107 free-living children and adolescents (I: mean 9y, II: mean 13y). They were instructed to record their food and beverage consumption autonomously, using a digital camera or smartphone. Validity was calculated compared to a UK-survey, performing 7d-weighed records (WR) in different age-groups (t-test). Feasibility and satisfaction were determined using questionnaires.

Results: In the pilot study satisfaction with the PM was higher than with the other methods. It was feasible and caused smaller participant burden. Validity was very high (rs=0,91, p=0,01), as was reliability (ICC=0,93, p=0,00). Bland-Altman analysis showed no relevant differences between the two methods. T-test comparing PM with 7d WR (mean kcal/day) showed no significant differences between females in age-group II and males in age-groups I & II. The PM was highly accepted among children and adolescents.

Conclusions: The PM is a well-liked method for a reliable and valid measurement of dietary intake in free-living adults. Also children and adolescents are autonomously capable of using this uncomplicated method. This makes possible the collection of high-quality data to evaluate nutritional intake and behavior by minimizing participant burden.

Keywords: (maximum 5): children, dietary intake, photographic method

149/110. Uncovering nutrition specific health literacy: Development of a brief questionnaire

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Introduction: Health literacy can be defined as knowledge and skills that support a healthy lifestyle. The concept is increasingly applied in the context of nutrition because health literacy is considered an important resource for making informed decisions about food and engagement in nutritional health and well-being in everyday life. As yet, there is no appropriate tool to assess nutrition specific health literacy (nHL).

Objectives: Developing a questionnaire that covers the three forms of functional, interactive and critical health literacy to assess nHL. The questionnaire will be used in a Swiss workplace intervention to reduce salt intake.

Method / Design: A preliminary set of items was developed, based on a working definition of nHL, and a comprehensive review of existing instruments. Nutrition and health literacy experts tested face validity of newly generated or adapted items. To ensure comprehensibility and applicability, we first conducted a cognitive pretest with 13 employees, and followed that with a standard pretest in a cohort of 69 students.

Results: The final questionnaire consists of 14 items that assess self-rated nHL, including, for example, the ability to access and understand information about food and nutrition (functional nHL), to apply nutrition information to one's own situation (interactive nHL), or to judge the quality of information (critical nHL). Based on the cognitive pretest, one item was canceled, three were rephrased, and three were complemented with additional information. The standard pretest of the adapted instrument showed satisfactory response distribution, minimal use of the "no answer" category, and few missing answers. Final changes were minor.

Conclusions: The questionnaire is comprehensible, distinct, and applies to everyday situations. It assesses a broad spectrum of skills needed to promote healthy nutrition behavior. The new tool will be applied next in an adult working population and further validated.

Keywords: (maximum 5): health literacy, questionnaire, nutrition, development

149/127. CACO2/HT-29 Coculture: an in vitro intestinal cell model to study nutrients-gut interaction.

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Introduction: The intestinal epithelium is the primary exchange surface between food and body. Modifications of nutrients by intestinal cells may determine their fate. An in vitro model of intestinal epithelium is necessary to study these interactions at molecular and biochemical level. Co-culture of Caco2 and HT-29 intestinal cell lines could offer this opportunity without limiting cell maintenance meanwhile taking advantages from cell heterogeneity.

Objectives: To characterize a 70% Caco2/ 30% HT-29 co-culture in relation to selected food processing aspects. To compare co-culture vs a Caco-2 monoculture to demonstrate the importance and implication of different cyto-type coexistence.

Method / Design: 70% Caco2/ 30% HT-29 co-culture was settled in Roswell Park Memorial Institute Medium supplemented with FBS, L-Glutamine, and antibiotics. All experiments were performed using co-culture and Caco-2 monoculture at different postconfluence stages. Transmission Electrical Microscopy (TEM) was used in order to detect cell ultrastructural features. In parallel with morphological analysis, physiological studies were carried out. The measurement of transepithelial electrical resistance (TEER), an indicator of the intestinal permeability, was performed with cells seeded in transwell growth supports wherein apical and basolateral chambers represent intestinal lumen and blood torrent, respectively. Enzymatic assays were performed for brush-border enzymes: Sucrase-Isomaltase, Alkaline Phosphatase, Dipeptidylpepdidase IV, Aminopeptidase N and Dipeptidyl Carboxydipeptidase I.

Results: TEER values of co-culture are similar to the in vivo small intestine epithelium (50–100 Ω•cm2), while TEER values of Caco-2 monoculture are higher, indicating a minor cell permeability. At all the specific postconfluence cell stages, co-culture shows a stricter parallelism between morpho-structural features, microvillus, mucus or junctions, and physiological differentiation, enzyme specific activity, TEER maintenance, compare to Caco-2 monoculture.

Conclusions: 70% Caco2/ 30% HT-29 co-culture demonstrated as a valid and versatile model to study food-intestinal epithelium interactions, allowing the selection of a specific postconfluence cell stage according to required experimental characteristics.

Keywords: (maximum 5): nutrients, co-culture, ultrastructure, permeability, brush-border enzymes.

149/142. Comparing metabolic profiles derived by two data-driven methods in Polish adolescents. The POLYSES project

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Introduction: Metabolic profile is characterized by many markers. It produces difficulties in concluding. Data-driven methods are rarely used to derive metabolic profiles (MPs).

Objectives: The aim of the study was to compare MPs derived by two data-driven methods in Polish adolescents.

Method / Design: The study involved 299 adolescents aged 13-18. All subjects lived in less-urbanized regions of Poland. The concentration in blood of total cholesterol (TChol), HDL-cholesterol (HDL), triglycerides (TG), LDL-cholesterol (LDL), albumin, transferrin, hemoglobin (Hb), hematocrit (Ht), as well as the systolic (SBP) and diastolic (DBP) blood pressure were determined. MPs were identified separately by two data-driven methods: Principal Component Analysis (PCA) and Cluster Analysis (k-means method).

Results: Using Cluster Analysis three MPs were obtained: 'Low Hb-High TChol' (38% of the sample), 'High BP-Dyslipidemia' (21%), 'Low Lipids' (41%). Using PCA four components were predefined as MPs: 'Hematological', 'TChol-LDL', 'Blood Pressure', 'HDL-TG'. Low Hb was found in 9% and high TChol in 13% of subjects from 'Low Hb-High TChol' profile. High SPB was found in 59%, high DBP in 52%, low HDL in 20%, high TG in 19% of subjects from 'High BP-Dyslipidemia' profile. In 'Low Lipids' profile mean value of TChol was equal 140.7mg/dl, HDL was 53.6mg/dl, TG was 68.8mg/dl, LDL was 73.3mg/dl. In 'High BP-Dyslipidemia' profile 81% of subjects was located in upper tercile of 'Blood Pressure' profile. In 'Low Hb-High TChol' profile 67% of subjects was located in bottom tercile of 'Hematological' profile. In 'Low Lipids' profile 63% of subjects was located in bottom tercile of 'TChol-LDL' profile.

Conclusions: We found that Cluster Analysis as well as Principal Component Analysis can be used to derive data-driven metabolic profiles. However, Cluster Analysis was better to derive metabolic profiles because it combined different lipid, protein and hematological markers.

Keywords: (maximum 5): adolescents, Cluster Analysis, metabolic profiles, PCA

149/146. Nutrition knowledge about food energy & behavioral correlates

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Introduction: Knowledge about calories is believed to play an important role in making low-energy food choices for maintaining a healthy body weight or successful weight loss against the background of the worldwide rising obesity rates.

Objectives: Because no validated scale exists to specifically measure this type of knowledge, our goal was to develop and validate a new scale to measure the practical knowledge about meals and meal components by focussing on applied knowledge, which might be relevant to daily food choices.

Method / Design: Items were carefully pretested by nutrition experts and laypeople, and a Rasch model approach was used for scale construction. To assess the validity and reliability of the new scale, four survey studies were conducted including people from the general population of Switzerland (N = 447, N = 505, N =136) and nutrition experts (N = 59).

Results: The new scale included eleven multiple-choice items – ranging from rather easy to fairly difficult – and indicated good validity: the Rasch model was replicated in a second study, and nutrition experts achieved significantly higher scores than laypeople ($t(90) = 18.36$, $P < 0.001$, $d = 1.80$). A test-retest showed good test stability ($r = .73$, $P < 0.001$). Substantial correlations between the new scale and general nutrition knowledge levels and health interests were found. Additionally, higher knowledge about calories was positively associated with a higher diet quality and indirectly associated with a lower BMI.

Conclusions: The new scale is a valid and reliable Rasch-based instrument to measure practical knowledge about food energy in the general population consuming a western diet, and it demonstrated practical relevance. Further studies are needed to investigate the influence of this type of knowledge on food choices and successful weight loss.

Keywords: (maximum 5): practical nutrition knowledge, calories, Rasch scale, weight management, low-energy food choices

149/176. Willingness among obese pregnant women to accept MRI scan.

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Introduction: During pregnancy weight gain is expected, but little is known about the change in maternal abdominal fat compartments during this period. Magnetic resonance imaging (MRI) presents accurate results and is safe to perform during pregnancy. In spite of this many women are reluctant to accept to be engaged in such an examination.

Objectives: To investigate the willingness of having MRI performed during pregnancy.

Method / Design: Obese pregnant women participating in a weight management intervention study were offered to have three MRI scans performed during pregnancy. Eligible subjects were 108, 63 and 44 for MRI scans performed in gestational week 15, 32 and 40, respectively. The measurements were performed to investigate the change in subcutaneous, visceral, liver and muscle fat during pregnancy.

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Results: In total 177 out of 210 possible scans were completed. The proportion of women who completed first, second and third MRI scans were 96%, 83% and 61%, respectively. Causes for not completed MRI scans were no-show (45%), cancelation without given cause (27%), claustrophobia (12%), ill (6%), too tight in scanner (6%) and declining (3%).

Conclusions: The clear majority of obese pregnant women accepted MRI scans in GW 15, 32 and 40. Thorough information about the safety of the method, and the applicability of the results encouraged the participation.

Keywords: (maximum 5): Magnetic resonance imaging, diagnostic radiology, gestational weight gain

149/196. Assessing protein status in human; Can analysing 13C protein oxidation play a role?

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Introduction: Easy and reliable assessment of the protein status of the human body would be highly valuable in clinical and epidemiological nutrition research. Direct measurement of protein oxidation in breath could be a parameter directly related to this.

Objectives: We aimed to develop a 13C-protein derived breath test and validated this technique under various metabolic conditions.

Method / Design: After baseline sampling, 30 gr of naturally labeled 13C-milkproteins were consumed. Breath samples were taken every 10 min during 5,5 h and 13CO2 measured by Isotope Ratio Mass Spectrometer. The following variables were used to calculate the amount of substrate oxidized: administered dose, 13C enrichment of substrate, molecular weight of substrate, number of carbon atoms in a substrate molecule, estimated CO2-production of the subject based on body surface area.

Results: Postprandial kinetics of oxidation of whey (rapidly digestible protein) and casein (slowly digestible protein) derived from our breathtest were comparable to literature data regarding the kinetics of appearance of amino acids in blood. Using this test we could demonstrate that 24 ± 14% of the milkprotein dose was oxidized over 5,5 h which served as our control (100%). A decrease of 31% ± 18% in milkprotein oxidation was observed after a 3 day protein restricted diet (~10 g/day) compared to a normal diet and 30 minutes of cycling before protein consumption reduced protein oxidation by 39% ± 37%. A protein restricted diet plus exercise reduced oxidation by 52% ± 19%.

Conclusions: With this technique we are able to characterize changes of overall protein oxidation under different circumstances such as diet and exercise, which might be of importance for establishing the protein status.

Keywords: (maximum 5): stable isotopes, breathtest, milkproteins, oxidation, protein status

149/198. Is participation rate in a dietary survey among adolescents affected by additional parental invitation?

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Introduction: Quantifying dietary intake and registering habitual dietary intake is a time consuming process that requires time and effort among participants. In order to explore health risk among generations, clustering of unhealthy or healthy dietary habits in families is increasingly important to explore. The emphasis on familial participation in life-course epidemiology therefore seems to increase. It has not previously been evaluated to which extend an increased burden on the family participating in a life-course epidemiological study may affect response rate to an online questionnaire.

Objectives: To investigate whether introducing additional food frequency questionnaires in the family would affect the response rate of the adolescent.

Method / Design: A randomized controlled trial, including 6000 participants who were divided in three 'invitation'-groups: A) Adolescents only, B) Adolescent and mother, C) Adolescent, mother and father.

Results: We found that the degree of familial invitation indicated a determinant factor of adolescent participation with difference in respondent rate of 22.4% and 14.9% between group A and C, and group A and B, respectively. No significant difference between invitation-groups were found for maternal age, pre-pregnancy BMI, parental educational level, and maternal diet however, significant difference was found for maternal smoking ($p<0.05$).

Conclusions: We have for the first time demonstrated by a randomized controlled design that response rate among adolescents decreased markedly with increased burden within a life-course epidemiological study whereas the participant characteristics did not change. Non-responses in epidemiological studies has been demonstrated to decrease validity and sample size however, participant characteristics seems to be unaffected by non-responses.

Keywords: (maximum 5): Randomized controlled trial, life-course epidemiological study, respondent rate, food frequency questionnaire

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149/241. Comparison of different methods for calculating usual intake

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Introduction: When studying food intake in a population of individuals you are often interested in describing the usual intake, i.e. the average intake over a longer period.

Since 1995, DTU Food institute has used a 7-day diet diary where participants in dietary studies registered everything they ate. The usual intake was then calculated as a simple average of 7 days.

However, it has been proposed to use 2 x 24 hour interview, i.e. participates are interviewed by a trained interviewer about what they have eaten the last 24 hours on two independent days. These interviews are supplemented with a questionnaire; about how often different foods are eaten. In order to use the 2 x 24 hour interviews to estimate usual intake a number of statistical methods have been proposed.

Objectives: To study the impact on the estimation of the usual intake if the 7-day diet diary is replaced by 2 x 24 hour interviews.

Method / Design: Data have been collected on 97 participants who have reported their intake using both the 7-day diet diary and 2 x 24 hour interviews. The usual intake is estimated using different methods (e.g the NCI method) both for nutrients and foods with a higher degree of zero-intake. The individual intake is also calculated.

Results: The results based on 2 x 24 hour interviews do not differ substantially from the traditional results.

Conclusions: The results based on the 2 x 24 hour interviews seem reasonable and one advantage is that extreme observations do not receive as much weight as in the old method. Combining the 2 x 24 hour interviews with the questionnaires gives more information about the intake distribution.

However, the NCI method is not so easy to use for a non-statistician.

Keywords: (maximum 5): 7-day diet diary: 2 x 24 hour recall: usual intake: method comparison: zero-intake.

149/260. Adaptation of the standardized computerized 24-h dietary recall method globodiet for Austria

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Introduction: Due to notable differences in study designs and dietary methodologies used, the comparison of dietary intake data across Europe is difficult. The use of GloboDiet is meant to allow a more reliable and comparable trans-national data collection.

Objectives: To describe and evaluate the adaptation of GloboDiet for Austria.

Method / Design: The work is based on the experience gained in adapting GloboDiet for use in the Austrian national food consumption survey. The process included the adaptation of about 70 interrelated files. First, the common files were customized according to the study aims. In a second step, country-specific files had to be modified to Austrian needs. Within a pilot study 48 repeated 24-h recalls were conducted. Results served as the basis for updating the databases. Additionally, participants as well as interviewers were asked to complete an online evaluation questionnaire concerning the feasibility of the 24-h recalls using GloboDiet.

Results: About half a year was needed to adapt GloboDiet. Additional time was required for attending training courses and for getting familiar with the tool. After completion of the pilot study, some more often consumed Austrian foods, recipes and brands were added and some issues related to quantification were resolved. During the pilot study interview time varied from 30 to 60 minutes. Most of the participants classified the time burden as moderate.

Conclusions: The results of the pilot study provided the basis for the update of the Austrian version of GloboDiet. Although the implementation was a great deal of work, GloboDiet appears to be a useful tool for nutritional monitoring.

Keywords: (maximum 5): GLOBODIET • 24-H RECALL

149/261. Effect of caffeine on attention and alertness measured in a home-setting, using web-based cognition tests

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Introduction: There is an increasing interest among nutritional researchers to perform web-based intervention studies instead of testing subjects in a clinical setting. Many tests for measuring particular parameters for nutritional studies are commonly available in drug stores as well as online. Here we present such a study, in which we reproduced the effect of caffeine on attention and alertness in an at-home setting.

Objectives: The study aimed to reproduce the effect of caffeine on attention and alertness using a web-based study environment of subjects at home.

Method / Design: Healthy volunteers consumed a cup of coffee after an overnight fast. Coffee was prepared from a sachet containing either regular coffee or decaf coffee. Each intervention was given twice. Before and one hour after coffee consumption subjects performed online cognitive tests at home which measured alertness and attention,

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established by three computerized tests provided by Quantified Mind. Each test was performed for 5 minutes.

The study was designed as a randomized placebo-controlled double blind cross-over study.

Results: The recruitment via internet was fast and efficient. Within two weeks about 100 subjects applied of whom 70 were eligible. Of these 70 subjects, 53 complete test sessions were obtained, indicating that they were able to perform the Do It Yourself tests at home correctly. The three cognitions tests conducted at home showed the same improvement in performance with caffeine as found in controlled studies in a metabolic ward.

Conclusions: The study showed that the effects of caffeine consumption on a cognition test in an at-home setting revealed similar results as in a controlled setting. This type of study is a fast and easy way to demonstrate effectiveness of a supplement and may therefore be interesting to evaluate life-style and nutritional interventions, e.g. by food industry.

Keywords: (maximum 5): Do It Yourself
At-home testing
Caffeine
Cognition
EFSA claim

149/274. Development, validation and backward compatibility of FFQ-NL1.0, a new food frequency questionnaire for The Netherlands

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Introduction: To study diet-disease associations in cohort studies good quality dietary assessment methods are required. In order to enrich and harmonize the Dutch cohort studies a standardized food frequency questionnaire (FFQ) for adults is needed.

Objectives: To develop and validate an up-to-date national FFQ for adults, and to compare it with existing Dutch FFQs.

Method / Design: The Dutch FFQTOOL was used to develop FFQ-NL1.0 by selecting food items that explained at least 80% of variance in energy and nutrient intake by adults in the Dutch food consumption survey 2007-2010. For the selected food items, standardized questions were used to compose the FFQ. Compatibility of FFQ-NL1.0 with 3 FFQs previously used in cohort studies was assessed through comparison of number of items, and explained variance of nutrients intake. Validity of FFQ-NL1.0 was assessed among 390 persons 20-70 y in the NQplus study. Reference methods included repeated 24-h dietary recalls, eue24-h urinary nitrogen and potassium excretion, plasma carotenoids and fatty acids. Attenuation factors were estimated; these provide information about the extent to which diet-health associations are affected by measurement error; values closer to one indicate less error.

Results: FFQ-NL1.0 included 155 food items, which was similar to the Dutch EPIC FFQ (n=153), and lower than the Wageningen FFQ (n=183) and the Maastricht Study FFQ (n=254). The average explained variances of energy and macronutrient intake varied from 83-95%, 83-94%, 77-95% and 84-96% for FFQ-NL1.0, Dutch EPIC FFQ, Wageningen FFQ, and Maastricht Study FFQ, respectively. Attenuation factors for both protein and potassium were 0.43 as compared to their recovery biomarkers. For the comparison with recalls, attenuation factors ranged from 0.23 for lutein to 0.76 for alcohol.

Conclusions: The FFQ-NL1.0 is a standardized and validated FFQ with the potential to enrich and harmonize the Dutch cohort studies among adults.

Keywords: (maximum 5): Food frequency questionnaire, development, validity, compatibility, nutrient intake

149/276. In silico analysis of the sensory profiles of selected food originating protein sequences

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Introduction: According to the literature, peptides as well as free amino acids can show all taste sensations which are recognized by human organism i. e.: sweet, salty, bitter, sour and umami. Such peptides/amino acids are present in the food proteins and after enzymatic release can affect the body functions and modify the taste of foods. The computer analysis (i.e. in silico) can be a useful tool in predictions of proteins that can be a source of taste peptides. In silico procedure is often used by researchers aiming the analysis of food components, including peptides. Bioinformatic studies concerning the biomolecules often involve the data collected in databases of biological and chemical information.

Objectives: The aim of the study was to apply an in silico procedure to obtain the sensory peptide profiles of selected proteins being the components of diet of Polish consumers.

Method / Design: To achieve this aim the following computer databases like BIOPEP (http://www.uwm.edu.pl/biochemia) and computer programs like Custom Peptide (http://www.sigma-genosys.

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com/calc/pepCalc.asp), ProtScale (http://www.expasy.org/protscale) were applied. The sensory profile was calculated with the use of BIOPEP function called the profile of potential sensory activity of protein (i. e. the type and a location of a sensory peptide/amino acid in a protein chain).

Results: Our results revealed that the all studied food protein sequences were the potential source of peptides possessing a bitter taste. Some peptides/amino acids found in these proteins showed multiple taste. They were e.g.: E (Glu), K (Lys), DE (Asp-Glu) and EEE (Glu-Glu-Glu) showing bitter, salty and umami taste (exemplary source: cereal proteins).

Conclusions: We found that the bitterness peptides was associated with the presence of Pro, Val, Leu and Ile. The in silico procedure applied showed that our results can be useful for designing foods affecting their sensory quality.

Keywords: (maximum 5): peptides: proteins: databases: bioinformatics: in silico analysis

149/279. Bioinformatic prediction of enzymatic release of sensory peptides from food protein sequences

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Introduction: Taste of food products may be related to the enzymatic release of peptides. The sensory activity of peptides can be the result of their chemical nature described by different physicochemical attributes. The knowledge about the in silico enzymatic release of sensory peptides can be found helpful in e. g. modifying of the taste of foods. These modifications may take place before laboratory experiment.

Objectives: The aim of the study was an in silico hydrolysis of some food originating protein sequences to obtain sensory peptides/amino acids.

Method / Design: The protein sequences were collected from the BIOPEP database (http://www.uwm.edu.pl/biochemia). Computer proteolysis of proteins was performed by Peptide Cutter (http://www.expasy.org/peptide-cutter). The following enzymes with known specificity were applied: pepsin (EC 3.4.23.1), trypsin (EC 3.4.21.4), chymotrypsin (EC 3.4.21.1), thermolysin (EC 3.4.24.27) and proteinase K (3.4.21.64). They were used in the combination "one protein-one enzyme".

Results: The peptides released were analyzed in the aspect of their sensory activity by comparing them to those sequences gathered in the BIOPEP database and possessing known taste properties.

We found that enzymes applied in our studies potentially released sensory peptides and amino acids from the food protein sequences analyzed. The bitter taste was found as predominant among all peptides released from the food protein sequences. Trypsin was indicated as not effective enzyme in the release of sensory pepides/amino acids from these proteins (no sensory peptides were released).

Conclusions: The methodology applied in our studies proved its suitability in the design of food with special (i. e. sensory) properties. The next stage of our research is to verify the obtained results in a laboratory conditions.

Keywords: (maximum 5): sensory peptides: enzymes: computer analysis

149/318. The new ASSO surveillance system for adolescent obesity and fitness: applicability within national health services

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Introduction: The Adolescents Surveillance System for Obesity prevention Project (ASSO) aimed at developing standardized and web-based tools for collecting data on adolescents' obesity, health, lifestyle and fitness. It was funded by the Italian Ministry of Health and piloted in Southern Italy.

Objectives: The aim is to provide an overview of the Project's design, development, implementation and evaluation, highlighting all the aspects for a potential scale-up of the surveillance system on the whole national territory and abroad, as a sustainable and effective source of data.

Method / Design: The overall structure and management, the ASSO-toolkit, the ASSO-NutFit software and all developed and used procedures for sampling, recruiting, training and data collecting/analysing are addressed. An interim evaluation was performed through a feasibility study; a final Project evaluation was performed reporting the Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis. The potential adoption of the surveillance system at a national and international level was proposed based on the system's applicability, the resources needed and different system attributes.

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Results: A detailed overview of the Project is provided. The ASSO-NutFit software allowed obtaining a database that could be easily analyzed and shared. ASSO can be considered a valid, logical, coherent, cost-effective, efficient and sustainable surveillance system that is consistent with countries needs and priorities.

Conclusions: The surveillance system developed by the ASSO Project is a useful tool to be adopted within the National Health Service and other countries' Health Services for obesity, health, lifestyles and fitness surveillance in adolescence. It provides high quality data to identify risk factors, monitoring trends and support implementation of appropriate preventive actions.

Keywords: (maximum 5): obesity, fitness, surveillance, adolescents, web-based

149/353. Innovative nutritional tool for dietary intake assessment and nutrition planning: diet assess & plan software

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Introduction: Collection of harmonized food consumption data in a standardized way is one of the high-priority in nutritional research. Software for the collection of dietary data comparable between countries enables harmonized nutritional monitoring and surveillance surveys systems across Europe.

Objectives: To develop the innovative nutritional tool for standardized and harmonized food consumption collection, comprehensive dietary intake assessment and nutrition planning- DIET ASSESS & PLAN software.

Method / Design: Software is designed for data collection from standard food consumption questionnaires: 24-h dietary recalls (24HDR), Food Frequency Questionnaire (FFQ), Food Records, Food Propensity Questionnaire (FPQ), general and pre-screening information about subjects, anthropometric parameters, blood pressure measurements, supplements intake and physical activity. Complex calculations, of all these datasets enable comprehensive diet evaluation on individual and population level.

Results: Unique structure of DIET ASSESS & PLAN tool enables application of all national Food composition data bases (FCDBs) from the West Balkan Regional, Serbian FCDB and EuroFIR Food Composition Exchange Platform (28 national database – indexed by LanguaL, on national and English language). Additional advantage is compatibility with EFSA FoodEX2 coding system and possibility for interconnecting with EuroFIR AISBL nutritional tools. Food photo album for most consumed foods and dishes with portion sizes is incorporated in software. Furthermore, software enables planning dishes, meals and menus for one day or for longer period, foods design/reformulation, food labeling and nutrient intake adequacy assessment according to selected nutrient recommendations for planned or consumed menus. DIETS ASSESS & PLAN is used and validated in different national and regional surveys and international project and evaluated in EFSA project.

Conclusions: DIET ASSESS & PLAN is user friendly software in food consumption collection and comprehensive dietary intake assessment in CEE/Balkan region which might be applied on broader scale for harmonizing nutritional monitoring and surveillance in Europe.

Keywords: (maximum 5): DIETARY INTAKE ASSESSMENT; FOOD CONSUMPTION; MONITORING; SURVEILLANCE; SOFTWARE

149/371. Are single measurements by Quark RMR adequate for indirect calorimetry? An estimation of quality criteria

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Introduction: Measurement of the resting metabolic rate (RMR) forms the basis of recommendations on energy supplies which is a very important question not only in clinical nutrition. The most common system for measuring RMR (Deltatrac IITM) is no longer in production.

Objectives: Therefore, the aim of this study was to evaluate the measurement reliability of the new device Quark RMR. Furthermore, this investigation compared gas exchange measurements obtained by using a face mask and a ventilated canopy.

Method / Design: Four measurements were performed in 20 persons (10 women, 10 men; age 23.1 ± 3.7 years; BMI 22.4 ± 2.7 kg/m2) in randomised order. Each measurement was done twice with ventilated canopy and face mask. RMR, respiratory quotient, oxygen consumption (VO2) and carbon dioxide production (VCO2) were recorded during a stable period of 30 minutes under standardised con-

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ditions. Reliability was determined by Pearson correlation coefficient. Comparison of measurements was done by paired t-test.

Results: Very high significant correlations were obtained for VO2 (r=0.87/0.91), VCO2 (r=0.97/0.88) and RMR (r=0.86/0.91) both for ventilated canopy and face mask. The system used for gas exchange measurement significantly affected the results. The extent of the effect was a significant 7.8% increase for VO2 with face mask. VCO2 was significantly increased by 9% and RMR by 8% with face mask. Mean calculated RMR differed neither by ventilated canopy nor by face mask from results of Harris Benedict formula.

Conclusions: Quark RMR seems to be a reliable system for indirect calorimetry. Using single measurement was shown to be adequate. However, it must be taken into account that the system used for gas exchange measurement substantially influences the results.

Keywords: (maximum 5): indirect calorimetry, Quark RMR, resting metabilic rate, reliability

149/381. LC-ESI-MS/MS method for the simultaneous determination of hydroxysterols and bile acids in different biological matrices

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Introduction: Hydroxysterols and bile acids have gained growing interest as they are important regulators of energy metabolism and inflammatory processes. The multifunctional presence of hydroxysterols and bile acids in different biochemical pathways of the lipid metabolism shows that their qualitative and quantitative changes in different biofluids and organs is of great scientific relevance, especially with respect to assess the nutritional and pathological state.

Objectives: Our aim was to provide a method for the simultaneous quantification of 34 sterols in various biological matrices using liquid chromatography-tandem mass spectrometry (LC-MS/MS) in one single run, in addition to the advantage of an easy-to-use and fast sample clean-up without further complex derivatization techniques.

Method / Design: The chromatographic baseline separation of isomeric hydroxysterols and bile acids was obtained using a polar embedded stationary phase. For isolation of favored analytes conventional solid phase extraction (SPE) was compared to simple liquid/liquid-extraction approach.

Results: The chromatographic baseline separation of positional isomeric sterol compounds can be achieved using a polar embedded stationary phase without any previous derivatization steps. In contrast to former described methods employing SPE as a classical procedure, the obtained results indicate that a simple and fast liquid-liquid-extraction with methanol is an efficient alternative to time-consuming SPE approaches. The method achieved a high dynamic range in different biological matrices and was successfully validated for the determination of hydroxyl sterols and bile acids in five biological matrices.

Conclusions: The developed LC-MS/MS-based method is suitable to quantify 34 hydroxy sterols and bile acids in different metabolically active compartments such as plasma, bile, feces, liver and adipose tissue selectively in a period of 35 minutes. The simultaneous quantification provides a powerful tool for the investigation of cholesterol utilizing metabolic pathways in response to environmental or genetic alterations.

Keywords: (maximum 5): Hydroxysterols; Bile acids; Polar embedded stationary phase; HPLC-ESI-MS/MS; Lipid metabolism, biological matrices

149/398. Validation of a Food Frequency Questionnaire for dietary vitamin D and calcium by cognitive interviewing

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Introduction: The intake of vitamin D from the diet is often estimated by a Food Frequency Questionnaire (FFQ) which is considered a useful tool to estimate intake of nutrients found in high concentrations in few foods at relatively low cost and participant burden. However, the accuracy can be unsatisfactory. In any questionnaire it is crucial that questions and concept are fully understood by the specific target population, this is particularly important when studying populations of special concern, such as immigrants. Validation by cognitive interviewing approaches has shown to improve accuracy of FFQ's.

Objectives: To validate a questionnaire estimating dietary intake of vitamin D and calcium in a population of Pakistani immigrants and ethnic Danes by cognitive interviewing methods to maximize content and construct validity and thereby the accuracy of the answers.

Method / Design: The FFQ was developed earlier for ethnic Danes and Pakistani immigrants; it contains 70 questions regarding foods and supplements known to contribute with 95% of vitamin D and 75% of calcium. The FFQ is administered by face-to-face interview in combination with cognitive 'think-aloud' interviewing techniques and semi-structured verbal probing in 12 individuals (n=6 Pakistani and n=6 Caucasian). The FFQ will later be used in the immigrant randomised controlled trial part of the European ODIN project.

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Results: The FFQ interviews will be carried out in May 2015; expected results include discovery of critical questions and concepts in the FFQ by verbal protocol analysis using a Problem Coding Frame. The cognitive interviews are expected to elucidate any ethnic differences in the understanding of questions and concepts and the results will facilitate a targeting of the FFQ in the specific study population.

Conclusions: Expected outcomes include increased overall validity and data quality following a validation of a culture-sensitive FFQ targeting two different ethnic study populations.

Keywords: (maximum 5): Food Frequency Questionnaire, dietary vitamin D intake, validation, Pakistani immigrants.

149/409. Food intake and inflammation in European children: the IDEFICS study.

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Introduction: High sensitivity C-reactive protein (hs-CRP) represents a commonly measured inflammatory biomarker in clinical and epidemiologic studies. Dietary habits, especially the consumption of specific foods and dietary components, seem to play a role in inflammation

Objectives: To assess consumption frequency of food items and high sensitivity C-reative protein (hs-CRP) in European children.

Method / Design: Out of the total of the baseline sample (N=16.228) of the IDEFICS study, 6.403 children (1.315 boys aged 2-<6, 1.908 boys aged 6-<10, 1.204 girls aged 2-<6 and 1.976 girls aged 6-<10 years) met the inclusion criteria of providing hs-CRP measured and the Children's Eating Habits Questionnaire (CEHQ), including a validated food frequency questionnaire (CEHQ-FFQ). Covariates used for the logistic regression were: body mass index z-score (zBMI), education of the mother, breast-feeding and self-reported hours of physical activity in a sport club per week.

Results: Vegetables were the food group showing more results across the analyses performed. Mean frequency intake of raw vegetable was lower in boys (p=0.022 in young and p=0.020 in old) and older girls (p=0.026) with high hs-CRP concentration, while in younger girls (p=0.008) the same occurred with the cooked vegetables. In addition, the probability of having higher hs-CRP concentration was significantly associated with having low consumption frequency of vegetables (p=0.004 in older boys, raw vegetables; and p=0.0032 in younger girls, cooked vegetables).

Conclusions: Although the consumption of different food items showed associations with hs-CRP, consumption of vegetables showed the most consistent results. Therefore, it seems plausible that a dietary approach would be effective for the reduction of chronic inflammation. More studies are needed in children in order to prevent an early onset of low-grade inflammation.

Keywords: (maximum 5): Food intake, inflammation, European, children, IDEFICS

149/430. The CED-MED project: the effect of a dietary intervention on inflammatory cytokines and lipid metabolism in women with metabolic syndrome: Preliminary results

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Introduction: Obesity, hypertension, insulin resistance, and dyslipidemia are features of the definition of metabolic syndrome (MS). The proinflammatory state that accompanies metabolic syndrome is associated with insulin resistance and endothelial dysfunction, providing a connection between inflammation and metabolic processes.

Objectives: The aim of the study was to analyze the influence of a dietary intervention (the Central European Diet or the Mediterranean Diet) on inflammatory cytokines and lipid metabolism biomarkers in a group of postmenopausal women with MS.

Method / Design: A group of 58 postmenopausal women were randomly introduced to a semicontrolled feeding scheme—a diet based on food items commonly used in Central Europe (the CED group) or the Mediterranean diet(the MED group) for 15 weeks.Body composition was measured with a Bod Pod (Cosmed, Italy).Serum concentrations of biomarkers were measured after overnight fasting with the use of a biochemical analyzer. The relative expression of TNF

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and IL-6 genes in peripheral blood mononuclear cells (PBMC) was analyzed usingreal-time PCR. Serum adiponectin, TNF, and IL-6 levels were measured using the immunoenzymatic method.

Results: The dietary intervention led to reductionsin body mass (85.9 ± 1.9kg before and 78.1 ± 1.7 kg after the intervention), percentage body fat(49.9 ± 0.6 before and 45.2 ± 0.8 after the intervention), glucose, triglycerides, and insulin (relative change:-5%, -25%, and -35%, respectively), while total cholesterol and adiponectin levels remained unchanged. After the intervention, the expression of the IL-6gene did not change and expression of the TNF gene was reduced by over 90%, but there were no changes in TNF cytokine levels. Moreover, there were no significant differences between the effectiveness of the diets used.

Conclusions: Both tested diets may be successfully used for improving lipid metabolism biomarkers; however, they do not seem to changeinflammation status.

Keywords: (maximum 5): metabolic syndrome, dietary intervention, PBMC, inflammation, lipid metabolism

149/440. Zero-excess data: estimating the distribution of occasionally-consumed food intake with application to alcohol consumption

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Introduction: Occasionally-consumed food intake records are zero inflated when collected with multiple-day food diaries or 24-hour recalls, resulting in semi-continuous data, which cannot be analysed adequately with standard statistical methods. Furthermore, the records are subject to measurement error, which, if not accounted for, can lead to bias in the estimation of the intake distribution. The bias is more pronounced at the tails of the distribution, which can affect public health policy, as it is usually under-consumers or over-consumers who are at greater risks of developing health conditions.

Objectives: To demonstrate the use of a new numerical method for estimating the quantiles of alcohol intake and to show the impact of model misspecification.

Method / Design: We fit a two-part mixed-effects model to alcohol intake data from a sample of individuals at risk of developing metabolic syndrome. The model accounts for excess zeros in the intake distribution and for measurement error. We estimate the model parameters under different model assumptions to demonstrate the impact of model misspecification. Then, we assess the quantiles of intake with a new numerical method. We compare the quantiles estimates obtained with the proposed method to quantiles obtained with Monte Carlo simulation.

Results: We found that some model parameter estimates change magnitude and significance under model misspecification. Monte Carlo simulations can require a large numbers of draws from the distribution to achieve agreement with the results obtained with our proposed method.

Conclusions: We show the application of a two-part mixed-effects model to the estimation of alcohol intake quantiles using real-life data. Our analysis suggests that model misspecification can lead to biased quantile estimates, which is especially notable at the tails of distribution. The new numerical method to estimate the distribution of occasionally-consumed foods is proposed as a concise and quicker alternative to Monte Carlo simulation.

Keywords: (maximum 5): Excess-zeros, occasionally-consumed food, intake distribution, two-part mixed-effect model

149/477. Human exposure to berry anthocyanins: Profiling urinary metabolites

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Introduction: Berries are a rich source of anthocyanin (ANC) pigments. While evidence supports a beneficial role for ANC in human health, correlating ANC forms with biological activity in vivo is essential to fully appreciating the evidence supporting health benefits

Objectives: To better understand ANC bioavailability by determining the forms and concentration of urinary ANC during long-term intake of blueberry juice.

Method / Design: Healthy human adults, n=17; ANC-free diet except where specified; ANC-free run-in was 5 days. For 28 days, daily intake of ANC as 216 mg cyanidin-3-glucoside equivalents in blueberry (Vaccinium angustifolium) juice. Individual urine voids were collected for 24h on days 0, 7, 14 and 28. Day 29-35 was ANC-free. On day 36 juice was taken followed by 24 h urine collection. LC-MS analysis used an ABSciex QTrap 4000 with multiple reaction monitoring (MRM) of 60 predicted ANC metabolites in urine after solid phase extraction.

Results: The 60 MRMs occurred at multiple retention times (RT) giving rise to more than 400 unique ANC metabolites (MRM x RT) among the approximately 700 urine samples. ANC metabolites were abundant in urine even after the 5-day run-in and before ANC intake. Approximately 100 ANC metabolites accounted for 80-85% of the total µg excreted in 24 h. Total excretion accounted for 1-2% of the dose. The large number of ANC-derived moieties is attributed to ANCs, their cis- and trans- chalcones, their respective phase 2 conjugates, including positional isomers, caused by enterohepatic circulation. ANC aglycones and their glucuronide conjugates dominated the pool of urinary ANCs.

Conclusions: Recent research has focused on the rapid loss of ANC and their conversion to low molecular weight phenolic acids.

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However the present results suggest a significant and chronic exposure to ANC-like moieties in vivo, which may contribute to health benefits.

Keywords: (maximum 5): anthocyanin; phase 2; LC-MS-MRM; metabolites; clinical

149/480. Seasonal and day-to-day variations in Finnish adult food consumption

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Introduction: Introduction: Both seasonal and day-to-day variations of food consumption are important factors in dietary survey design. Food availability is reasonably uniform throughout the year due to retail-dominated and global food market. Thus seasonal variation in food consumption is assumed to be small. Information on day-to-day variation of food consumption in Finland is limited.

Objectives: Objectives: To evaluate the seasonal and day-to-day differences in food consumption.

Method / Design: Method / Design: Three-day food records were collected twice during all four seasons in a subsample of the National FINDIET 2007 Survey (n=912, 25-74 years old). Food consumption was described in 77 ingredient-based food groups and aggregated into 24 groups. Seasonal variation was studied by examining the proportion of consumers and the average consumption of consumers. Seasonal differences were tested using logistic regression (proportion of users) and analysis of variance or Kruskal-Wallis test (consumption of consumers). To evaluate the day-to-day variation, the difference in food consumption during consecutive days was compared to difference in food consumption of non-consecutive days. Day-to-day variation was tested using parametric or non-parametric pairwise test depending on the distribution of consumption difference. Results were considered significant if p-values were >0.05.

Results: Results: Although no seasonal variation was seen in the combined fruit, berry and vegetable consumption, both berries and vegetables were consumed more and fruit less during the summer months compared to other seasons. Clear seasonal differences both in proportion of consumers and in amount consumed were seen in ice cream consumption. The differences in consumption of most food groups were larger between non-consecutive days compared with consecutive days.

Conclusions: Conclusions: To improve food consumption estimates in Finland, at least the summer months is needed to be included in the data collection. Also, data collection of non-consecutive days is warranted.

Keywords: (maximum 5): Keywords: dietary survey methodology, seasonal variation, day-to-day variation

149/504. The influence of beetroot juice on triathletes performance

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Introduction: In recent times Australian Institute of Sport acknowledged beetroot juice (BR) as a supplement which contributes to optimal performance. Studies from Sweden and Australia, shows that BR supplementation influence on maximal oxygen uptake.

Objectives: The purpose of this study was to determine the effect of drinking beetroot juice as a source of nitrate, influence on maximal oxygen uptake (Vo2 max).

Method / Design: Fifteen 21-41 years old male triathletes volunteers were submitted to Vo2 max during a seven days assesment measurement by submaximal cardiorespiratory test using FitmateMED Cosmed. In the assessment, before and after the 7 days study period, during which the subjects consumed 500 ml of fresh beetroot juice per day, they were also instructed to maintain the same level of activity during the study. Data are presented as means ± SD. Differences in the cardiorespiratory variables between conditions were analyzed with two-tailed, paired-samples t-tests. Statistical significance was accepted when $P < 0.05$.

Results: There were no significant difference between first and second measurement (Vo2 max: 61,4 ±7,7 vs 62,6 ± 8,9 ml/kg/min). The results show no implications between supplementation of beetroot juice on maximal oxygen uptake in group of fifteen male triathletes.

Conclusions: Beetroot juice did not improve performance during one week supplementation in small group of well trained triathletes.

Keywords: (maximum 5): beetroot juice, performance, triathletes, Vo2 max

149/514. Associations between biomarkers of fat intake and diet in a multi-ethnic population: validation of the HELIUS-FFQs

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Introduction: We developed four ethnic specific Food Frequency Questionnaires (FFQs) to assess the habitual diet of participants in the HELIUS multi-ethnic cohort.

Objectives: To examine the associations between fatty acid biomarkers with fat intake measured by the HELIUS FFQs.

Method / Design: A random sub-sample of participants in the HELIUS study; Dutch, African Surinamese, South Asian Surinamese, Turkish and Moroccan residents of Amsterdam (n=200 per ethnic group) were included. Participants who had fully completed a FFQ within three months of having their blood drawn were eligible for this study.

Fasting venous blood samples were collected, initially stored at -20oC and, subsequently -80°C. Fatty acids from plasma cholesteryl esters were quantified by gas-liquid chromatography. Plasma fatty acids were calculated by summing all the SFAs (n=9), MUFAs (n=7) or PUFAs (n=21) with 12-24 carbon atoms.

Dietary intake of fat was measured using ethnic specific FFQs. Respondents were asked to report the frequency of consumption of foods over the last four weeks.

Results: Ethnic differences were observed in most of the variables studied. Dutch and Turkish participants reported the highest intakes of saturated fat (12% energy intake), while the highest monounsaturated fat intakes were reported by Turkish and Moroccan participants (13.5 to 14% energy intake). Surinamese participants reported eating the most fish, while the intake of dairy products was somewhat higher in Dutch participants.

Plasma EPA, DHA and n-3 fatty acids correlated well with dietary fat intakes. In addition, we observed that reported fish intakes and plasma n-3 fatty acids, EPA and DHA were consistently correlated in all ethnic groups.

Conclusions: Our finding that correlations between EPA, DHA and n-3 fatty acids in diet and plasma were consistent for all groups indicates that the HELIUS-FFQs are able to capture food level intakes among the five ethnic groups studied

Keywords: (maximum 5): FFQ, Validity, Multi-ethnic population, Fatty acid biomarkers

149/521. Comparison between the neck circumference and other anthropometric indicators in risk prediction in school cardiometabolic

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Introduction: The childhood overweight rises the chances of an adult overweight and the risks factors of cardiovascular diseases, such as dyslipidemia, arterial hypertension, insulin resistance, wich are responsible for the morbidity and mortality increase in maturity. The anthropometric assesment and diagnosis of overweight are mesures that assist in early identification of increased risk of developing cardiovascular disease.

Objectives: So, the present study aimed to compare the measure of neck circumference with other anthropometric predictors of cardiometabolic risk in students.

Method / Design: A cross sectional study was conducted with a random sample of students of both genders. Identification and anthropometric data were collected from them.

Results: The Body Mass Index (BMI), Waist-to-height-ratio (WHtR) and Neck Circumference (NC) were the measures that best identified students' cardiometabolic risk. It was possible to observe a significant correlation between the BMI/I and NC ($r = 0{,}706$ e $p < 0{,}001$), BMI/I and WC ($r = 0{,}733$ e $p < 0{,}001$) and BMI and WHtR ($r = 0{,}723$ and $p < 0{,}01$).

Conclusions: Despite having a lower percentage of risk in relation to BMI and WHtR was relevant the use of NC in predicting cardiometabolic risk of the selected students as a measure that does not modify, low cost, low exposure rated and easy to apply in this population.

Keywords: (maximum 5): Anthropometry, Child, Cardiovascular diseases, Risk factors

149/532. Use of baseline outcome measurements in randomized controlled trials in nutrition

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Introduction: In a randomized controlled trial baseline outcome measurements are measurements of the outcome of interest recorded before an intervention period.

Objectives: We will present recent evidence on the use of baseline outcome measurements in randomized controlled trials, and provide a unifying set of recommendations on their use. This will allow clinicians and statisticians participating in the design, execution, and interpretation of randomized controlled trials to better appreciate the advantages, disadvantages, and consequences of using a particular modelling approach.

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Method / Design: Two statistical modelling strategies for handling baseline outcome measurements: 1) conditional approaches that utilize the baseline outcome measurements, and 2) joint modelling approaches that treat the baseline as part of the outcome on equal footing with all subsequently recorded outcome measurements.

Results:

• An inadvertent choice of modelling strategy for baseline outcome measurements may lead to an unnecessary loss in power

• Pre- and post-randomization baseline outcome measurements may require intrinsically different modelling strategies

• There is no single best way of modelling baseline outcome measurements suitable for all commonly used RCT designs

• Study design, randomization procedures, eligibility criteria, and type of outcomes should be carefully considered before determining the appropriate modelling strategy

• All studies should report and, ideally, motivate the chosen modelling strategy for incorporating baseline outcome data in statistical analyses

Conclusions: There is no single best statistical approach that accommodates both parallel-arm and cross-over designs routinely used in randomized controlled trials. Thus, for a given randomized controlled trial, the choice depends on how much the randomization may be trusted and, more subtly, on how various aspects of the intervention may modify the distribution of the outcome during the course of the study.

Keywords: (maximum 5): analysis of covariance, cross-over design, linear mixed models, parallel-arm design

149/552. Measuring quality of meals: development of an index to be used in multicultural context

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Introduction: A meal is a combination of foods, source of nutrients and bioactive compounds eaten together. Approaches that better capture this interaction might help understand the relationship between diet and disease.

Objectives: To develop an index score to evaluate the nutritional quality of the main meal of the day, that can be employed across populations with different cultural backgrounds.

Method / Design: Data were derived from the cross-sectional Health Survey of Sao Paulo-2008 (Brazil). Food consumption was measured by a 24-hour dietary and lunch was considered the main meal consumed in Brazil. The final study sample included 956 adolescents, adults and elderly of both genders that had consumed lunch. Nutritional guidelines and recommendations were considered to develop this Main Meal Quality Index (MMQI). The MMQI was based on the World Health Organization and the World Cancer Research Fund nutritional recommendations and was composed by ten components: fruit, vegetable (excluded potatoes), ratio animal protein/total protein, fiber, carbohydrate, total fat, saturated fat, processed meat, sugary beverages and desserts, and energy density. Each component can score between zero and 10 points and the final score range is 0-100 points.

Results: The MMQI had a normal distribution ($p=0.531$) and the Cronbach's alpha value was 0.70. The MMQI was positively associated ($p<0.001$) with the nutrients vegetable protein, carbohydrates, fiber, vitamins A,E,K and C, total folate, potassium and magnesium; and was statically and associated ($p<0.01$) with energy and the nutrients total fat, saturated fat, animal protein, cholesterol, phosphorus, selenium, sodium and added sugar.

Conclusions: The MMQI was capable of simultaneously evaluating several components of the meal, providing an estimate of its quality regardless of the amount of food consumed. Next steps will include testing in different populations and different meals.

Keywords: (maximum 5): Meal quality, meal patterns, meal index, meal score and nutritional guidelines

149/554. The choice of dinner definition can change the nutrient profile

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Introduction: No consensus about dinner definition is found in the scientific literature. Meal definitions according to what the respondent named (self-reported) and according to the period of the day that it was consumed are the most used.

Objectives: The aim of this study was to evaluate the nutritional profile of dinner, considering two different meal definitions

Method / Design: Dietary data from the cross-sectional Health Survey of Sao Paulo-2008 (Brazil) was used. The final sample consisted of 487 adults that had consumed dinner accordingly to two criterions. Food intake was measured by 24-hour recalls administered by previously trained interviewers. Dinner classification was done considering two definitions: (1) self-report and (2) hour of consumption (meals consumed between 6pm and 9pm). Mean nutrients intake (contents of energy, carbohydrate, total fat, saturated fat, protein, animal protein, fiber, vitamin C, total folate, iron, sodium and added sugar) comparison between meal classifications was done using the non-parametric Mann-Whitney test due to lack of normality distribution.

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Results: Nutrient profile was different between dinner classifications. Saving added sugar, with mean intake of 14g for both criterions (p=0.396), all other nutrients presented statistically different mean intake (p<0.001). Comparing to the self-reported meal definition, the definition by hour underestimated the nutrients intake in at least 10%. Protein, animal protein, vitamin C and sodium presented over than 20% of underestimation.

Conclusions: Both definitions may have bias and depending on the dinner definition it is chosen, the meal nutrient profile can be over- or underestimated. It is necessary to compare others dinner definitions to standardize an appropriate definition making studies comparable.

Keywords: (maximum 5): meal, dinner definition, dinner.

149/557. Weighting the Factors Associated with Children Obesity: a Random Forest Approach

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Introduction: Obesity and overweight (OWO) are a recognized worldwide health issues. Individual data are needed in order to assess role played by different factors. A key point is whether commonly accepted risks factors for child obesity play the same role in the various countries. Difficulties arise when the number of variables/number of subjects ratio is close to, if not greater than, one. This makes common regression approaches impracticable.

Objectives: To evaluate the contribution of various risk factors to children obesity worldwide using random forests.

Method / Design: Data on 2640 children 6-11 years (Argentina, Brazil, Chile, France, Georgia, Germany, UK, India, Italy and Mexico) were collected on more than 90 parameters (anthropometrics, built environment, familiar socio economic status, food and activity). Two outcomes were considered, BMI z-scores and WHO classes of OWO vs. Normal children.

Since sample size is heterogeneous across countries (from 60 up to 1640 children), role played by each potential factor associated with both outcomes separately was estimated using Random Forests (RF), implemented using bootstrap under Bylander's bias-correction approach. All factors have been used as potential predictors of both outcomes. 100 permutations per tree were run for assessing each factor's importance, using the MSR for BMI z-score and the OOB classification error rate for OWO vs. Normal.

Results: Factors do not explain in the same extent, in the various countries, variability in BMI z-score (from 5% up to 34%) and they show different capability to classify OWO children (error rate from 5.50% up to 94.7%), suggesting that cultural heterogeneity exists in weighting determinants of children's obesity.

Conclusions: The development of a unified model for determinants of children obesity is troubled by the high heterogeneity in data. Machine Learning techniques proven to be an attractive way to approach this issue.

Keywords: (maximum 5): Global children obesity, risk factors, machine learning techniques, random forests.

149/564. An 8-month nutritional intervention improves athletes nutrition knowledge, body composition and nutrient intakes

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Introduction: A proper diet is important for improving sports performance. Athletes may have nutritional inadequacies related to the adoption of erroneous strategies to change body composition and the low level of nutritional knowledge, however, few studies have explored effective nutritional intervention strategies in this population.

Objectives: To evaluate the effect of an 8-month nutrition intervention on athletes nutritional knowledge, nutritional intake and body composition

Method / Design: In a before and after quasi-experimental clinical study, 32 athletes (21 adults and 11 adolescents) participated in a nutritional counseling consisting of four consultations separated by an interval of 45 to 60 days. Athletes nutrient intake were evaluated through the 24-hour recall. The Nutrition Data System for Research 2011 software (NDSR) was used to calculate nutrient intakes. Macronutrient data were compared to athletes guidelines and the dietary reference intakes (DRI) were used as the reference for vitamins and minerals intake. Participants body composition was estimated by skinfold thickness. Participants also completed a questionnaire of nutritional knowledge at the beginning and the end of follow-up and participated in a nutrition education workshop on Food Pyramid. For the nutrient intake analysis, a variable called "positive effect of nutritional intervention" was created. It consisted in the prevalence of individuals who maintained at or approached to the guidelines. Data analysis were conducted using t paired tests for time comparisons.

Results: Both groups showed an increase nutritional knowledge, especially regarding the Food Pyramid, and an increased total and lean body mass. Only adolescents had an increase in arm muscle area. Both groups showed a high prevalence of athletes with positive effects on macronutrients and micronutrients and energy intake, but

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only adolescents increased monounsaturated and polyunsaturated fat intake.

Conclusions: The nutritional intervention was effective in promoting beneficial changes on athletes body composition, nutritional knowledge and nutrient intake.

Keywords: (maximum 5): NUTRITIONAL COUNSELING. ATHLETES. NUTRITIONAL INTAKE.

149/575. Carbohydrate supplementation together with glutamine modulates concentration of HSP-70 and glutamine after exercise in hypoxia

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Introduction: High altitudes affect the homeostasis of different biological systems. However, there are few studies about the combination of carbohydrate and glutamine supplementation after exercise in this harsh environment, although its effects at sea level are well documented. We suggest that carbohydrate and glutamine supplementation modulate HSP-70 and glutamine serum occurring in hypoxic environments.

Objectives: The study evaluated the effects of carbohydrate and glutamine supplementation on HSP-70 and glutamine serum after strenuous exercise in hypoxia simulating altitude of 4,500m.

Method / Design: Nine physically active men were submitted to three sessions of exercise at an intensity of 70% VO2peak until exhaustion in a normobaric chamber (CAT-12 Air Unit). These sessions were as follows: 1) hypoxia and placebo (Crystal Light®-Kraft Foods), 2) hypoxia with supplemented 8% maltodextrin (200mL/20min, during and 2h after exercise), and 3) hypoxia after 6 days of glutamine supplementation(20g/day) and carbohydrate (8% maltodextrin-200mL/20min) during exercise and for 2h of recovery. The procedures were double-blind and randomised. HSP-70 and glutamine serum were evaluated before entering into the chamber (baseline), after 2h of rest (pre-exercise), after exercise (post-exercise) and after 2h of recovery remaining in the chamber. Data normality was verified and descriptive analysis was performed by calculating the mean±SE. Analysis of variance for repeated measures was carried out followed by a Tukey post hoc test and $p<0.05$ was considered.

Results: There was an increase in HSP-70 at the moment after exercise vs. baseline ($p=0.008$), post-exercise vs. pre-exercise ($p=0.0008$), as well as an increase at the moment after 2h vs. baseline ($p=0.001$) and after 2h vs. pre-exercise ($p=0.01$) in the hypoxia+carbohydrate condition. The concentration of glutamine increased at the post-exercise moment compared with the baseline ($p=0.01$) in the Hypoxia+carbohydrate+glutamine condition.

Conclusions: Carbohydrate supplementation stimulated an increase in HSP-70, whilst glutamine together with carbohydrate increased the glutamine concentration after exercise.

Keywords: (maximum 5): CARBOHYDRATE, GLUTAMINE, HSP-70, EXERCISE AND HYPOXIA

149/579. Carbohydrate supplementation improves the TH1/TH2 response mediated by HSP-70 after exercise at high altitude

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Introduction: Studies at sea level identify that carbohydrate has a positive effect, and may alleviate the stressful events of strenuous exercise on the immune system.

Objectives: This study evaluated the effect of carbohydrate supplementation on HSP-70 concentration, cytokine production and TH1/TH2 balance by lymphocytes after strenuous exercise at high altitude.

Method / Design: Nine physically active men were submitted to two sessions of exercise at intensity of 70% VO2peak until exhaustion in a normobaric chamber (CAT 12 Air Unit) simulating altitude of 4500m. These sessions were as follows: 1)hypoxia+placebo, and 2) hypoxia+8%maltodextrin (200mL/20min) during and 2h after exercise. The procedures were double-blind and randomised. HSP-70 serum and cytokine production were evaluated before entering into the chamber(baseline), after 2h of rest(pre-exercise), after exercise(post-exercise) and 2h after exercise in the chamber. To determine cytokine production and TH1/TH2 balance, lymphocytes (1x105cel) were incubated in RPMI 1640 medium supplemented with glutamine, homologous serum and LPS. After 48h the concentration of IL-2 and IL-4. Data normality was verified and descriptive analysis was performed by calculating the mean±SE. Analysis of variance for repeated measures was carried out followed by a Tukey post hoc test and $p<0.05$ was considered.

Results: There was an increase in HSP-70 at the moment after exercise vs. baseline($p=0.008$), post-exercise vs. pre-exercise ($p=0.0008$), as well as an increase at the moment after 2h vs. baseline ($p=0.001$) and after 2h vs. pre-exercise ($p=0.01$) in the condition of hypoxia+carbohydrate. In relation to IL-4 production, there was a reduction in the hypoxia+carbohydrate supplemented group compared with the hypoxia group ($p=0.05$). This change was observed at the pre-exercise, after exercise and 2h after exercise moments. There was no difference in IL-2.

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Conclusions: Supplementation with carbohydrates influences the TH1/TH2 balance towards a Th1 response after exercise in simulated altitude of 4500m, possibly mediated by increased HSP-70.

Keywords: (maximum 5): CARBOHYDRATE, HSP-70, EXERCISE, HYPOXIA AND TH1/TH2

149/608. Inter- and Intra-Laboratory Variability of Glycemic and Insulinemic Indexes

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Introduction: Glycemic Index (GI) concept has been developed by Jenkins et al in 1981 to rank carbohydrate (CHO)-containing foods.

Objectives: This study aimed at quantifying Inter- and Intra-laboratory variability on GI and II after standardisation of protocols in 3 different labs.

Method / Design: At least 15 healthy normal-weight subjects aged 18-45 years and HOMA-IR lower than 1.7 were recruited in each lab. They underwent 9 sessions to test 3 times a glucose solution or 6 different cereal products. Glycemia and Insulinemia were quantified at 15, 30, 45, 60, 90 and 120 minutes. The three selected labs used the validated GI method (WHO/FAO 1998, Brouns et al. 2005, ISO2010). In addition, glucose, insulin kits and subject selection were standardised between labs to reduce their variability.

Results: GI values for the different products ranged from 44 ± 15 to 92 ± 29. For a same product, the largest difference between 2 labs was 11. No statistical difference was observed between the labs. Significant product effect was observed on incremental area under the curve (iAUC) and peak of glycemia. For II, values ranged between 54 ± 12 and 85 ± 34 with the largest difference between the 3 labs for a same product being 21. Significant lab and product effects were observed for insulinemic response parameters. Inter-individual and Intra-individual coefficient of variability (CV) ranged between 20 and 28 % and between 18 and 30%, respectively for iAUC glycemia and between 35 and 51% and between 22 and 43 %, respectively for iAUC insulinemia.

Conclusions: GI was not statistically different between the 3 labs and the products can be differentiated. II displays statistically significant differences between the labs showing the difficulty to compare the results on these parameters.

Keywords: (maximum 5): Inter-laboratory variability, Intra-laboratory variability, Glycemic Index, Insulinemic Index, cereal products

149/648. Different versions of the German nutrient database BLS: Effect on nutrient intake

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Introduction: Food composition databases are subject to continuous changes and hence, affect the calculated nutrient intake of study populations.

Objectives: To examine the effects of altered nutrient data of three versions of the German Nutrient Database (BLS versions II.3, II.4, 3.02, generated in 1999, 2006, 2014) on the calculated energy and nutrient intake of the study participants of the German National Nutrition Survey (NVS) II.

Method / Design: Food consumption data assessed by diet history interviews of 7093 men and 8278 women (aged 14-80 years) who participated in the NVS II were used to calculate daily energy and nutrient intake (median, relative difference of the median, and 95% confidence interval of the median). For relative differences a pairwise comparison between the BLS versions II.4 versus II.3, 3.02 versus II.4 and 3.02 versus II.3 were conducted. Differences were considered significant when 95% confidence intervals do not overlap.

Results: Sex-specific analysis showed that the median intake of most of the studied nutrients varied significantly between the three BLS versions. For the majority of nutrients discrepancies between medians were below 10%. The most pronounced differences were found between version 3.02 and II.3 for calcium (men: -21.5%; women: -22.5%), magnesium (men: -19.3%; women: -22.1%), iodine (women: -20.2%), beta-carotene (men: +18.5%; women: +19.2%), iron (men: -16.3%; women: -18.0%), retinol (men: +18.6%; women: +14.0%), and alpha-tocopherol (men: +12.6%; women: +13.1%).

Conclusions: A strong impact of the applied BLS version on the calculated nutrient intake of the NVS II was shown. This was especially the case, when nutrient values of food items with high consumption were altered. Therefore, it is of great importance to consider the applied version of a food composition database when comparing nutrient intakes of different food consumption studies.

Keywords: (maximum 5): food composition database; nutrient intake; nutrient data; German National Nutrition survey (NVS) II, German Nutrient Database (BLS)

149/652. Generalizability of dietary data in e-epidemiological research: The French NutriNet-Santé and ENNS studies

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Introduction: Despite numerous advantages over traditional methods, Web-based study designs continue to elicit concerns about generalizability.

Objectives: To compare dietary intake in a large e-cohort of volunteers with respective data from a nationally-representative sample.

Method / Design: We studied 49,443 adults (aged 18-74 y) recruited during the first year (2009-2010) of the NutriNet-Santé e-cohort where volunteers aged 18+ years, residing in mainland France and having Internet access were eligible for enrollment. Self-reported dietary intake (food groups, micro- and macro-nutrients, and total energy from three 24-h dietary records) was weighted according to the national Census. It was then compared with data from the nationally-representative study "Etude Nationale Nutrition Santé" (ENNS, 2006-2007, N=2,754 adults aged 18-74 y) in which dietitians carried out dietary interviews. Energy underreporters were excluded from analysis in both surveys. Given the large sample size, we employed a >5% cutoff for establishing practically meaningful differences.

Results: The findings revealed similar intake as regards total energy, simple and complex carbohydrates, total lipids, and protein. However, across sex, intake of fruit and vegetables, dietary fiber, vitamins B6, B9, C, D, E, iron, and magnesium was higher while intake of alcohol, and non-alcoholic beverages was lower in the e-cohort than in ENNS. In addition, mean differences in intake of calcium and vitamin A reached significance only among men, whereas mean differences in intake of vitamin B12, zinc and potassium were significant only among women.

Conclusions: The results of the present study revealed similarities and differences in food group and nutrient intake between a large e-cohort of volunteers and a nationally-representative French sample. Apart from research, dietary data from large e-cohorts could also potentially serve trend monitoring purposes as regards dietary practices in the target population, especially in population subgroups underrepresented in population-based surveys.

Keywords: (maximum 5): dietary intake, diet assessment, prospective cohort, generalizability, Internet

149/690. Development and validation of general FFQ for use in clinical practice.

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Introduction: To optimise the clinical care of patient populations, (para-)medics are looking for new tools to facilitate and increase the quality of care. A patient-tailored feedback regarding their diet is one aspect of optimising care.

Objectives: Development, validation and reproducibility of a Food Frequency Questionnaire (FFQ) to assess selected nutrient and food intake.

Method / Design: Cross-sectional validation of an online FFQ, which contains 24 food groups. Reference data for validation were 3-day estimated food records. Analyses were done for all participants at the nutrient and food group level. The food groups are based on the Flemish (Dutch speaking part of Belgium) Food-Based Dietary Guidelines. The validation study was conducted in a sample of 40-70 years old adults recruited through cultural and sport organisations.

Results: In total 54 women (52.3y±5.9 and BMI: 24.7kg/m^2±4.2) and 32 men (55.4y±7.3 and BMI: 26.4kg/m^2±2.5) participated. The measured intakes of water/thee/coffee, sugared milk products, brown bread, breakfast cereals, fish, meat replacers, potatoes, pasta and margarine were not significantly different between the two methods. The Spearman correlation for all foods was on average 0.41 (ranging from 0.09 for sugared milk products to 0.81 for alcoholic beverages). The reproducibility was acceptable as there was only a significant different for eggs. The overall correlation coefficient was 0.69. There were no significant differences for the relative nutrient intake between the two methods except for total fat, carbohydrates, water and sodium. The overall correlation coefficient was 0.3. The reproducibility test shows no differences for all nutrients between the two measurements of the FFQ.

Conclusions: The current online FFQ shows an acceptable reproducibility for both nutrients and food items, whereas validation only showed reliable intakes for a restricted number of food items and nutrients. This online FFQ can be a valuable tool to perform dietary assessment in a clinical context.

Keywords: (maximum 5): FFQ, validation, food, nutrients

149/719. Comparison of food consumption and nutrient intake assessed with different dietary assessment methods

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Introduction: Different dietary assessment methods are used to estimate dietary intake. Each method comprehends certain strengths and limitations. In the German National Nutrition Survey (NVS) II three dietary assessment methods - diet history interviews (DHI), 24-h recalls (24HR) and weighed food records (WR) - were applied.

Objectives: To determine differences in food consumption and nutrient intake of the three dietary assessment methods.

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Method / Design: Data were assessed within a subgroup of 677 participants of the NVS II (2005-2007). Nutrient intake was calculated with the German Nutrient Database (BLS 3.02). Multiple Source Method was applied to estimate population distributions of usual intakes based on two 24HR. Confidence intervals were calculated on basis of bootstrapping samples and Cohen's d was assessed as an effect size estimate.

Results: Greatest differences in food consumption were found between DHI and 24HR, least differences between 24HR and WR. Higher estimates for nutrient intake were observed for DHI compared to 24HR and WR in 15 and 12 out of 20 nutrients. Pairwise comparisons of DHI with the two other methods showed high relative differences for certain nutrients with medium effect sizes, reflecting the higher consumption estimates of vegetables, fruit and milk/-products of the DHI.

Conclusions: Food consumption based on WR is close to 24HR, whereas DHI reveal higher results. Especially socially desirable foods like vegetables or fruit are stated in higher amounts by DHI. Another reason may be the enormous cognitive task of respondents which facilitates subjectivity. It is not known which method is closest to the true consumption. However, comparison of consumption data with data of food balance sheets suggests that the results of DHI regarding vegetables are overestimated.

Keywords: (maximum 5): German National Nutrition Survey II, diet history interviews, 24-h recalls, weighed food records

149/720. Impact assessment of a sports kit on physical activity in children aged 8 to 11

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Introduction: Only 50% of French children respect the WHO recommendation on physical activity. Playing is probably a way to promote physical activity for children, this is why this study proposes to use a tool that proposes sports in a safe and funny way: the sports kit: "Le Sport Ça Me Dit", with an innovative methodology using 3D accelerometers.

Objectives: To confirm that the use of the sports kit increases, at medium-term, the children global physical activity (PA) and willingness to be physically active.

Method / Design: In the EPODE France community-based programme, 5 facilitators were recruited to provide bi-weekly physical activity (PA) sessions to children for 7 weeks, using the kit, which includes 6 different activities. 213 children aged 8 to 11 were recruited, from which 122 composed the control group and 91 the action group. Each child received a 3D accelerometer wristband. Measurement of the children PA was made once a week for 14 weeks (with sports kit use during 7 weeks) using accelerometers. In parallel, the children completed a questionnaire, before, during and at the end of the study, on their PA habits, screen time and sleeping habits.

Results: The data were treated to compare the difference between the action group and the control group and to measure the evolution of both groups over the study. The data analysis was conducted in a way that allows the observation of an increase of physical activity and sports practice in children, a decrease of screen time and an increase of the sleep duration.

Conclusions: This study shows the impact of a playful tool on the physical activity level and on the motivation to do sports, in children. Besides, it assesses if this impact is sustainable at medium-term.

Keywords: (maximum 5): Physical Activity, Children, Accelerometer, Inactivity

149/731. Global changes in gene expression in CACO-2 cell line treated with extracts from iodine-biofortified carrot

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Introduction: Iodine deficiency can cause a wide spectrum of disorders from endemic goitre to the mental retardation. On the basis of the WHO report about 1.9 billion of people around the World consume a diet deficient in iodine. The highest percentage of people with iodine deficiency is found in Europe. An alternative source of iodine, may be biofortification of vegetables, especially those that are the basis of daily diet.

Objectives: The aim of this study was to determine the effect of carrot biofortified with iodine on global changes in gene expression in Caco-2 cell line.

Method / Design: Caco2 line cells were treated with extract from iodine-biofortified carrot (164,4 μg/dm3) and extract from non-biofortified carrot. The analysis of gene-expression profile was made using SurePrint G3 Human Gene Expression 8x60K v2 Microarray. The statistical analysis was performed using Gene Spring 12.6.1 software (Agilent, USA). The statistical significance of the differences was evaluated with a one way ANOVA and Tukey's HSD Post-hoc test ($p < 0.05$). A multiple testing correction was performed using Benjamini and Hochberg False Discovery Rate (FDR) < 5%.

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Results: We have found the difference in 42 genes expression between cells treated with extract from iodine-biofortifitied carrot and cells treated with extract from non-biofortified carrot. These genes were involved in 18 statistically significant receptor signaling pathways.

Conclusions: In this study, for the first time, we presented whole genome microarray analysis to describe the transcription profile of human Caco-2 cells under the influence of extract from iodine-biofortified carrot. These results may be useful in the assessment of iodine-biofortified carrot as a potential source of iodine in the prevention of deficiency of this trace element.

This work was financed by the 2012–2015 Polish National Science Center grant no. DEC-2011/03/D/NZ9/05560.

Keywords: (maximum 5): iodine, biofortification, carrot, Caco-2, microarrays

149/739. Development of a short food list for use in a web-based dietary assessment tool.

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Introduction: Self-administered web-based 24-h recalls may represent a low-cost dietary assessment method for use in different population groups. Such methods must be user-friendly, fully auto-coded and linked to a comprehensive food composition database.

Objectives: To develop a short food list for use in the Diet Ireland tool (web-based 24-h dietary recall) and to test the agreement of this short list with the original extensive food list in its ability to estimate nutrient intakes in a nationally representative sample of adults in Ireland.

Method / Design: A total of 2319 food codes were reported by participants of the Irish National Adult Nutrition Survey (NANS) (www.iuna.net). Food-codes that were similar in composition were combined to produce a shortened food list of 751 food-codes. Using NANS food consumption data (4-day semi-weighed food diary), and UK and Irish food composition tables, mean daily intakes of energy, dietary fibre, macronutrients and 22 micronutrients were estimated using both the extensive (n=2319) and the shortened food list (n=751). Spearman rank order correlations were used to assess the relationship between estimates of nutrient intake between the two food lists. NANS participants were classified into thirds of daily nutrient intake estimated by both lists, and the percentages of participants classified into the same category were determined.

Results: Using the extensive and shortened food lists, there was a strong positive correlation between the estimates of daily nutrient intake (rs = 0.9-1.0, n =1500, p<0.001). Cross classification of NANS participants into thirds of daily nutrient intake resulted in 81-100% of participants being classified into the same category when using the shortened food list.

Conclusions: A shortened food list developed for use in a 24-h online dietary recall showed good agreement with a more comprehensive list in estimating daily nutrient intakes in Irish adults.

Keywords: (maximum 5): 24-h recall; short food list; dietary assessment; Diet Ireland;

149/747. Cardiovascular risk and weight cycling

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Introduction: The accumulation of diseases attributed to obesity and sedentary lifestyle has emerged as mayor problem. For the treatment of obesity a supervised weight reduction with life style changes is recommended. Even though documented as beneficial over short term, long term data differ about the final assessment of the value of these studies.

Objectives: Our aim was to examine the weight development and its effect on cardiovascular risk after weight reduction in a cohort of 60 overweight individuals.

Method / Design: All individuals were drawn from the study cohort of the Metabolic Syndrome Berlin Potsdam (MeSyBePo) and the MeSyBePo follow-up study. A subcohort of 60 overweight individuals took part in a 6 months intensive weight reduction program. All participants underwent a physical examination after an overnight fast. Anthropometry was performed, blood samples taken and an oral glucose tolerance test (oGTT) was performed. Weight course of all 60 participants was assessed by phone in retrospective and validated with documented weights from the study center. Framingham risk score was calculated.

Results: Mean weight loss after 6 months accounted for -6,5% of initial weight and was overall stable for another 6 months (-6,6%). A distinct trend indicated weight regain over time resulting in +1,1% of initial weight after 54 months. Accompanied by weight change increases in BMI (p=0,004), total body fat (p≤0,001), systolic blood pressure (p=0,004), fasting blood glucose (p≤0,001) and insulin (p≤0,001), as well as HOMAIR (p≤0,001) were seen. With no obvious effect over time for all 60 participants, stratified by weight course, the cardiovascular risk was particularly increased for strong cycling 7,8±4,8% to 11,9±6,7% (p=0,010).

Conclusions: Our data imply that especially in follow-up care after weight reduction weight courses should be monitored to prevent

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form weight regain and especially cycling, which was shown to be associated with an increase in estimated cardiovascular risk.

Keywords: (maximum 5): Weight Cycling

149/755. Design of intervention studies using oral nutritional supplements (ONS) in elderly fracture patients.

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Introduction: Impaired nutritional status or long-term inadequate intake of specific nutrients has detrimental effects on bone fracture prevalence, quality of life, postoperative complications and rehabilitation in geriatric patients. Intervention studies on effects of oral nutritional supplements (ONS) attain inconsistent results. The Marienhospital-Hohenheim-Malnutrition II (MaHoMal II) - Study aims to investigate the effects of ONS in geriatric fracture patients, taking into account conceptional shortcomings of former studies.

Objectives: To make sure the study design of the MaHoMal-Study II is appropriate and feasible. A pilot study for test of protocol was conducted, approved by local ethics committee.

Method / Design: Literature research yielded in eleven eligible studies. Six subjects (mean age: 78,7 years) with osteoporotic vertebral or femoral fractures took part in the pilot study phase after written informed consent.

Results: Literature research shows, that in 9 out of 11 studies a fixed dosage of ONS was chosen without explanation. 4 of these investigators report poor compliance. In 5 studies effects during hospitalization were recorded, whereas 6 studies followed up patients after a longer time period. In 5 studies nurses, physicians or physical therapists were involved in the procedure. In accordance to literature the pilot phase of our protocol confirms that different tools for evaluation of energy balance result in quite variable caloric needs. Compliance improved with better patient information. Regular assessment of energy requirements improved outcomes. Therefore a specific algorithm to determine the amount of ONS has been developed and a guideline for patient information was generated.

Conclusions: In the setting of intervention studies in elderly short- and long-term supplementation should be determined by assessing energy needs, and be accompanied by check for compliance. Collaboration between study and clinic staff is required to assure constant motivation and care.

Keywords: (maximum 5): Oral Nutritional Supplements; Malnutrition; Intervention Study

149/758. Dietary underreporting: comparison between face-to-face and telephone 24-hour recalls in Health Survey of São Paulo

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Introduction: Food intake data are susceptible to underreporting (UR) and interview design could interfere in results.

Objectives: To compare UR percentage with either a face-to-face or a telephone 24-hour dietary recall (24HR) interview design.

Method / Design: Cross-sectional population-based survey performed in 2008 which enrolled 563 adults and elderly living in urban area of São Paulo, Brazil, with two measurements of 24HR, for dietary intake information. Both 24HR used the Multiple-Pass Method, whereas the first one was applied in a face-to-face interview at households and the second 24HR was administered by telephone. Sociodemographic, lifestyle, and anthropometric data were collected at households. Body Mass Index (BMI= weight (kg)/height (m)2) was self-reported and individuals were classified according to BMI into two categories: with and without excess body weight (adults with EBW: BMI≥25 kg/m2 and elderly with EBW: BMI≥27 kg/m2). Misreporting (MR) percentage of each individual energy needs was determined by: Energy intake – EER (estimated energy requirements) /EER x 100. Underreporting (UR) percentage was defined as the MR percentage with values lower than zero. All analyzes considered the complexity of the sample design.

Results: Individuals presented lower misreporting median responding to face-to-face interview (MR1) than reporting dietary consumption by telephone (MR2) (MR1=-29.04; MR2=-36.3; p<0.001). The median UR percentage of energy was 38.9% of energy needs in the first and 40.2% in the second 24HR (p=0.013). UR percentage was higher in individuals with EBW in both recalls (p1=0.047; p2=0.038). Elderly women with EBW presented higher percentage of UR than those without EBW in both the first (p=0.008) and the second (p=0.018) recalls.

Conclusions: UR percentage was higher in telephone 24HR and also in elderly women with EBW. Differences between both designs should be considered in surveys of food intake according to its advantages and disadvantages.

Keywords: (maximum 5): Misreporting; Underreporting; Food intake analysis; 24-hour-recall

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149/762. Riksmaten FLEX - using modern technology to assess diet in Sweden

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Introduction: A major challenge when collecting dietary data in surveys is to have a valid method that is cost effective, easy to use and provides high quality data. A new web-based self-assisted method, Riksmaten FLEX (RM-FLEX), has therefore been developed for the next Swedish national dietary survey in adolescents.

Objectives: To describe the method and development of RM-FLEX.

Method / Design: The development consisted of: A) A pre-study with the aim to explore adolescents' perceptions on foods and eating using face-to-face interviews. 23 boys and girls in school grades 5, 8 and 11 were included. B) The development of RM-FLEX was carried out as an iterative IT-project with close collaboration between IT-developers and dietary survey team. RM-FLEX was regularly tested and end users were involved to improve design and user friendliness of the method. C) Preparation of a food list adapted for the target population.

Results: The pre-study showed that there was a marked difference in knowledge about foods and drinks between the two youngest and the oldest age group, however the variability was as large between girls and boys, as between individuals. It also showed that the adolescents want to respond correctly but some drinks and foods were easy to forget. The principles for the method identified in the pre-study were a) to make it easy to record foods and drinks, b) to split complicated questions into several simpler ones, c) to support memory by including prompts and d) to meet the adolescents in the smartphone. Approximately 800 foods were included in the food list, developed with knowledge from previous dietary surveys and market statistics.

Conclusions: The development of RM-FLEX has been successful and well received in the target group. A validation study will be carried out in autumn 2015. The main study will be carried out 2016-2017.

Keywords: (maximum 5): Diet, self-assisted, dietary survey, web-based, food intake

149/767. The role of soft drinks on children obesity a global analysis using machine learning techniques

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Introduction: Among lifestyle factors, soft drinks' consumption has been suggested as playing a role in contributing to obesity onset.

Objectives: To evaluate the contribution of various risk factors to obesity worldwide using a class of machine learning techniques, namely random forests.

Method / Design: Data on 2640 children 6-11 years (Argentina, Brazil, France, Georgia, Germany, UK, India, Italy and Mexico) were collected on more than 90 parameters (anthropometrics, built environment, familiar socio economic status, food and activity frequency).

Given that sample size is heterogeneous across countries (from 60 up to 1640 children), role played by soft drinks associated with WHO classes of OWO (overweight or Obese) vs. Normal children was estimated using Random Forests (RF), which represent a more robust way to assess the additional contribution of weight status' predictors compared with traditional statistical methods. RF have been implemented using 150,000 bootstrap samples using Bylander's bias-correction approach. Incremental role of soft drinks has been evaluated on top of all the other potential predictors.

One-hundred permutations per tree were run for assessing each factor's importance, using Out-of-Basket (OOB) classification error rate (CER).

Results: Despite the fact that soft drinks consumption is very different across continents, (children were consuming never 20% Europe, 28% India, 6% South America, and very often 33% Europe, 16% India and 54% South America, $p<0.001$), its contribution in determining children's weight status was not significant.

Conclusions: The analysis of the association of soft drinks on children obesity is undermined by the great heterogeneity in data. Random forest approach provided stable and informative estimates, showing that the role played by soft drink consumption is not relevant among common recognized determinants of OWO in children.

Keywords: (maximum 5): Global children obesity, risk factors, machine learning techniques, random forests

149/793. A priori and a posteriori dietary patterns in infancy and body composition in childhood

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Introduction: Dietary patterns are linked to obesity in adults, but this association is unclear in early childhood.

Objectives: We examined associations of different types of a priori and a posteriori-derived dietary patterns in toddlers with body composition at school-age.

Method / Design: We assessed dietary intake with a food-frequency questionnaire in 2,026 Dutch 1-year-old children participating in a population-based cohort study. At their age of 6 years, we measured anthropometrics and body fat mass (with dual-energy-X-ray-absorptiometry) and calculated body mass index (BMI), fat mass index (FMI), and fat-free mass index (FFMI). Three dietary pattern approaches were used: 1) An a priori-defined diet quality score for preschool children; 2) a 'Health-conscious' and 'Western' pattern derived from principal-component analysis (PCA) based on variation in food intake; 3) two patterns derived with reduced-rank regression (RRR) based on variations in FMI and FFMI.

Results: After adjustment for confounders, children in the highest quartile of the a priori-defined diet score or the 'Health-conscious' PCA-pattern at 1 year had a higher FFMI at 6 years than children in the respective lowest quartile (0.19 SD (95%CI 0.08;0.30) difference for the diet score), but no difference in FMI. The 'Western' PCA-pattern was not associated with body composition. The first RRR-derived pattern was characterized by high intake of meat, fish, sauces, and sugar-containing beverages and was positively associated with both FMI and FFMI. The second RRR-pattern was characterized by intake of whole grains, pasta and rice, and vegetable oils and was positively associated with FFMI, and inversely with FMI.

Conclusions: Our results from both a priori and a posteriori-derived dietary patterns suggest that patterns characterized by high intake of vegetables, grains, and vegetable oils in early childhood are beneficial for later body composition; while patterns characterized by high intake of refined grains, meat, and sugar-containing beverages may be unfavorable.

Keywords: (maximum 5): dietary pattern analysis, children, body composition

149/796. Cognitive performance impairment of obese children: an evidence from meta-analysis study

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Introduction: Child obesity has sharply risen worldwide. Whether this obesity influences the child cognitive performance or not remains inconclusive.

Objectives: The present study would like to summarize the linkage between child obesity and cognitive performance by using a meta-analysis.

Method / Design: The present study has been conducted by integrating the available studies using a meta-analysis approach with Hedges' d effect size method.

Results: Obese children have significantly lower satiety responsiveness (d++, ±95%CI: -0.37, ±0.08), math achievement (-0.52, ±0.20), memory ability (-0.41, ±0.02), and IQ score (-0.26, ±0.02), compared to normal children. Brain scanning presents that obese children have significantly lower signal intensity of grey matter (-0.31, ±0.50), higher signal intensity of white matter (0.56, ±0.16), and higher signal contrast of white matter to grey matter ratio (0.56, ±0.16) than the normal children have.

Conclusions: Child obesity indeed enables to impair the cognitive performance. Increasing of adiposity which might induce inflammation and atrophy of grey matter area seems become the plausible reason behind this phenomenon. A preventive action on this problem is preferable since the obese children are more likely to grow and persist as obese adult who has consistent correlation with cognitive impairment and more prone to many noncommunicable diseases.

Keywords: (maximum 5): Cognitive performance, obese children, meta-analysis.

149/810. Barley protein profiles of potential antioxidative and dipeptidyl peptidase IV inhibitory activity – in silico analysis

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Introduction: Peptides belong to food components possessing many kinds of biologically activities [1]. During the recent years, antioxidative as well as dipeptidyl peptidase IV (DPPIV) inhibitory activity, among other peptide activities, became the object of extensive studies.

Objectives: The aim of present study was preliminary evaluation of barley (Hordeum vulgare) proteins.

Method / Design: Protein sequences (12 prolamins, 10 enzymes, 2 albumins and 6 globulins) were taken from UniProt knowledgebase [2]. Peptide sequences were inserted into a BIOPEP database [3], currently (23.03.2015) containing 485 antioxidative and 204 DPPIV inhibitory peptides. The analysis covered profiles of potential biological activity of protein sequences, calculation of A parameter (A = the number of fragments with given activity divided by number of amino acid residues in a protein chain [3]) and simulation of proteolysis by pepsin, trypsin and chymotrypsin.

Results: A value of proteins analyzed was within the range 0.009-0.078 for antioxidative and 0.144-0.302 for DPPIV inhibitory activity.

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Pepsin and chymotrypsin were predicted to be more efficient in active fragment release, than trypsin.

Conclusions: The work performed revealed possibility of release of bioactive peptide from barley proteins by proteolytic enzymes.

Keywords: (maximum 5): proteins: antioxidative peptides: dipeptidyl peptidase IV inhibitors: barley

149/811. Annotation of sensory peptides and amino acids in BIOPEP database

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Introduction: Peptides belong to compounds affecting the food taste. All basic tastes i.e.: bitter, salty, sour, sweet and umami may be revealed by peptides. Peptides are annotated in specialized databases utilizing amino acid sequences (e.g. BIOPEP) as well as chemical databases using codes such as SMILES, InChI or InChIKey (e.g. PubChem).

Objectives: The aim of presented work was to create a database of sensory peptides and amino acids.

Method / Design: Information about compound taste was taken from the literature. Bioactivity data was taken from the BIOPEP database of bioactive peptides and from other databases (e.g. ChemSpider or PubChem). Data was inserted into a database using BIOPEP form. Amino acid sequences of peptides were converted into chemical codes by use of Open Babel program. The resulting annotations were verified and corrected by means of Ketcher program available at ChemSpider website.

Results: The information annotated in BIOPEP includes: ID number, peptide sequence, taste ("Activity" tab), reference („References" tab), structure written by chemical codes, bioactivity data („Additional information" tab), Identifiers from other databases („Database reference" tab). BIOPEP database is available at the website: http://www.uwm.edu.pl/biochemia/index.php/pl/biopep.

Conclusions: Recent version of BIOPEP database of sensory peptides and amino acids may be a tool integrating biological and chemical information about peptides important from the point of view of food scientists and nutritionists. It offers opportunity to facilitate peptide searching in chemical databases.

Keywords: (maximum 5): bioinformatics: database: peptides: taste

149/850. Stability of dietary indices: a 10 years follow-up

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Introduction: Diet quality is often measured using dietary indices rather than single foods and nutrients. Adherence to the Healthy Eating Index-2010 (HEI), the Diet Quality Index (DQI) and the Mediterranean Diet Score (MDS) is positively associated with health outcomes. However, most of these prospective studies estimated diet quality only at baseline and assume a stability of the quality during the follow-up period.

Objectives: The aim of this study was to evaluate three dietary indices (HEI, DQI, MDS) and their components over a 10-year follow up period.

Method / Design: Within the framework of a study concerning physical activity, physical fitness and health a sample of 1569 participants was tested and measured during 2002-2004 whilst 652 participants were tested and measured again during 2012-2014. By means of a three days diet record nutritional intake data were obtained for 197 women and 373 men at both occasions. HEI, DQI and MDS were calculated as prescribed. Tracking coefficients were calculated using Pearson or Spearman correlation coefficients.

Results: Mean DQI, HEI-score increased significantly over the 10 years evaluation period (all $p<.01$) whilst the mean MDS scores did not change over time. According to Bloom's (1964) definition, the HEI and the DQI showed moderate stability (r values ranging from .401 to .486), while the MDS showed weak stability both in men (r=.136) and women (r=.258). The components of the three dietary indices showed mostly weak to moderate stability for both men and women.

Conclusions: The evaluated dietary indices and their components showed only moderate to weak stability over a follow-up period of 10 years. The weak stability of these indices should be taken into account in prospective cohort studies evaluating diet related health outcomes in which a measure of diet quality is performed at baseline only.

Keywords: (maximum 5): dietary index; tracking; Mediterranean Diet Score; Healthy Eating Index; Diet Quality Index

149/886. Developing a cooperative multicenter study in Latin America: issues and difficulties (ELANS Project)

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Introduction: Utilizing a multicenter approach in cross-sectional studiesof obesityallows for improved generalizability of the results, a largersample size, and, consequently, planning of health policies and programs.

Objectives: This studyaims to highlight important issues regarding the organizationof multicenter observational studies on nutrition research at institutional, researchers and support/sponsoring level among countries with diverse culture.

Method / Design: The Latin American Study of Nutrition and Health (ELANS) are used as an example on the feasibility of developing a cooperative multicenter study in Latin America.

Results: A well-conducted multicenter study needs to assure standardization, uniformity of procedures, high data quality, and collaboration across sites. One of the barriers to conducting thesestudies is their relatively complex organization, including need to recruit collaborators and research staff, cooperation between institutions, develop infrastructure, and find funding.The Coordinating Center (CC) and External Advisors Committee may be responsible for selection of the study sites. During the planning phase, aside from identifying the data to be collected and the collectionmethodology, it should be defined the important outcome measures.The CC should develop an international Institutional Review Board (IRB) application and, after approval, each site principal investigator should submit to local IRB. It is extremely important to define sponsor role in the study. The differentlevels of involvement of the sponsor (providingoversight to the study investigators or being a financial provider), depend on thedesires of the study investigators or of the sponsor, and should be discussed. Developing in advance a plan of communication, data analysis and publicationensures the appropriate data management and dissemination.

Conclusions: Multicenter cooperative studies require vigilance to detail,comprehensive planning, andcollaboration betweenstudy sites.While challenging, such studies offer great potential for building a scientific base for studies on nutrition and health.

Keywords: (maximum 5): multicenter study, Latin America, design, difficulties

149/899. Influence of physical activity on fatty acid profile

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Introduction: Modifying the chemistry and lipoprotein metabolism, physical activity reduce the degree of cardiometabolic risk. Impacts of physical activity on the fatty acid profile are follows: reduction of arachidonic acid, an decrease of saturated fatty acids, decrease of polyunsaturated fatty acid, and the level of peroxidation index.

Objectives: Physical activity in terms of movement therapy, especially aerobic training, contributing to the reduction of trans fatty acids and inflammatory parameters (ratio Ώ6 / Ώ3). The effects were also observed on the reduction of oxidative stress markers such as "thiobarbituric" acid reacting substances.Impact of physical activity on the fatty acid profile was evaluated in human and experimental models, where the erythrocyte membrane is very sensitive indicator of oxidative damage. In the process of fat metabolism during exercise is negligible and the importance of the sympathetic nervous system, circulating catecholamines (epinephrine-adrenaline).

Method / Design: Physical activity and adequate diet - therapy are classified in multifactorial concept, with an interdisciplinary approach, with the scope to reduce cardiometabolic risk, changing lifestyle and behavior custom.

Results: The positive effect of physical activity on lipid and cardiovascular system is reflected in: amplification of the lipid profile, insulin sensitivity, immune function, increase myocardial perfusion, increased fibrinolytic activity, improving aerobic capacity, metabolic function, reduce the adherence of platelets due to increased synthesis of prostaglandins, increasing energy expenditure (which is important for the maintenance of ideal body weight), the prevention and treatment of obesity as well as in controlling fat metabolism.

Conclusions: Extremely beneficial effect have aerobic, dinamic physical exercises involving multiple muscle groups (fast walking, running, swimming), with values heart rate, or pulse, 40-85% of maximum. Not recommended are types of physical activity that requires very intense but short-lived effort. Therefore, it is more important to increase physical endurance than strength.

Keywords: (maximum 5): Fatty acid profile, physical activity, fat metabolism, cardiometabolic risk.

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149/900. Inventory of existing surveillance systems in Europe: A dedipac study

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Introduction: Member States have recognized the need for harmonized public health surveillance systems to obtain more comparable data across European countries and align their policies, action plans and recommendations in terms of healthy diet and physical activity. The Determinants of Diet and Physical Activity (DEDIPAC) Knowledge Hub (KH), is the first pillar of the Joint Programming Initiative "A Healthy Diet for a Healthy Life". One of the DEDIPAC major aims is to provide a framework for an integrated (future) pan-EU surveillance and research infrastructure for population surveillance and for the evaluation of interventions on a population level.

Objectives: To conduct an inventory of national, regional and international surveillance systems in Europe targeting different populations and health outcomes to identify gaps and needs and to contribute to the roadmap for an integrated pan-European surveillance system.

Method / Design: An ad hoc inventory questionnaire was developed and disseminated among the representatives of the eleven DEDIPAC countries. Eligible surveillance systems were required to meet specific inclusion criteria. A two-step procedure was followed. Firstly, pre-screening of available surveillance systems in each country was conducted. Secondly, it was performed an in-depth appraisal of the retained surveillance systems complying with the pre-defined requirements.

Results: Fifty-one surveillance systems met the inclusion criteria: six international surveys and forty-five national initiatives. Dietary intake and physical activity were the domains mostly assessed and most frequently studied group were adults.

Conclusions: Many on-going activities were identified, mainly at the national level, but there is a lack of surveillance systems involving young populations. Assessment of sedentary and dietary behaviours should be more frequently included in monitoring surveys. Additionally, there is a need for standardization of the surveillance methodologies to ensure the comparability of data across countries.

Keywords: (maximum 5): Europe, DEDIPAC, inventory, surveillance system

149/977. FODMAP intake in children with functional gastrointestinal disorders - a pilot study

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Introduction: Fermentable Oligosaccharides, Disaccharides, Monosaccharides, and Polyols (FODMAP) are poorly absorbed, osmotically active, short-chain carbohydrates, widespread in the dietary. Multiple studies of last years showed that FODMAPs can induce symptoms of functional gastrointestinal disorders. The low FODMAP diet is a new and promising diet therapy which could be used in the treatment of functional gut disorders.

Objectives: The purpose of this pilot study was to analyze the frequency of consumption of food sources of FODMAPs in children with functional gastrointestinal disorders.

Method / Design: Retrospective study of 19 children, age range 4 -17 years with gastrointestinal functional disorders (constipation, functional abdominal pain) hospitalized in Department of Pediatrics, Gastroenterology and Nutrition Children's Hospital in Olsztyn. A food frequency questionnaire was used to collected information about consumption of food sources of FODMAPs categorized in 6 groups: sweets and snacks, dairy products, cereal products, fruits, vegetables and drinks.

Results: The results of analyzing frequency of consumption food sources of FODMAPs indicate that in diet of children with functional disorders of gastrointestinal tract the main sources are group of dairy products (17 times/week). Products most commonly consumed within each group were: sweets and snacks -chocolate sweets (4 times/week), dairy products -milk and/or natural dairy products (7 times/week), cereal products -refined breads (9 times/week), fruits -apples and pears (5 times/week), vegetables -root vegetables (2 times/week), and drinks -fruit juices and nectars (6 times/week).

Conclusions: The pilot study showed a high intake of FODMAPs in the analyzed diets. The next stage of research will be to compare intake of FODMAPs in children with different functional gut disorders and the clinical results of low FODMAP diet. Currently evidence on the effectiveness of low FODMAP diet are insufficient. More research is needed to confirm the long-term efficacy and safety of applying diet to patients.

Keywords: (maximum 5): FODMAP, gastrointestinal diseases, diet therapy, carbohydrates

149/1001. Breeding for Enhanced ProVitamin A Levels in Cassava Roots in Nigeria

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Introduction: Biofortification of cassava for enhanced levels of proVitamin A carotenoids is an approach to overcome vitamin A deficiency (VAD), among women and children in rural areas. Cassava biofortification requires rapid, robust and economical screening tools for total carotenoid content (TCC) for hundreds to thousands of genotypes. Selection and replanting should be completed within weeks and this can be a challenge if the screening and laboratory procedures are time taken, hence the BioAnalyt iCheck™ CAROTENE device being a rapid method promises to be useful.

Objectives: To develop cassava varieties with high beta carotene levels and compare analysis of TCC in roots using iCheck™ CAROTENE and spectrophotometer

Method / Design: This work reports evaluation for TCC starting with the seedling nursery until the final product development in uniform yield trials. Fifteen cassava genotypes established in a uniform yield trial (UYT15YR 8a) in two locations in Nigerian (Ubiaja and Ilorin), and seedling nursery in Ibadan in 2013/2014 were analysed for TCC. Harvested root were analysed for TC levels using the iCheckTM and the spectrophotometer. In the seedling nursery, a total of 5122 seedlings were assessed by colour chart, and 713 analysed for TCC with iCheck™. A sub-sample of 39 progenies were tested with spectrophotometer to verify their TCC.

Results: A high correlation (r2) of 0.8 in Ubiaja and 0.7 in Ilorin were observed for TCC by iCheck™ and spectrophotometer. Thirty-nine seedlings showed above 15µg/g, values higher than released varieties (6µg/g to11µg/g). Elite clones crossed to CIAT clones GM3579-32 and GM3569-12 gave high levels of TCs (15µg/g -25µg/g) with iCheckTM device. Spectrophotometer analysis confirmed TCC of 15µg/g -21µg/g.

Conclusions: Cassava breeding research in I ITA has developed high proVitamin A cassava genotypes and iCheck™ CAROTENE has been very useful in this pursuit

Keywords: (maximum 5): Biofortification, cassava, carotenoids, progenies, clones

149/1002. Folic acid supplement induces changes in 1-carbon metabolism of healthy women compared to food folate

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Introduction: Mandatory folic acid fortification has been introduced in several countries to improve the dietary folate intake. Some metabolic studies have shown that synthetic folic acid and reduced food folate are metabolized differently in the human body.

Objectives: The aim was to use NMR metabolomics-based approach to investigate if individual folate forms have different effects on one-carbon metabolism.

Method / Design: Fiftyseven apparently healthy women of reproductive age with normal folate status participated in a 12-weeks controlled parallel intervention trial. Subjects were asked to consume their habitual freely chosen diet and were randomly assigned to one of the following groups: folic acid group (n=18) receiving 500 µg/d supplemental folic acid, food group (n=19) receiving 250 µg/d folate from legume foods and orange juice and control group (n=20) receiving apple juice containing 0 µg/d folate. The metabolic profile of plasma was measured using NMR in fasted blood at baseline and after 12-weeks.

Results: At baseline, groups show no significant differences between measured metabolites and folate status parameters. After intervention, both, the folic acid and food group improved folate status significantly, whereas no changes were observed in the control group. Multivariate data analysis showed, however, distinct metabolic patterns between all groups. The Variable Influence of Projection identified glycine as the first discriminating variable. Folic acid supplementation increased plasma glycine (37%, P=0.02) and betaine (27%, P=0.008) after correction for changes in the control group. No significant changes were observed for both metabolites in the food group. In addition, folic acid supplementation significantly decreased the glycine/serine ratio compared with both, control and food group.

Conclusions: Results suggest that a dose of 500 µg folic acid/d is associated with increased glycine and betaine concentrations in plasma. This indicates that folic acid supplementation affects the one-carbon metabolism differently compared to natural food folate.

Keywords: (maximum 5): Folic acid : folate : 1-carbon metabolism : metabolomics

149/1008. Evaluating the Effects of Daily Consumption of a Probiotic Diary Product in Healthy Adult Population

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Introduction: Gut microbiota impacts overall health and can be influenced by dietary factors. Evaluating the effect of consumption of a special foodstuff is challenging and maintaining the level of compliance is crucial during intervention studies.

Objectives: As part of a dairy product development the aim was to find a feasible method for studying the potential human physiological effects of daily consumption of the new probiotic yoghurt.

Method / Design: In a double-blind, randomized controlled crossover trial 60 healthy individuals consumed 180 ml yoghurt product with or without added probiotic strains for 6 weeks each. All participants were instructed to maintain their usual dietary habits and lifestyle and to avoid consuming any probiotic products other than that provided to them by the researchers. Data were collected at the beginning and on 6th and 12th week of intervention. Body composition was measured using InBody170, dietary habits were assessed using 3 day dietary record, blood and stool sample were collected for analysis, and gastrointestinal symptoms were surveyed with Gastrointestinal Symptom Rating Scale, while stool consistency was examined with Bristol Stool Chart.

Results: The effect of consuming probiotic yoghurt on gastrointestinal functions and BMI value proved to be minor but positive in the case of healthy individuals. Some serum lipid parameters improved. The daily consumption of the product was well tolerated and had no significant effect on overall energy intake.

Conclusions: The motivation of the enrolled volunteers was maintained by using the social media, providing and sharing recipes for enjoyable daily yoghurt consumption, so at the end 55 individuals completed the study. Online communication proved to be an effective way during both the recruiting process, and the organizing and scheduling of measurements, collecting data and maintaining compliance.

Keywords: (maximum 5): probiotic, yoghurt, health impact, compliance

149/1055. An examination of the delivery of dietary feedback from web based dietary assessment tools.

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Introduction: Automated analysis of dietary intake data is a key feature of web based dietary assessment methods and offers potential to provide personalised dietary feedback. In recent years personalised dietary feedback has been shown to incentivise participation in dietary interventions.

Objectives: To inform the development of the feedback component of a web based 24 hour recall tool (DietIreland tool), an audit of the content and delivery of existing web based personalised dietary feedback tools was examined to investigate the most effective format/mechanism to provide dietary feedback.

Method / Design: Two electronic databases (PubMed and Google Scholar) were used alongside search terms ("diet feedback" "nutrition feedback" "personalised nutrition" "online nutrition" and "dietary assessment tools") to identify literature relating to web based dietary assessment methods and dietary feedback. Articles met the inclusion criteria if adequate descriptions of the content and presentation of the dietary advice that the tool delivered was provided.

Results: In total eighteen web based dietary assessment tools met the inclusion criteria of the audit. The majority of tools provided feedback on both macronutrient intake (energy, fat, saturated fat, protein, fibre most commonly reported) and micronutrient intake (vitamin C, calcium and iron most commonly reported). Of the web based recall tools that provided feedback, one tool provided feedback on food groups (grains, meat and beans, fruit and veg, dairy, oil). In terms of the display of feedback, the use of short tabular format emerged as the most popular format.

Conclusions: The results from this audit highlighted that overall there was no apparent evidence based approach for the effective delivery of dietary advice from these tools. Further research into defining an approach for the delivery of dietary feedback is required to ensure that dietary advice can be communicated effectively to individuals participating in nutrition research.

Keywords: (maximum 5): Web based recall; dietary assessment; dietary feedback; DietIreland

149/1065. Non-targeted metabolite profiling applied to study metabolome of masticated breads and in vitro digested breads

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Introduction: Postprandial insulin responses have shown to be lower for rye breads than for wheat bread. However, the origin of the differences in postprandial responses remains unclear. Little is known about the early phases of bread digestion: mastication and stomach digestion and if compounds released in these phases could be mediating the insulin responses.

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Objectives: The aim of this study is to investigate the release of compounds from breads in in vivo mastication and in vitro stomach digestion.

Method / Design: Fifteen young, healthy females masticated three types of rye breads and refined wheat bread in a random order. The participants masticated a piece of bread until subjective swallowing point and expectorated the bolus. 200 mg bolus sample by dry weight basis was weighed in 2 ml plastic tubes and 610 µl of water was added. The tubes were centrifuged and the supernatant was collected. Samples were prepared by protein precipitation by adding 200 µl methanol to 100 µl of sample. The tubes were mixed and let stand on ice for 30 minutes and centrifuged. The supernatant was stored for metabolomic analyses. In vitro stomach phase was conducted by adding hydrochloride acid solution (150 mM) to the samples to reach a pH between 2,5 to 3. Pepsin was added and the samples were incubated at 37°C for 2 hours. The samples were otherwise treated as the masticated samples.

Results: LC-qTOF-MS analyses are being performed to characterize the compounds released from breads during in vivo mastication and in vitro stomach digestion. Non-targeted metabolite profiling allows simultaneous examination of a wide range of compounds. In this case, especially branched chain amino acids known to regulate insulin metabolism will be studied.

Conclusions: To the best of our knowledge this is the first study aiming at investigating the metabolome of masticated and in vitro digested breads.

Keywords: (maximum 5): metabolomics, rye, bread, mastication, digestion

149/1072. Repeatability of arterial function by EndoPAT2000: a potential tool for studying vasoreactivity of bioactive-rich foods

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Introduction: EndoPAT2000 is a non invasive pletysmographic method used for the evaluation of arterial function in several epidemiological studies, while its use in human intervention studies is still poor exploited. In this regards, it has been suggested that multiple evaluations performed within the day could improve endothelium-dependent vasodilatation. This could mask/overestimate the effect of intervention with vasoactive dietary compounds in the modulation of arterial function.

Objectives: The objective of the present study was to investigate the inter- and intraday repeatability of RHI measured by EndoPAT2000 in healthy volunteers.

Method / Design: Twenty-two male subjects were recruited for the interday study in which RHI repeatability was tested in two consecutive days at the same time points. Sixteen volunteers were enrolled for the RHI intraday repeatability study measured at baseline, after 2 and 4 h. Data were evaluated by analysis of variance. Agreement between paired RHI was evaluated by Bland–Altman method, coefficient of variation (CV), coefficient of repeatability (CR) and intraclass correlation coefficient (ICC).

Results: The RHI mean did not vary significantly between day 1 and 2 (2.00 ± 0.41 vs 1.96 ± 0.33; $p=0.429$) and showed a good repeatability as documented by CV (6%), CR (0.505), and ICC (0.773).

Multiple evaluations within the day significantly affected RHI ($p<0.001$) and the repeatability of the measurement. A significant increase occurred at 4 h compared to baseline (+37.5%; $p<0.05$) and 2 h (+21.5%; $p<0.05$), respectively. In addition, RHI at 4 h showed a low repeatability (CV: 18.8%; CR: 1.26; ICC: 0.48).

Conclusions: In conclusion, RHI showed a good interday repeatability in healthy subjects, while intraday repeatability can be acceptable till 2 h. Further investigations and standardization of the protocols are needed to assess the postprandial effect of vasoactive dietary compounds in humans.

Keywords: (maximum 5): EndoPAT2000: inter- and intraday repeatability: reactive hypermia index: young healthy male

149/1074. Bariatric surgery in obese diabetic women – effect on fatty acid composition of adipose tissue

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Introduction: Fatty acid composition of adipose tissue reflects composition of fat in food and metabolic processing of fatty acids including oxidation and lipogenesis. Bariatric surgery is the effective method in obesity and type 2 diabetes treatment.

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Objectives: To evaluate effect of different bariatric procedures on fatty acid composition in subcutaneous adipose tissue in morbidly obese diabetic women after two years follow-up..

Method / Design: Severely obese women underwent one of the three bariatric methods- biliopancreatic diversion (BPD), laparoscopic gastric banding (LAGB) and laparoscopic greater curvature plication (LGCP). Anthropometric characteristics and fatty acid composition of adipose tissue were analysed before the treatment, after 6 months and 2 year follow up. Fatty acid (FA) composition was analysed by gas chromatography. Results were evaluated by bidirectional

orthogonal projections to latent structures (O2PLS) and ANOVA..

Results: Women in BPD group (n=8), LAGB (n=9), LGCP (n=12) were evaluated. The most often diabetes remission was found after BPD. Weight loss was predicted by a higher decrease in alpha linolenic acid (18:3n-3) and n-3 polyunsaturated fatty acids (PUFA) after 6 months due their higher decrease in BPD in this time period. After two years higher weight loss was predicted by a lower decrease in n-6 PUFA. In comparison with initial levels significant decrease in percentage of n-3 and n-6 PUFA was found after two years without significant difference between individual types of surgeries. After two years increase in percentage of monounsaturated FA (MFA) differing according to the type of operation (F ratio 2.7, $p<0.05$), in comparison with initial levels was found,

Conclusions: Bariatric surgery lead to significant changes in fatty acid composition of subcutaneous adipose tissue in severely obese diabetic women influenced partly by the type of surgery used.

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Keywords: (maximum 5): obesity, fatty acid composition, adipose tissue, bariatric surgery

149/1108. Postprandial plasma differences after beef and herring based meals in 2-aminoaidipic acid, β-alanine, 4-hydroxyproline, cetoleic acid and docosahexaenoic acid: a metabolomics study

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Introduction: Dietary guidelines generally recommend increased intake of fish, and reduced intake of red meat for better long-term health. However, few studies have compared the metabolic differences between eating meat and fish.

Objectives: We aimed to compare the difference in plasma global metabolic response to herring and beef meals

Method / Design: We studied the metabolic response of humans to fish or red meat in 17 overweight males in a randomised cross-over intervention study. Subjects ate baked herring, pickled herring or baked beef based meals and post-prandial blood plasma samples were taken over 7 h. Metabolic profile was measured using gas chromatography-mass spectrometry.

Results: A total of 50 metabolite differences were found for the comparisons between baked herring and baked beef, or baked herring with pickled herring. 2-aminoadipic acid, a suggested marker of diabetes risk, was elevated after the beef meal compared to the herring meals, preceded by a similar rise in the branch chain amino acid leucine, also suggested to be an early marker of diabetes risk. Furthermore we found marked rises in β-alanine and 4-hydroxyproline after beef intake. Herring intake led to greater plasma concentrations of docosahexaenoic acid (DHA) and cetoleic acid (fatty acid C22:1 n-11), while hippuric acid and benzoic acid differentiated between baked and pickled herring intake.

Conclusions: These results confirm that DHA and cetoleic acid are biomarkers of herring intake, while β–alanine and 4-hydroxyproline are potential biomarkers for beef intake. The greater postprandial rise in 2-aminoadipic acid and leucine suggests a potential role for beef in stimulating insulin secretion, which may have importance in the context of red meat intake and increased diabetes risk.

Keywords: (maximum 5): Metabolomics
Beef
Herring
Diabetes risk

149/1122. Biomarkers of polyphenols in observational studies and their association with chronic diseases: systematic literature review

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Introduction: A large body of scientific evidence suggests that a diet abundant in fruits and vegetables helps to prevent the development of chronic diseases. This effect is partly attributed to polyphenols; however, results from epidemiologic studies remain inconclusive, probably due to the use of dietary assessment methods for evaluating exposure. Measurements of polyphenols in the biofluids urine and plasma might overcome this limitation.

Objectives: The objective was to summarize the evidence of associations between polyphenol biomarkers and chronic disease risk by means of a systematic literature review of observational studies.

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Method / Design: Studies published before 14 January 2015 investigating biomarkers of total polyphenols or flavonoids, flavanols, flavonols, flavanones, flavones and stilbenes and any chronic disease were identified through PubMed, Web of Science, and reference lists. Studies were eligible if they reported on multiple adjusted associations of health outcomes in human studies. Outcomes were grouped into all-cause mortality, cancer, cardiovascular disease (CVD) or other.

Results: Nineteen studies were retained investigating 22 different biomarkers of polyphenolic compounds in association with 20 outcomes. Eleven, seven and one studies were conducted in Asia, Europe and USA, respectively. Two prospective, eight nested case-control, four case-control, and five cross-sectional designed studies were used, which included between 81 and 1053 participants. Sixteen studies used urine and three used plasma biomarkers. Inverse associations were found for one of two studies for all-cause mortality, three of nine studies for cancer, one of two studies for CVD, and three of six studies for other outcomes. Positive associations were reported in both two cancer and other studies. Most inverse associations were found for total polyphenols and the flavanol compound epigallocatechin.

Conclusions: Studies using biomarkers add to the evidence for inverse associations between polyphenols and some chronic diseases. However, the overall picture is still inconclusive and more prospective studies are needed.

Keywords: (maximum 5): Polyphenols, biomarkers, chronic diseases, observational studies, epidemiology

149/1124. Correlation between the probability of consumption and consumption-day amount on 24-hour recalls

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Introduction: It is presumed that the usual food intake (e.g. gram/day) of a study participant equals the probability of consumption of a food on a given day times the amount of food intake. The correlation between those two parts may be of relevance for statistical modeling.

Objectives: To study the correlation between the probability of consumption and consumption-day amount using 24-hour dietary recall (24HDR) data from the German National Nutrition Survey II (NVS II)

Method / Design: The NVS II was carried out from November 2005 to January 2007 in a representative sample of the German-speaking population. Dietary intake was assessed on two non-consecutive days using a well-established computerized 24HDR (n=12,502; aged 20-80 years). The MIXTRAN SAS macro developed by the US National Cancer Institute (NCI) was applied to study the correlation between the probability of consumption and consumption-day amount in 15 groups of foods and beverages.

Results: After adjustment for sex, age (years), body-mass-index (kg/m2), weekend (yes, no) and season (spring, summer, fall, winter), a positive correlation rho between consumption probability and consumption-day amount was observed for all 15 food groups (mean rho=0.49). The correlation rho ranged from rho=0.12 (95% CI: 0.01; 0.23) for the food group cake and cookies to rho=0.75 (95% CI: 0.71; 0.79) for drinking water.

Conclusions: Overall, a positive correlation between the probability of consumption and consumption-day amount was found. Study participants who ate a food group more frequently tended to eat more of it. The impact for statistical modeling of usual dietary intake needs to be evaluated in future studies.

Keywords: (maximum 5): usual dietary intake, statistical modeling, large-scale cohort studies

149/1146. Validity of the performance of a panel trained in satiety assessment on food intake measures

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Introduction: Enhanced satiety food is one the big challenges for food companies. In this context, we developed a new approach based on the training of panelists in satiety assessment by using visual analogue scales (VAS). This specific training provided discriminative results and the methodology was reproducible.

Objectives: The aim of this work was to evaluate the link between appetite score measured by VAS and food intake, using our methodology developed on the satiety panel.

Method / Design: In a randomized cross-over design, sixteen sensory panellists who have been previously trained in satiety feelings assessment evaluated 6 cereal based products. The selected products represented large scale of satiety sensations and were French baguette, wholemeal bread, crumbly biscuit, natte, yoghurt cake and strawberry filled soft cake. During each cross-over randomized session, the fasting panellists consumed a 250kcal-portion of product and answered to the four VAS (hunger, fullness, desire to eat and prospective consumption) every 30 min during 2h30. The satiety power of the products was compared by calculating the average appetite score. An ad libitum meal was served 2H30 after beginning of breakfast to evaluate food intake at lunch.

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Results: Baguette, wholemeal bread and crumbly biscuit induced significantly lower appetite scores (range of 39-40 mm) than strawberry and yoghurt soft cakes (55 mm and 53 mm respectively). Food intake results were consistent with appetite scores. Baguette and crumbly biscuit induced less energy intake than the strawberry soft cake (delta max of 115 kcal).

Conclusions: We confirmed the satiety sensations ranking of the 6 cereal products. More interestingly we showed a clear link between appetite scores based on sensations and food intake with two distinct groups of products. These results strengthen the interest of a satiety panel approach to screen satiety potential of food.

Keywords: (maximum 5): satiety, food intake, appetite sensations, new approach, cereal products

149/1154. Effect of Q10 on cardiac enzyme and troponin in patients undergoing coronary artery bypass graft (CABG)

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Introduction: Coronary artery bypass surgery (CABG) is associated with Ischemia-perfusion injury and tissue damage. CO Q10 as an antioxidant has an important role may have cardioprotective value after myocardial dysfunction and CABG.

Objectives: We evaluated whether coQ10 on cardiac biomarkers after CABG have à myocardial cardioprotective impact.

Method / Design: In this double blind, 80 patients with coronary artery disease who underwent

CABG surgery is divided into intervention and control groups to receive placebo or Q10. The surgical characteristics of the patients in the two groups were similar. The intervention group will receive the Q10 supplement 150 mg a day for 7 days before surgery. The control group receive same capsule. After operation, inter and intra group blood levels of CK-MB and troponin before and after the CABG. Postoperative outcomes such as arrhythmias after surgery, ICU stay, and hospital stay were compared.

Results: Thirty-eight women, forty-two men and with a mean age of 58.37±7.98 years were enrolled in the study in two Co Q10 and placebo groups (each consisting of 40 patients). The incidence of postoperative atrial fibrillation was 70% in the control group to 37% in the intervention group decreased after supplementation (P value=0.004). ICU stay and hospital stay not significant (P value=0.822). CK-MB and troponin levels at three different times and during the period, there was no significant difference in the reduction of the enzymes.

Conclusions: Q10 supplements have side effects is low. Although it did not affect the levels of cardiac enzymes after CABG. Due to the reduction in the incidence of atrial fibrillation in patients after surgery, CABG, these supplements can be recommended for the prevention of atrial fibrillation after CABG.

Keywords: (maximum 5): CK-MB, Troponin, coronary artery bypass, CO Q10

149/1166. A common food list for pan-European dietary monitoring

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Introduction: When using computer-assisted 24-Hour Dietary Recalls (24-HDR) like GloboDiet, it is important to foresee exhaustive food and recipe lists in the software databases to facilitate the 24-HDR interviews. The workload for preparing such food and recipe lists can be high.

Objectives: To investigate the usefulness of a common food list for pan-European dietary monitoring.

Method / Design: Comparison of food lists used in several past/ongoing dietary monitoring surveys in Europe: Austria, Belgium, Bulgaria, Czech Republic, Finland, France, Germany, Hungary, Poland, Portugal, Switzerland and The Netherlands. The foods included in the different food lists were merged together into one single exhaustive food list including 23,133 foods. If a food appeared several times in this exhaustive food list, then it was named a "common food" as it derived from several country-specific food lists.

Results: The different country-specific food lists included between 848 (Poland) and 3040 (France) foods. In total 910 foods were in common between at least 5 countries, 1,208 between at least 4 countries, 1,631 between at least 3 countries and 2,716 foods were in common between at least 2 countries. The food category in which a common food was categorized often differed between countries.

These results indicate that a common food list would provide most of the foods to be included in a new food list. Only country-specific foods would then still need to be added to such new food list in order to be sufficiently exhaustive for a national dietary monitoring survey.

Conclusions: A common pan-European food list might facilitate the preparatory work in developing country-specific GloboDiet 24-HDR versions. In addition, might such a common food list also facilitate the matching with food composition data.

Keywords: (maximum 5): Food list, dietary monitoring, pan-European

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149/1177. Dietary non-enzymatic antioxidant capacity and risk of stroke and myocardial infarction

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Introduction: Oxidative stress plays an important protective role in the development of cardiovascular diseases. Dietary non-enzymatic antioxidant capacity (NEAC) is a biomarker which measures the antioxidant potential, including synergistic interactions, of food compounds. Few studies have investigated the association between NEAC and cardiovascular diseases.

Objectives: Our aim was to assess dietary NEAC from a validated 85 items food frequency questionnaire, and to study its association with risk of stroke and myocardial infarction.

Method / Design: In 1997, we recruited a cohort of 43,880 subjects who completed a questionnaire on physical activity, sleep, and dietary habits. Through linkages to Swedish National Registers, which allowed a complete follow-up until 2010, we identified 1,190 and 1,141 incident cases of stroke and myocardial infarction, respectively. To assess NEAC, we used ferric reducing antioxidant potential (FRAP), whose values were obtained from an Italian public database. NEAC intake distribution was categorized in quintiles. Multivariate Cox models were fitted to estimate hazard ratios (HR) and 95% confidence intervals in women and men.

Results: Compared to women in the lowest quartile of NEAC women, in the highest quartile had a 31% lower incidence of total stroke (HR=0.69; 95% CI: 0.51-0.94; p-trend 0.02) and 36% lower incidence of ischemic stroke (HR=0.64; 95% CI: 0.43-0.95; p-trend <0.01). Among men, the relationship between NEAC and risk of stroke was not statistically significant, with HRs close to unity. For myocardial infarction, we observed a not statistically significant 21% risk reduction when comparing the highest quintile of NEAC with the lowest quintile (HR=0.79; 95% CI: 0.61-1.03; p-trend 0.03). Similar patterns were observed for men and women.

Conclusions: Our results suggest a potential inverse association between NEAC and both stroke and myocardial infarction. Limitations of our study include the use of FRAP values from a non-Swedish food database.

Keywords: (maximum 5): Non-enzymatic antioxidant capacity; food frequency questionnaire; stroke; myocardial infarction; prospective studies

149/1192. Sources of uncertainty in dietary reporting: A ring-trial involving six European dietary assessment tools

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Introduction: European dietary surveys apply various assessment methods which need to be considered when addressing potential harmonisation of dietary data collection.

Objectives: To understand sources of uncertainty in estimates obtained through 24h dietary recalls and food records.

Method / Design: An on-line questionnaire was constructed to assimilate variation and similarities of country-specific systems to collect 24h recalls and/or food records in large-scale studies and understand differences in data collection and analysis across Europe. Replies received from 11 countries. Furthermore, an inter-method ring-trial using same consumption data was applied in the methods of Estonia, Italy, Latvia, Portugal, Spain and Sweden. The intakes included 256 standardised/harmonised items and were translated to national languages. Data entry simulated fieldwork and native speakers, trained to identically report the same intakes, acted as "study participants". Statistical analysis involved the evaluation of the methods' repeatability and relative accuracy in capturing quantitative and qualitative information of dietary intake.

Results: Next to country-specific differences, the variation observed could be explained by the stage of the tool's development, the use of new technologies for the interaction between researchers/interviewers and subjects and the tool's scope. The methods considered in the ring-trial exhibited adequate repeatability and relative accuracy in recording quantities. Most tools performed less than expected in capturing qualitative characteristics of food items (e.g. fat or salt content) and in certain cases results did not support the notion that elaborate tools performed better.

Conclusions: Notwithstanding the possibility of unpredicted variance, a ring-trial mimicking laboratory conditions involving six European dietary assessment methods showed that improvements in integrated databases and food descriptor systems as well as adequate training could enhance data quality.

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Keywords: (maximum 5): 24h recalls, food records, measurement error

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149/1218. Exposure to toxic metals through food in some population groups in South East Serbia

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Introduction: Food is one of the main factors of survival on this planet. However, in some cases, food may pose a high health risk, if it contains dangerous contaminants from the environment.

Objectives: of this study was to determine exposure to toxic metals (lead and cadmium) in different population groups through food in South East Serbia.

Method / Design: Sampling of food were carried out on the territory of South East Serbia (960 samples)) during last ten years (2005-2014.). Chemical analysis for the presence of lead and cadmium were performed by atomic absorption spectrophotometry on a Perkin Elmer AAnalyst 600 in an accredited laboratory of the Institute of Public Health Niš (ISO / IEC 17025: 2006). Examination of the meal was done by technique of double rations and composite technology.

Results: A small number of food samples (0.92%) due to faulty toxic metals, but in most of the samples metals were present in measurable concentrations. Dietary intake of Pb and Cd in children aged 1-9 years, who eat in kindergarten, does not exceed tolerable daily intake (0.056 mgPb/day and 0.005 mg Cd /day). Dietary intake of Pb in adult professional non-exposed people is 0.198 mg/day, which is below the tolerable daily intake. In fact, the largest share of the total Pb input have cereals and cereal products (28.2%), followed by vegetables (22.8%), fruits (15.7%) and milk products (13.9%), while other types of foods much less participate the total input. Imported food products have slightly higher content of Pb and Cd in relation to food of domestic origin.

Conclusions: Exposure to toxic metals in food is not high among professional unexposed populations in South East Serbia. However, nutritional intake is just one of the possible entry of these toxic substances. Other forms of exposure (air, water, general use) can also significantly contribute to the overall intake of these hazardous contaminants. Therefore, a permanent monitoring in order to timely and properly taken measures to protect the health of exposed populations in South East Serbia these contaminants.

Keywords: (maximum 5): exposure, daily intake, toxic metals, lead, cadmium

149/1234. Comparison of store-sales data to self-reported data for measuring population level dietary intake

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Introduction: Population-level food and nutrient intake data are valuable but their collection can be time-consuming and costly.

Objectives: We present an innovative, objective method to estimate population-level dietary intake using store-sales data, and compare to Australian Bureau of Statistics data (ABS-data).

Method / Design: Store-sales data on all foods and drinks purchased over 18-months were collected from 20 stores in 20 remote Indigenous Australian communities that represented the main source of food for >8000 individuals. Nutrient densities per megajoule and the proportions of energy from each food group were calculated and compared to ABS-data (24-hour recall from 2300 Indigenous Australians living in remote Australia). Sodium and iodine values in ABS-data were adjusted for discretionary salt as this was not estimated.

Results: There was a median of -8% (range -51% to 63%) difference between nutrient densities from store-sales and ABS-data. Estimates for 17/30 nutrients in store-sales data were within 15% of ABS-data. Store-sales data indicated considerably higher carbohydrate and sugar and lower protein intakes compared with ABS-data. Percentages of energy from sugar products/dishes and fats/oils were more than double, while energy from seafood, fruit, vegetables and meat/poultry were considerably lower, in store-sales than ABS-data. Minimal difference to ABS-data was attributable to wild-harvested foods.

Conclusions: Both methods of collecting dietary intake data have inherent strength and limitations. There was evidence of reporting bias (over-reporting healthier while under-reporting less healthy foods) in the self-reported ABS-data which likely explains some of the differences in nutrient densities. Store point-of-sale data offer an objective, cost-efficient and unobtrusive surrogate for dietary intake which places no burden on individuals. There is great potential for the development of a food and nutrition monitoring system based on store-sales data in contexts where the store is the primary food source and where communities are distanced from alternative food sources.

Keywords: (maximum 5): dietary intake measurement; population; monitoring

149/1250. Sardine by-products oil improves lipids and lipoproteins transport in obese rat

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Introduction: Sardine is a major source of fish oil presenting a high content of bioactive lipids (omega-3 polyunsaturated fatty acids

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(PUFAs), including EPA and DHA. Production of omega-3 rich fish oils has become a good opportunity for valorizing fish by-products.

Objectives: The purpose of this study was to investigate the effects of sardine byproducts oil on lipids and lipoproteins transport in obese rats.

Method / Design: Obesity was induced in male Wistar rats by a high fat diet containing 20% of animal fats. At 400 ± 10g, responders rats were divided into two groups (n = 8) and were fed a 20% casein diet supplemented with 20% sardine byproducts oil (heads and viscera) (Sb-PO) or 20% sardine edible part (net) oil (SO), for 28 days.

Results: Byproducts oil compared with edible part oil induced a reduction in serum and liver triacylglycerols levels (-36%, -23%, respectively). The hypotriglyceridemic effect resulted from a decrease in VLDL-TG (-64%), LDL-HDL1-TG (-75%) and HDL3-TG (-28%). Similarly, serum and hepatic total cholesterol levels were decreased (-8% and -19%, respectively). In the Sb-PO group compared to the SO group, total lipid contents were decreased in serum (-28%), while they were similar in liver. The study of reverse cholesterol transport revealed that byproducts oil induced an increase in lecithin: cholesterol acyltransferase (LCAT) activity (+35%) and HDL2-CE concentrations (the reaction products) by 12%.

Conclusions: In obese rats, sardine byproducts oil induced cholesterol and triacylglycerols-lowering effects and may have a protective effect against cardiovascular risk by improving anti-atherogenic metabolic pathway of cholesterol and triacylglycerols. Thus, byproducts oil should be valorized seeing its remarkable nutritional and therapeutic interest.

Keywords: (maximum 5): Rat:Obesity: Sardine :Byproducts oil: Lipoproteins:LCAT

149/1255. Novel biomarkers of milk intake: A metabolomic approach in multiple European cohorts

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Introduction: Milk is a rich source of calcium, protein, vitamins and other minerals for European populations and its use is encouraged throughout life. Yet, conflicting results have been reported regarding the metabolic consequences and health impacts of long-term milk consumption. Objective biomarkers of milk intake may strengthen associations observed in epidemiological studies and may help to further elucidate the health effects.

Objectives: To identify novel biomarkers of milk intake by performing a multi-platform metabolomics analysis in a UK twin population (TwinsUK) with findings replicated in two independent European cohorts of unrelated individuals (Cooperative Health Research in the Region of Augsburg (KORA) and Estonian Genome Center of the University of Tartu (EGCUT)).

Method / Design: Milk intake assessed by a validated food frequency questionnaire (FFQ) was analysed against fasting blood metabolomic profiles in females from the TwinsUK cohort (n=3559) in a linear regression model adjusted for BMI, age, batch effects, family relatedness, dietary covariates and multiple testing using Bonferroni correction (P< 8.08x10-5 = 0.05/619 metabolites). Significant metabolites were then replicated in two independent populations (EGCUT, n=1109 and KORA, n=1593) and the results were then meta-analysed using inverse variance fixed effects meta-analysis.

Results: Four metabolites were associated with milk intake in TwinsUK and were replicated in KORA and EGCUT: hydroxylsphingomyelin C14:1 (meta-analysis results: β[SE]=0.034[0.005]; P=9.75x10^-14); diacylphosphatidylcholine PC(28:1) (0.034[0.004]; P=4.53x10^-16); uridine (0.004[0.001]; P=9.86x10^-6); and 3-dehydrocarnitine (0.012[0.002]; P=2.98x10^-12). A particularly strong association was observed for 3-dehydrocarnitine in TwinsUK which we further validated in urinary samples concurrent with blood for 236 twins (0.091[0.032]; P=0.004) and a group of 484 monozygotic twins discordant for milk intake (0.050[0.015]; P=7.53x10^-4).

Conclusions: We identified four novel biomarkers of milk intake: 3-dehydrocarnitine, uridine, hydroxysphingomyelin C14:1 and diacylphosphatidylcholine PC(28:1). These metabolites have the potential to objectively examine and refine investigations into the impact of long-term milk consumption on health.

Keywords: (maximum 5): nutrition, metabolomics, biomarkers, milk

149/1257. Comparison of smartphone-based Calculation of Metabolic Equivalent and Spiroergometry Data in Activities of Daily Living

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Introduction: Smartphone applications offer dietitians new potential for counseling client's documentation of dietary/energy intake and the calculation of energy expenditure using inherent acceleration sensors. The accuracy of this calculation can be tested by comparing the mechanically assessed energy expenditure with synchronously measured data of indirect calorimetry derived from spiroergometry.

Objectives: The purpose was to compare the acceleration-based calculation of energy expenditure with the energy expenditure measured by spiroergometry.

Method / Design: 15 healthy volunteers (mean age: 25±4.7 years, height: 1.68±0.05 m, weight: 62±9 kg) were included. All subjects performed five 7-minute intervals of activities of daily living (walking, walking with an additional load of 7 kg, vacuuming, stairway walking, cycling with 80 Watts). Subjects wore two smartphones (Android and IOS) calculating Metabolic Equivalent (MET) data per interval and a portable spiroergometry system (K4B2®, cosmed®, Fridolfing, D) also calculating MET data while performing above mentioned activities. Bland-Altman analysis (bias and limits of agreement, LoA) was used for comparison of smartphones and method comparison. T-tests for dependent measures analyzed differences between methods (α=0.05) and Pearson's correlation coefficients were used to calculate correlations among phones and methods.

Results: The IOS-phone measured statistically significant ($p<0.001$) higher MET values (2.29±0.7) than the Android-phone (2.12±0.6) while both phones strongly correlated ($r = 0.96$). The comparison of acceleration-based MET calculation and Spiroergometry-based MET values revealed a substantial discrepancy (phone: 2.29±0.7, Spiroergometry: 4.93±1.5; $p<0.001$, $r=0.33$). The mean bias was 2.73±1.44 with LOAs from -0.10 – 5.55) indicating a distinct underestimation of energy expenditure by acceleration-based MET calculation.

Conclusions: Acceleration-based data does not reflect physical load. Smartphone-based measurements are therefore not suitable for valid energy expenditure estimation (unless complex algorithms are used). Nevertheless, relative changes in physical activity can be revealed. The smartphone application can help dietitians / clients to monitor physical activity changes via an easily accessible tool.

Keywords: (maximum 5): indirect calorimetry, physical activity, energy expenditure

149/1261. Capacity development in public health nutrition research in Central and Eastern Europe and Balkan countries

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Introduction: Prerequisite for harmonized public health nutrition (PHN) research and timely policy making is existence of research infrastructure (RI) and Capacity Development (CD).

Objectives: To support PHN research in Central and Eastern Europe and Balkan Countries (CEE&BC), we aimed at developing consistent food and nutrition RI including food composition databases (FCDB) and dietary assessment tools.

Method / Design: Involvement of FCDB developing organizations from CEE&BC in constitution of Balkan Food Platform (BFP). Identification of the challenges: FCDB status, inventory of dietary surveys and training needs in the field. Design and presentation of nutritional tools: web-based EuroFIR harmonized Food Composition Data Management (FCDM) software and DIET&ASSESS&PLAN, dietary intake assessment tool.

Results: During EuroFIR Nexus project, BFP was established, Memorandum of Understanding has been signed by EuroFIR AISBL, Institute for Medical Research, Serbia, Capacity Development Network in Nutrition in Central and Eastern Europe-CAPNUTRA and representatives from Cyprus, Croatia, Federation of Bosnia & Herzegovina, Republic of Macedonia, Republic of Moldova, Montenegro, Russia, Serbia, Slovenia and Ukraine. Identified priority training needs were in: data base management systems, quality and reviewing of existing data, food nomenclature, recipe calculation, software tools and dietary intake assesment methods. Lack of harmonized and standardized FCDBs and dietary tools was identified. CD activities, workshops and trainings, enabled participants to get to know developed tools. Result of joined efforts is the 1st online regional FCDB, with 2080 foods and 160 traditional recipes, created using the FCDM.

Conclusions: Systematic approach to CD in PHN research in CEE&BC brought about creation of the network of research institutions and development of RI, which are premises for joining European nutritional surveillance, evaluation and planning processes.

Keywords: (maximum 5): Nutritional surveillance; Food composition data; Dietary assessment tools; Harmonization; Capacity Development

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149/1263. Title: Newly Derived Children Based Food Index. An Index That May Detect Childhood Overweight and Obesity

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Introduction: Introduction: Obesity in children is of Global concern and is currently termed an epidemic. Studies have shown the importance of diet on overweight (OW) and obesity (OB), hence Food Indexes (FI) mostly for adults have been developed to assess dietary patterns while accounting for food interactions. Children remain understudied and a simple tool to detect OW/OB is still warranted.

Objectives: Objectives: To develop a FI for children, that detects OW/OB based on: (1) a-priory knowledge, (2) USDA data and (3) the Mediterranean Food Pyramid guidelines.

Method / Design: Methods: The FI included 14 foods : 8 «positive: non-obesogenic» and 6 «negative: obesogenic» foods. Scores were set according to intake, from 1 to 4 or 4 to 1 respectively with weights of 1.5 given to some. Statistical tests, such as Adjusted Coefficient of variation (R2), Cronbach-α, Random sampling via splitting data into two new sets (75%/25%), were used to test the index's sensitivity. The FI was validated using the GRECO study.

Results: Results: All food variables in the FI added to the model (adj. R2= 0.989) and a good intercorrelation was found (Cronbach-a= 0.7). In the GRECO population, the score ranged from 17 to 53.5 (mean 34.8 ±5.01), was inversely associated with BMI (-0.057 ±0.02; 95%CI -0.098, -0.017) and waist circumference (WC) (-0.08± 0.03, 95% CI: -0.137, -0.022). Associations remained significant upon adjusting for age, gender and inactivity (p=0.02 and p=0.013, respectively). Sensitivity analysis showed that the probability of children being OW/OB decreases significantly (p<0.001) as the FI score increases.

Conclusions: Conclusion: The FI developed has high sensitivity, strengthening its power in detecting OW in children. It adequately distinguished OW/OB children, from normal weight. The weights given to specific foods require further validation.

Keywords: (maximum 5): Keywords: children, food, epidemic, dietary habits, obesogenic factors

149/1272. Assessing School Meals intake by Digital Photograph Method in the Nordic Contexts (the Promeal study)

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Introduction: The variation of organizational systems of school lunches in Nordic context enables comparisons between countries that serve free school meals and countries that do not. The Promeal study (Prospects for promoting health and performance by school meals in Nordic countries) is a multicenter study that will contribute substantially to the growing research field around school meals. Previously food intake at school has mainly been assessed by using food frequency questionnaires, which include many methodological obstacles.

Objectives: One of the aims of the Promeal study was to develop and test the feasibility of a digital photograph method suitable for the school lunch environment.

Method / Design: The Participating 10-year-old children (n=841) were recruited from 30 schools in four Nordic countries (Sweden, Finland, Norway and Iceland) in 2013-2014. All the foods and drinks taken by a child as well as leftover foods and drinks were photographed. The pictures were taken from two perspectives (above and sidewise) for five days per each child. This created a collection of altogether more than 10 000 photos. Two reference portions (whole portion and half portion) were weighed and photographed each day. A picture booklet including pictures and amounts (grams) of all reference portions was created. The weights of children's portion sizes were estimated by comparing the photos of children's portions with weighted standard portions.

Results: Practical experiences of the photograph method shows that the method is feasible and has low participation burden. The method can, with reasonable accuracy, be used when studying food consumption in the school setting.

Conclusions: The digital photograph method is a suitable method for studying consumption of school meals. Computer-based analysis of the data and practical applications of the method may open up new possibilities for nutrition research and education.

Keywords: (maximum 5): digital photograph method, school lunch, Nordic countries, meal composition

149/1273. New theoretical insights into the demand for dietary quality

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Introduction: Food demand related to an unbalanced and excessive eating behavior suggests the need for more elaborated food demand models with a clearer focus on dietary quality.

Objectives: We aim at enhancing Grossman's dynamic health investment model by the goods characteristics approach in order to consider two dimensions of dietary quality: the adequate intake of vitamins and minerals as well as the moderate intake of nutrients, which increase the risk of chronic diseases if consumed in excess.

Method / Design: Based on our newly developed dietary health investment model, demand functions for healthy and risky nutrients are derived whose theoretical implications are in line with the results of previous empirical studies. Further, a simulation of the dietary health investment model is presented to illustrate the model's empirical application. We simulate a panel data set of 16 rounds based on the cross-sectional German National Nutrition Survey II. Afterwards, we estimate the demand for vitamin C and total fat using the fixed effects and Hausman-Taylor estimator.

Results: Our estimation results reflect general findings of other empirical studies (e.g. regarding income and price effects) but also provide important new insights. For example, in line with our dietary health investment model, our estimation results show that, inter alia, healthy nutrient demand significantly increases with decreasing health states, increasing nutritional knowledge, and lower rates of time preference. Further, our time path illustrations of vitamin C and fat consumption allow tentative hypotheses about the impact of nutrition policies.

Conclusions: Our dietary health investment model and the respective simulation model provide a reasonable basis for future empirical work on dietary behavior. It may thus contribute to set up more effective nutrition policies by a growing understanding of the responsible causal mechanisms behind the increasing prevalence of diet-related chronic diseases.

Keywords: (maximum 5): Dietary quality, health investment, dynamic model, simulation

149/1282. Supercritical fluid fractionation of royal jelly fatty acids

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Introduction: Royal jelly, which is secreted from glads of young worker bees (Apis mellifera L.), has been recognized for its beneficial medicinal properties and various biological activities. Lipid fraction of royal jelly is consisted of short-chained hydroxy fatty acids, particularly 10-hydroxy-2-decenoic acid (10-HDA).

Objectives: The aim of this research was isolation of lipids from lyophilized royal jelly using modern extraction technique such as supercritical fluid extraction (SFE). Since polar (protein) fraction of royal jelly is heat-sensitive, mild working conditions of SFE should preserve its biological activities.

Method / Design: Lyophilized royal jelly was extracted by SFE using carbon dioxide as extraction solvent. Extractions were performed in various operating conditions: temperature (40 - 60°C), pressure (200 – 400 bar) and extraction time (2 – 4 h). Total extract and fatty acids yield were the response variables. In order to determine effect of SFE parameters on polar residue, change in antioxidant activity was determined before and after the extraction.

Results: The best operating conditions for maximized total lipid extract yield were between 300 – 400 bar, 40°C and 3 h. Fatty acid profile was determined by gas-chromatography/mass spectrometry and 10-HDA and other hydroxy fatty acids were dominant compounds in obtained extracts. SFE on 60°C caused reduced antioxidant activity on residual royal jell fraction.

Conclusions: SFE could be very useful for separation and fractionation of lipid royal jelly fractions since its selectivity could be modified by appropriate process parameters. Therefore, extracts with high content of 10-HAD could be obtained. Moreover, low-temperature treatment during SFE could preserve antioxidant activity in residual protein fraction.

Keywords: (maximum 5): Royal jelly, supercritical fluid extraction, fatty acid, 10-HDA

149/1303. Usual Dietary Intake Estimation based on 24-h food lists in KORA FF4

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Introduction: Valid assessment and estimation of dietary intake still pose a challenge in epidemiological studies. The new approach combines the strength and information provided by two different instruments. This method estimates the probability of consuming a food item by the 24-h food lists (24HFLs) and the intake amount on a consumption day using an external data source. Multiplying the individual's estimated probability and amount yields the usual intake for each subject.

Objectives: The aim of this project was to adapt 24HFLs to our study data in order to gain valid estimates of the participants' habitual dietary intake.

Method / Design: At least two 24HFLs and a food frequency questionnaire (FFQ) were applied within the population-based KORA FF4 study (age: 39-88 years). Intake amount of a consumed food item was predicted for each participant based on the Bavarian Food Consumption Study II as 24HFL does not provide portion sizes. Linear

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mixed models, adjusted for age, gender, BMI, smoking, and physical activity, were applied. Consumption probabilities were estimated using logistic mixed models adjusted for the above and additionally the consumption frequency information derived from the FFQ. Those results were compared to calculations derived solely based on the FFQ.

Results: The new approach was tested in 805 participants. Comparison of both methods (usual intake estimates, FFQ) resulted in weighted kappa values based on quintiles ranging from a fair 0.35 for potatoes to a good agreement of 0.71 for milk products or even excellent agreement for female meat intake (0.92). Still, the mean differences for, e.g., vegetables or fruits are quite large (~ 30-40 g/d) between both methods.

Conclusions: Usual intake estimates and FFQ deliver comparable results on the food group level. However, discrepancies are also present and need to be addressed. Further improvements may render the application of 24hHFLs as a useful tool in nutritional epidemiology.

Keywords: (maximum 5): KORA FF4, 24HFL, FFQ

149/1313. Comparison of three commonly used indicators of abdominal obesity in estimating prevalence and metabolic risk

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Introduction: Waist circumference (WC), waist-to-hip-ratio (WHR) and waist-to-height-ratio (WHeR) are commonly used criteria to estimate abdominal obesity (AO).

Objectives: To compare the prevalence of AO provided by the three criteria and their capacity to discriminate metabolic risk in overweight subjects.

Method / Design: Participants were 88 men and women (20-41 years; 39.8% women) classified as overweight/obese (BMI≥24.5 kg/m2). Height (cm), WC (cm; midway between lowest rib and iliac crest) and hip circumference (cm; widest point at hips) were measured, WHR and WHeR were calculated, and participants were classified as AO according to WC (men: ≥94 cm, women: ≥80 cm), WHR (men: ≥1.0, women: ≥0.85) and WHeR (all: ≥0.5). Blood samples were collected in the fasting state for analysis of glucose, insulin, lipids, apolipoproteins A and B, iron status, leptin, adiponectin and ghrelin. Differences in prevalence of AO were analysed by Pearson's Chi-squared. Serum variables were compared between AO and non-AO participants by analysis of covariance, controlling for gender.

Results: Prevalence of AO varied significantly between criteria, in total sample and separately by gender; total sample: 55.7% estimated by waist, 8.0% by WHR and 85.0% by WHeR ($p<0.001$); in women: 74.3%, 14.3% and 71.4%, respectively; in men: 43.4%, 3.8% and 77.4%, respectively. Glucose, triglycerides, total cholesterol, VLDL-cholesterol, LDL-cholesterol, apoB and leptin were higher in AO, the trend being significant for triglycerides, VLDL and leptin ($p<0.05$), regardless of criteria used. For insulin, HDL-cholesterol, apoA, iron, ferritin, adiponectin and ghrelin, one or two criteria would show trends to higher values in AO, while the other would show lower values, although differences were not significant in any case.

Conclusions: There were discrepancies in prevalence of AO between the three indices. Their capacity to discriminate metabolic risk was similar for glucose, most lipids and leptin, but inconsistencies occurred for insulin, HDL-cholesterol, iron status, adiponectin and ghrelin.

Keywords: (maximum 5): Abdominal-obesity, waist-circumference, waist-to-hip-ratio, waist-to-height-ratio, metabolic risk.

149/1332. Clinical trial: To test for prebiotics on metabolic, inflammatory and behavioral disorders in obese population

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Introduction: We propose a nutritional approach to control obesity based on the concept of prebiotics (inulin-type fructans or ITF) in a multidisciplinary and inter-university project (FOOD4GUT, Excellence Program financed by the Walloon Region). Our working hypothesis is that changing the microbiota via supplementation with ITF accompanied by dietary advice promoting the consumption of vegetables rich in these prebiotics, may modulate feeding behavior, body composition, inflammation and metabolic disorders associated with obesity.

Objectives: We describe the methodology of a trial designed to highlight the interest of vegetables rich in ITF-prebiotics in obese adults.

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Method / Design: 150 obese subjects (BMI> 30 kg.m-2; 18–65 years) recruited in three different university hospitals in Belgium will be selected with at least one of the following criteria: (pre-)diabetes, hypertension, dyslipidemia, liver steatosis. They will be randomly assigned to receive either 16 g/day of inulin (Fibruline, Cosucra) with dietary advice to promote the consumption of vegetables rich in ITF or 16 g/day placebo (maltodextrin, Cargill) with dietary advice provided nutrients to promote the consumption of vegetables poor in ITF for 3 months. Review of literature, analysis of ITF content in vegetables and satisfaction and digestive tolerance tests (on healthy volunteers) will be performed to propose adequate receipts.

Results: The primary outcomes are to improve metabolic, inflammatory and behavioral disorders related to obesity due to higher consumption of ITF-prebiotics. Secondary outcomes include the evaluation of liver fibrosis, steatosis, cardiac and lung functions, brown adipose tissue activity. Feces will be collected for both pyrosequencing and qPCR analyses of the 16S rRNA gene.

Conclusions: The goal of this intervention study is to establish the proof of concept that nutrients which selectively stimulate the growth of beneficial bacteria in the human colon might offer protection against metabolic disorders associated to obesity on an adequate target population.

Keywords: (maximum 5): Gut Microbiota, Obesity, Prebiotics, Inflammation, Behavior.

149/1349. Hydration intervention in young female soccer athletes to prevent dehydration

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Introduction: Hydration status in athletes is an often discussed topic of scientist. Only few studies include an intervention, used female athletes or chose a hot and humid environment to assess and improve the hydration status

Objectives: The purpose was to examine the hydration status in female soccer players and to perform an intervention to optimize fluid intake to prevent the players starting exercising dehydrated.

Method / Design: Ten female soccer players participated over a period of seven weeks in the present study. Body weight changes, fluid intake, urine color (UC), and urine specific gravity (USG) were measured to assess the hydration status at different points to define individual hydration strategies. Two game days were used to evaluate if the hydration counseling after the baseline assessment helped the players to start the games in a euhydrated state.

Results: Baseline test: up to seven players started exercising dehydrated (USG < 1.020 g/ml; UC <3). In a preliminary questionnaire eight thought that they drink enough during the day and exercise. After a four-week hydration counseling players USG, UC, and fluid intake were measured two hours before a game, indicating that 4 players were dehydrated. Despite hydration guidelines two of these payers experienced tiredness and cramps at the second half of the game. Before the next game, players USG and UC was measured in the morning. 7 players were in a dehydrated state and got individual rehydration instructions. USG and UC were measured again two hours before the game. None player started the game dehydrated nor experienced any tiredness or cramps.

Conclusions: These results demonstrate that accessing the hydration status and including an intervention by individualizing the drinking strategies in female soccer players helps them to start exercising in a euhydrated status and risk factors associated with dehydration might be prevented.

Keywords: (maximum 5): hydration intervention, athletes, hydration strategies, urine specific gravity

149/1367. The GloboDiet-Europe branch as an advanced prove of concept of the IARC-WHO Global nutrition surveillance initiative

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Introduction: The world is currently facing an unprecedented global diet-related burden of major health, societal and economic impacts. Among the major drawbacks for more concerted pan-European food-health actions is the lack of standardized dietary data and support research infrastructure. The joint IARC-WHO GloboDiet initiative aims to fill this gap and provide the framework to promote and support population-based standardized food consumption data collection, through a worldwide pilot initiative.

Objectives: To report on the GloboDiet-Europe branch, as the most advanced proof of concept of the Global initiative and as a cost-effective integration to/interfacing with other existing European networks (e.g. EU-Menu, JPI-HDHL).

Method / Design: The GloboDiet-Europe consortium involves 7 European countries (AT, BE, FR, DE, CH, NL, MT)- and 6 observers-using the same standardized 24-hour dietary methodology (GloboDiet, adapted for surveillance from the former EPIC-Soft program) in their National surveillance. This consortium cumulates a wide

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experience on the development, validation and implementation of standardized dietary methodologies and provision of unique related dietary data. It will be used in this presentation as a "real case learning framework" to support standardized dietary data collection in Europe and elsewhere.

Results: Science-based evidences will be used to illustrate the added value of the a priori standardization of dietary data experienced in the GloboDiet-Europe consortium, and to report on the current gaps and needs to generalize the provision of more comparable data in Europe and elsewhere. The potentials of the GloboDiet data to address multiple pan-European diet-health needs and challenges will also be reported.

Conclusions: The successful implementation of a standardized methodology in Europe and the high potentials of the collected dietary data for nutritional surveillance, food safety, risk assessment, research and prevention pave the way and provide the rationale for the globalization of the initiative.

Keywords: (maximum 5): Europe, Standardization, GloboDiet, nutritional surveillance

149/1391. Semi-acute Effects of Evening Meals Rich in Indigestible Carbohydrates on Metabolic Responses and Appetite Regulation

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Introduction: Whole grain has shown promising potential to prevent obesity and type 2 diabetes and one possible mechanism could be related to colonic fermentation of specific indigestible carbohydrates, i.e. dietary fibre (DF).

Objectives: The purpose of this study was to investigate semi-acute effects on metabolic risk markers and appetite regulation of some commonly consumed Nordic cereals.

Method / Design: Whole grain based test bread (WGB) rich in DF or a white wheat flour based bread (reference product, WWB) was provided as late evening meals prior to an experimental day to healthy young adults in a randomized crossover design. The test- and reference meals were provided in two settings; as a single evening meal or the inclusion of test- or reference products in the evening meals at three consecutive evenings prior to the experimental days. Test variables were measured in the morning, 10.5-13.5 hours after ingestion of WGB or WWB. The postprandial blood was analyzed for measures of e.g. glucose metabolism, inflammatory markers, appetite regulating hormones and short chain fatty acids (SCFA).

Results: No significant differences in test variables were observed depending on if the test products were consumed as a single evening meal or during three consecutive evenings (P>0.05). Preliminary results show that WGB evening meals increased concentrations of satiety-inducing hormones, PYY (0-120 min, P<0.001) and GLP-1 (0-90 min, P<0.05), compared to WWB evening meals. Moreover, WGB evening meals decreased the incremental blood glucose area (iAUC 0-180 min, P=0.001), but no significant effects on inflammation markers (IL-6 & IL-18) were observed. Additionally, WGB evening meals increased total SCFA (acetate, propionate and butyrate) concentration in fasting plasma.

Conclusions: The results show no difference in WGB evening meals since both indicate to have anti-diabetic potential and an increased release of satiety hormones which could be beneficial in preventing obesity. These effects could possibly be mediated through colonic fermentation.

Keywords: (maximum 5): Glucose tolerance, PYY, SCFA, Dietary fibre, Colonic fermentation

149/1420. Preventing complications at home after placement of a Percutaneous Gastrostomy tube

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Introduction: Percutaneous endoscopic gastrostomy (PEG) is chosen when there is inability to swallow as a result of central nervous system impairment, or less frequent such as severe facial trauma, or the necessity of nutritional augmentation in patients with inflammatory bowel disease. In order to ensure low incidence of complications, it requires simple and accurate knowledge and application of care.

In "Hospital Universitario del Henares" we give spoken and written recommendations about care after PEG. This allows minimizing and early detection of complications.

Objectives: The aim of this study is to determine the follow-up of nursing care recommendations and to describe the treatment when complications appear.

Method / Design: Cross-sectional study. A program evaluation was developed in 66 outpatients referred for PEG between April 2008 and April 2012. Exclusion criteria were inpatients or decease. Data about kind of tube, ostomy, and cares were collected by non-randomised phone call in a survey to patient or relatives. All data was analyzed with SPSS software.

Results: Sixty six (66) patients underwent PEG at our hospital. Forty three (43) were excluded. Twenty three (23) patients were analyzed, 10 were female gender. The main carer at home was a relative. Although complications occurred in 13 patients, they usually were minor in 77% of patients and 10 of them went to the hospital to receive treatment. Most recommended cares are accurately performed for 100% except for push-and-pull to avoid adhesions, wound cleansing and oral care. 100% consider that PEG is useful for nutrition. 98% understood the information sheet.

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Conclusions: Most principal carers understand and follow-up the nursing care recommendations, although minor complications appear. The information sheet is easy to understand and useful.

We consider it is important to give appropriate information (spoken and also written) to the patient and principal carer in order to minimize complications while using PEG.

Keywords: (maximum 5): Percutaneous Gastrostomy Tube (PEG); Nursing Care; Home Care; Written Information; Self-Care.

149/1423. Personalized Dietary Advice for Diabetes Type 2 Patients; a new intervention approach based on individual requirements

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Introduction: Dieticians battle the consequences of type 2 diabetes (T2D) using mainly generic advice, and personalize it by focusing on individuals' motivation and preferences. A new and promising paradigm has emerged with personal dietary advice based on individual genetics, health status, fitness, and motivational goals, which means a giant step forward for both dieticians and their clients. This study, FP7 project no. 613783 Qualify, aims to increase dietary compliance by introducing Personalized Dietary Advice Services (PDAS) based on individual requirements.

Objectives: The study aims to assess the effect of Personalized Dietary Advice after a three-month intervention on established markers of nutritional and health status in T2D patients.

Method / Design: In this randomized controlled trial 23 patients participate. The intervention starts with a baseline measurement, during which genetic, blood, physical and nutrition profile of the participant are determined. Subsequently, the intervention group will receive personalized dietary advice based on their personal profile from the dietician, while the control group receives regular care. After this initial consult, three more consults will follow, where monitoring takes place and the advice may be adjusted. After three months baseline measurements are repeated to examine effectiveness of the intervention.

The PDAS use decision trees based on micronutrient and metabolic markers for personalization of the advice. These markers include, amongst others, blood cholesterol levels, vitamin status, and SNPs associated with T2D.

Results: The study is in full progress at the moment. The first results will become available within two months and will be presented at the congress.

Conclusions: All decision trees are based on solid scientific knowledge and result in relevant advice for the individual. It is expected that this more personalized advice will result in improvement of diabetes-related health biomarkers. Also, it is expected that the personalized approach will increase compliance, because of the personal relevance of the advice.

Keywords: (maximum 5): Type 2 Diabetes, Personalized Advice, Dietary services, Do It Yourself, Biological markers

149/1428. Serum vitamin B12 and folic acid reference ranges for functional Vitamin B12 deficiency:

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Introduction: Vitamin B12 assists in methionine-homocysteine cycle with folic acid where methyl groups are provided for the DNA and protein synthesis. Serum vitamin B12 levels are measuredin clinical laboratories; however, there's no certain cut off. Increased levels of homocysteine and methylmalonic acid might be beneficial for diagnosis of Vitamin B12 deficiency and folic acid.

Objectives: To investigate the relationship between vitamin B12, homocysteine and folic acid levels in a large study group.

Method / Design: The retrospective data of simultaneously measured serum vitamin B12, folic acid and total homocysteine from 2301 subjects who were admitted to AcibademLabmed Laboratories between the years 2004-2015 were evaluated. Vitamin B12 and folic acid concentrations were measured by Immunoassay (Roche E170, Roche Diagnostics Corp) and homocysteine was measured by Liquid Chromatography Mass Spectrometry. Median continuous values between two groups were compared by Mann-Whitney's U-test. Difference between the variances of three groups was examined by Kruskal-Wallis test. Statistical analysis was performed using PASW 18.0 Statistics. ($p>0,05$ was considered significant)

Results: In subjects with homocysteine threshold levels >13umol/L, Vitamin B12 was significantly lower (433.8±313.5) than subjects with homocysteine levels <13umol/L (535.3±466.7, $p<.0001$). Of 1033 subjects with Vitamin B12 <400pg/ml, 293 (28,4%) and of 484 subjects with folic acid <8ng/ml, 206 (42.6%) showed higher homocysteine levels. 131 subjects with both vitamin B12 <400pg/ml and folic acid <8ng/ml, out of 255 (51.4%) showed high homocysteine levels (>13 umol/L).

Conclusions: Vitamin B12 level of plasma isn't sufficient enough to determine the functional vitamin B12 deficiency. Clinical investigation of reference levels with homocysteine and folic acid results can be considered for the diagnosis of functional vitamin B12 deficiencies. In subjects with 400pg/ml cut off for vitamin B12 and 8ng/ml cut off for folic acid, it might be beneficial to evaluate serum homocysteine (and/or methylmalonic acid) levels.

Keywords: (maximum 5):

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Topic 3: Metabolic Diversity

149/68. Chronic zinc deficiency alters gut microbiota structure and function

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Introduction: Zinc (Zn)-deficiency is a highly prevalent micronutrient insufficiency primarily caused by a lack of adequate dietary-Zn and/or poorly bioavailable dietary-Zn. Although the gut is a vital organ for Zn-utilization, and therapeutic Zn-administration positively influences gut health, the significance of the gut microbial ecology to the host during Zn-deficiency has yet to be studied.

Objectives: Characterization of distinct bacterial shifts induced by chronic dietary Zn-depletion.

Method / Design: Cecal samples from Zn-replete (42μg/g-dietary-Zn) and Zn-deficient (2.5μg/g-dietary-Zn) treatment groups (Gallus-gallus, n=14, 4-weeks) were harvested for bacterial DNA-extraction and sequenced using bar-coding of the 16S-rRNA gene V4 hypervariable region. The diversity of microbiota was assessed through measures of β-diversity, α-diversity, and overall species-richness. Chao1-index and observed species-richness were used to assess α-diversity. We utilized weighted-UniFrac distances as a measure of β-diversity to assess the effect of chronic Zn-deficiency on between-individual variation in bacterial community composition.

Results: Zn-depletion induces significant taxonomic shifts and decreases overall species-richness and diversity, establishing a microbial profile resembling that of various other pathological states. Metagenomic-analysis showed that predicted KEGG-pathways responsible for macro-and micro-nutrient uptake are significantly depleted in Zn-deficiency, and, along with decreases in beneficial short-chain-fatty-acids, such depletions induce notable functional and metabolic alterations which may further preclude an optimal host Zn-status. We identified four bacterial species; Enterococcus-sp., Ruminococcus-lactaris, Clostridium-lactatifermentans, and Clostridium-clostridioforme –positively correlated with zinc-adequacy, and two bacterial species; Clostridium-indolis and Unclassified-S24-7 –positively correlated with Zn-insufficiency as candidate microbes which may play a significant role in the utilization of dietary-Zn during a prolonged deficiency.

Conclusions: Our results characterize a unique cecal-microbiota during Zn-deficiency, and provide evidence for these perturbations as influencers of the Zn-deficient phenotype. Additional research, such microbial alterations could be used to designate a Zn-deficiency profile, which could be used as an additional physiological biomarker to establish and quantify deficiency stage and risk

Keywords: (maximum 5): ZINC DEFICIENCY, MICROBIOTA, CECAL-MICROBIOME, ZINC-BIOMARKER

149/114. Lingonberry juice supplementation protects kidney from ischemia reperfusion injury

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Introduction: Lingonberry contains high levels of anthocyanins. Antioxidants have been shown to protect the kidney from ischemia-reperfusion (IR) induced acute kidney injury (AKI) in animal models. Berry pigments, primarily anthocyanins, are also antioxidants and have been shown to be bioavailable in the kidney. Although lingonberry has high levels of anthocyanins, their effect on kidney IR is unknown.

Objectives: This study investigated the effects of feeding rats with lingonberry juice on IR-induced kidney injury.

Method / Design: Sprague-Dawley rats were fed 1 mL of lingonberry juice daily for 3 weeks, at which time the left kidney was subjected to IR. A multitude of plasma and renal protein biomarkers were measured.

Results: Without treatment, the IR model induced significant increases in plasma creatinine and NGAL, indicating impaired kidney function. Plasma proinflammatory cytokines MCP-1 and TNFα were increased, and the stress-activated signaling pathway components JNK and c-Jun were significantly activated in the kidney. Rats fed lingonberry juice had significantly decreased levels of creatinine, NGAL, MCP-1, and TNFα in plasma and decreased levels of phosphorylated JNK and phosphorylated c-Jun in kidney tissue after IR. The reduction in creatinine, NGAL, and inflammatory markers concurrently with the reduction in JNK activation indicated that lingonberry juice pretreatment preserved kidney function after IR and may be protective against AKI.

Conclusions: This study demonstrates the potential use of lingonberry juice as a functional food to prevent AKI.

Keywords: (maximum 5): LINGONBERRY, VACCINIUM VITIS-IDAEA, PROTECTION, KIDNEY INJURY

149/118. Zinc and Chromium levels in Obese Children and their Relation to Metabolic Indicators

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Introduction: Childhood obesity has become a mass metabolic disease with serious repercussions on general health of the young population.

Zinc (Zn) is an essential mineral, important for biological processes - growth, development and immunological status. Chromium (Cr) is nutritive element which improves insulin activity, slow the development of metabolic syndrome, polycystic ovary syndrome, and prevents the occurrence of gestational diabetes and depression.

Objectives: Determining zinc and chromium levels in obese children and their relation to relevant anthropometric and biochemical parameters

Method / Design: A total of 110 children, boys and girls, aged 2-17, participated in the study. The participants were classified in two groups according to BMI (60 children with BMI >95 percentile and 50 children with BMI ≤ 85 percentile, respectively). Zinc and chromium concentrations were determined using the atomic absorption spectrophotometer UNICAM 969AAS.

Results: Serum zinc inversely correlated with waist / height ratio, subscapular skinfold thickness and BMI, decreasing with the rise in the total body fat, and in particular, the abdominal fat. Zinc also correlated ($\rho = 0.70$, $p<0.05$) with the serum insulin levels and HDL cholesterol. Interesting feature is a very high correlation between the serum zinc levels and family history including stroke, diabetes and hypertension; this might indicate a significant cause-effect relationship.

Chrome shows a negative correlation with the examined anthropometric factors - BMI, waist circumference and of triceps skinfold thickness, as well as insulin, blood glucose and HDL-cholesterol levels.

Conclusions: Serum zinc and chromium levels were significantly lower in the group of obese children comparing to those with normal body weight. Both trace elements inversely correlated with BMI, waist/height ratio, waist circumference and skinfold thickness as well as the relevant biochemical parameters.

Keywords: (maximum 5): Obesity, children, zinc, chromium

149/121. Salivary flow and composition are associated with liking and usual nutrient intake

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Introduction: Saliva flow and composition have an impact on flavor perception. However, very few studies have explored the relationship between saliva, individual liking and usual dietary intake.

Objectives: The aim of our study was to evaluate the association of salivary flow and composition with both a liking for fat, saltiness and sweetness and the usual nutrient intake in an adult French population.

Method / Design: Liking levels for fat, saltiness, and sweetness were from liking scores obtained during hedonic tests on 32 food products among 282 French adults participating in the Nutrinet-Santé Study. Before assessing liking, resting saliva was collected. Standard biochemical analyses were performed to assess component concentrations and enzymatic activities. Dietary data were collected using three web-based 24h records. Relationships between saliva flow and composition, sensory liking and nutrient intake were assessed using linear regression.

Results: Total antioxidant capacity was positively associated with simple carbohydrate intake (estimate=31.5, P=0.04) and inversely related to complex carbohydrate consumption (estimate=-52.4, P=0.002). Amylolysis was positively associated with both total (estimate=0.20, P=0.03) and simple carbohydrate intake (estimate=0.21, P=0.04). Salivary flow was positively associated with liking for fat (estimate=0.14, P=0.02). Proteolysis was positively associated with liking for saltiness and for fat (estimate=0.31, P=0.01; estimate=0.36, P=0.006, respectively). Amylolysis was inversely associated with liking for sweetness (estimate=-10.13, P=0.03). Carbonic anhydrase 6 was inversely associated with liking for saltiness (estimate=-46.77, P=0.02).

Conclusions: Saliva does not substantially vary according to a usual diet, except for carbohydrate intake, whereas the specific association between saliva flow/composition and sensory liking suggests the influence of saliva characteristics in food acceptance.

Keywords: (maximum 5): saliva, dietary intake, liking, amylolysis, proteolysis

149/141. Physical activity patterns and their association with metabolic profiles of Polish adolescents from less-urbanized regions

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Introduction: Metabolic profile is influenced by many environmental factors. Less-urbanized regions create specific conditions for living and physical activity. The relation between physical activity (PA) and metabolic profiles (MPs) of Polish adolescents living in less-urbanized regions is not well understood.

Objectives: The aim of the study was to analyze the association between PA and MPs of Polish adolescents living in less-urbanized regions.

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Method / Design: The study involved 299 adolescents aged 15-18 from less-urbanized regions of Poland. The International Physical Activity Questionnaire (IPAQ) was used to determine time spent on different activity types and the total physical activity (in MET-minutes/week). The concentration in blood of total cholesterol (TChol), HDL-cholesterol (HDL), triglycerides (TG), LDL-cholesterol (LDL), albumin, transferrin, hemoglobin (Hb), hematocrit (Ht), as well as the systolic (SBP) and diastolic (DBP) blood pressure were determined. Cluster Analysis (k-means method) was used to identify both PA patterns (in 208 subjects) and MPs (in 299 subjects).

Results: Two PA patterns were found: 'Moderately active' (51% of the sample), 'Sedentary-walking' (49%), and three MPs: 'Low Hb-High TChol' (38%), 'High BP-Dyslipidemia' (21%), 'Low Lipids' (41%). Adolescents with 'Moderately active' pattern compared to 'Sedentary-walking' had significantly higher PA (1068 vs. 420 MET-minutes/week), and lower TChol (155.0 vs. 166.1mg/dl) and transferrin (2.9 vs. 3.1g/l). 'Low Lipids' profile adolescents spent significantly more time on moderate sport and recreation activities (54.5minutes/day) compared to 'Low Hb-High TChol' (39.5minutes/day) and 'High BP-Dyslipidemia' (36.9minutes/day). 'Low Lipids' profile adolescents spent significantly more time walking at school (188.0minutes/day) compared to 'Low Hb-High TChol' (171.5minutes/day) and 'High BP-Dyslipidemia' (174.8minutes/day). Significantly more 'Moderately active' adolescents were classified as 'Low Lipids' (48%), whereas more 'Sedentary-walking' adolescents were classified as 'Low Hb-High TChol' (41%).

Conclusions: Moderate physical activity with different activity types was favourable to adolescents blood lipids profile.

Keywords: (maximum 5): adolescents, IPAQ, metabolic profile, PA patterns

149/145. Impact of diet on Plasma Choline, Carnitine, and their gut metabolite concentration in elderly women

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Introduction: Trimethylamine (TMA) is a gut-microbiota-derived metabolite that is synthesized from choline, betaine, or carnitine, whose concentration depends on the diet. TMA is oxidized in the liver to form trimethylamine-N-oxide (TMAO).

Objectives: The aim of the present study is to evaluate the impact of the dietary intake of choline, betaine, and some food products on plasma carnitine, free choline (fChol), trimethylamine (TMA), and trimethylamine-N-oxide (TMAO) concentrations in elderly Polish women.

Method / Design: 122 women over 60 years of age were recruited from the University of the Third Age or a publicly run nursing home. The intake of food products, choline, and betaine was assessed using a food-frequency questionnaire. Plasma fChol, TMA, and TMAO levels were determined using LC-ESI-MS/MS analysis, and carnitine levels were measured with a colorimetric enzymatic assay.

Results: There was no influence of betaine or choline intake on plasma fChol, TMA, or TMAO. People consuming more meat or less green leafy vegetables or legumes had higher TMAO concentrations but did not show higher levels of carnitine, fChol, or TMA. Individuals consuming higher amounts of white bread or less fresh or dried fruits had higher concentrations of fChol and TMA. Lower TMA concentration was also found in people who consumed more fermented products, such as cheese, yoghurt, or kefir.

fChol plasma concentration was correlated with TMA ($r = 0.34$) and TMAO ($r = 0.29$) and TMA was correlated with TMAO ($r = 0.20$).

Conclusions: The concentration of TMAO depends on the consumption of different food products than those affecting the concentration of choline or carnitine.

Keywords: (maximum 5): nutrition, choline, trimethylamine, trimethylamine-N-oxide, gut microbiota

149/167. Metabolomic Signature of Lysophosphatidylcholines on Coffee intake: a targeted approach

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Introduction: Lysophosphatidylcholines (LPCs) have pro-inflammatory properties in vitro and they are known to be a pathological component of oxidized low-density lipoproteins (ox-LDL) and in atherosclerotic lesions. Otherwise, bioactive compounds like phenolic acids founded in coffee might inhibit the LDL oxidation. The relationship between LPCs and coffee intake has not been described previously in humans.

Objectives: To evaluate if coffee intake can alter the LPCs concentrations in plasma and if LPCs are a possible biomarkers of effect of coffee intake in a general population.

Method / Design: Data came from a population based cross-sectional survey in 2008 (ISA-Capital) among adults and elderly in Brazil. The population (n=169) was divided in three groups: non-coffee consumers (G1, n=21), low coffee consumers (≤ 100 ml/day-G2, n=51) and high coffee consumers (>100ml/day-G3, n=97). Usual intake of coffee was assessed by two 24-hour dietary recalls and a food frequen-

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cy questionnaire using the Multiple Source Method. Quantification of the metabolites was performed by mass spectrometry (FIA-MS/MS and HPLC-MS/MS) of the type targeted. The association between LPCs and coffee intake was analyzed by multiple linear regression models adjusted for sex, age, body mass index, smoking, physical activity, use of drugs and fruit intake. ROC curves were used to evaluate if LPCs are a biomarkers of effect of coffee intake.

Results: The unsaturated LPCs were lower in G3 than in G1, such as arachidonoyl-LPC (C20:4) [β=-1.046;p=0.037], oleoyl-LPC (C18:1) [β=-2.465;p=0.018] and palmitoyl-LPC (C16:0) [β=-0.558;p=0.014]. In opposition, the ratios of C16:0/C16:1 and C18:0/18:1 were higher in G3 (β=4.690;p=0.025, β=0.284;p=0.003, respectively). The oleoyl-LPC and the ratio C18:0/C18:1 showed good performance in the differentiation of G1 and G3 groups (AUC=0.705 CI 95%:0.561;0.833 and AUC=0.751 CI 95%:0.633;0.854, respectively).

Conclusions: There were metabolome modifications on LPCs according to consumption of coffee. The oleoyl-LPC and the ratio C18:0/C18:1 might be possible biomarkers of effect of coffee intake.

Keywords: (maximum 5): Coffee; Metabolomics; Lysophosphatidylcholines; polyphenols

149/174. Liver delipidation effect induced by a combination of Polyphenols is not mediated by increased Mitochondriogenesis

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Introduction: In a previous experiment, a reduction in liver fat content was shown in rats when resveratrol (RSV), found in grapes and wine, and quercetin (Q), found in onions and kales, were administered together at doses that were inefficient when these polyphenols were administered separately. One of the mechanisms involved in this effect was increased fatty acid oxidation.

Objectives: The aim of this work was to analyze whether the increased fatty acid oxidation induced by RSV+Q was mediated by a stimulation of mitochondriogenesis.

Method / Design: Thirty-six Wistar rats were divided into four groups fed an obesogenic diet for 6 weeks: control rats (C), rats treated with resveratrol (RSV; 15 mg/kg body weight/d), quercetin (Q; 30 mg/kg body weight/d) or both molecules (RSV+Q). Liver enzymatic activity of citrate synthase and gene expression of peroxisome proliferator-activated receptor (PPARα), nuclear respiratory factor (NFR-1) and mitochondrial transcription factor A (TFAM), were assessed by spectrophotometry and RT-qPCR, respectively. The results were analyzed by ANOVA I and post-hoc Newman Keuls test.

Results: Citrate synthase, a marker of mitochondrial density, remained unchanged in all groups. No significant changes were observed in the expression of PPARα, NRF-1 and TFAM, three genes involved in the control of mitochondriogenesis.

Conclusions: The delipidating effect observed in liver when resveratrol and quercetin were administered together, which was mediated by increased fatty acid oxidation, is not associated with increased mitochondriogenesis.

Keywords: (maximum 5): combination, liver, obesity, fat, mitochondriogenesis

149/200. Antibiotic treatment reduces enterolactone levels - a model experiment with pigs

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Introduction: High levels of enterolactone are known to be protective on several chronic diseases such as cancer. Enterolactone is produced from plant lignans by the colonic microflora. The final step is carried out by a penicillin-sensitive member of the microflora.

Objectives: The aim of this model study was to investigate the impact of antibiotic treatment on enterolactone levels in pigs to gain knowledge for use in an epidemiological study in humans relating use of antibiotics to enterolactone levels.

Method / Design: A total of 20 intact pigs were served a lignan-rich diet for 14 days. Antibiotic treatments were administered daily to a group of 10 animals on d 8-14. Fasting blood samples were collected from the jugular vein in the morning of d 7 and again at d 14. At slaughtering urine samples were taken directly from the bladder. Enterolactone concentrations in plasma and urine samples were analyzed by LC-MS.

Results: Animals treated with antibiotics showed significantly reduced levels of enterolactone in plasma and urine compared to untreated animals with reductions of 36% and 64%, respectively in treated animals. All animals responded equally to the lignan-rich diet on d 1-7, thus we suggest that the lower enterolactone level is caused by the antibiotic treatment most likely due to compromised enterolactone production by the colonic microflora.

Conclusions: Antibiotic treatments of pigs ingesting a lignan-rich diet significantly reduce plasma and urinary levels of enterolactone. Future experiments will study enterolactone levels measured in 3921 human blood samples with antibiotic intake 12 months prior to the blood sampling.

Keywords: (maximum 5): Enterolactone: lignan: antibiotic: pigs:

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149/271. The role of one carbon metabolism and methylation capacity in metabolic syndrome

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Introduction: One carbon metabolism (OCM) and especially elevated homocysteine (Hcy) is related to adverse health conditions including cardiovascular disease and metabolic syndrome. The role of OCM in epigenetics is increasingly being recognized as a way to affect health outcomes.

Objectives: To investigate if OCM metabolites such as plasma Hcy, s-adenosyl-methionine (SAM), s-adenosyl-homocysteine (SAH), and SAM:SAH (methylation-capacity) are related to metabolic syndrome markers.

Method / Design: A cross-sectional study based on two dietary intervention studies from the 3G center with a total of 118 participants. The subjects were apparently healthy, 20-65 years old, BMI 25-35kg/m2 and at least one other feature of metabolic syndrome. Key OCM metabolites were analyzed using quantitative mass-spectrometry. Associations between OCM and metabolic syndrome markers were examined by linear regression models adjusted for age, gender and BMI (only non-anthropometric measures).

Results: Plasma concentrations of Hcy and SAM were associated with BMI, central fat distribution and body fat (p-values <0.01–0.06). SAH was also associated with BMI (P=0.05), but no other associations were found between SAH and SAM:SAH and anthropometry. After BMI adjustments, SAM was associated with fasting insulin, c-peptide, and insulin resistance (IR)(p-values <0.01-0.04), and tendencies were also observed between some markers of glucose homeostasis and Hcy and SAH (P<0.10). The SAM:SAH-ratio was associated with fasting glucose(P=0.04) and also tended to be so with IR and glycated hemoglobin. Markers of fatty-liver and liver function were also associated with OCM metabolites, as SAH was associated with aspartate-transaminase (ASAT) after adjusting for BMI (P<0.01) and SAM:SAH was inversely associated with ASAT and alanine-transaminase:ASAT (BMI-adjusted P=0.03 for both).

Conclusions: OCM seems to be associated with metabolic syndrome parameters - especially markers of obesity, glucose metabolism and liver function. The relationship between metabolic syndrome and OCM warrants further investigation to determine if epigenetics is involved in this relationship.

Keywords: (maximum 5): Obesity, glucose homeostasis, fatty liver, homocysteine, metabolomics

149/301. Effects of wine lees extract on zebrafish embryo´s lipid metabolism

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Introduction: Lees, polyphenol rich wine by-product formed at the bottom of wine containers, are assessed for their potential health benefits for the first time. The added value of this by-product promotes the enhancement of waste-management efficiency of wine industry. The Zebrafish is a well stablished model for natural compounds testing and its ability to absorb and metabolize single and complex mixtures of polyphenols allows the assessment of complex extracts for their potential health benefits in a reliable and fast way.

Objectives: Evaluate the effectiveness of lees polyphenolic extract on lipid metabolism using zebrafish embryo as animal model.

Method / Design: Firstly, polyphenolic extract was extracted from lees, and its toxicity was evaluated (OECD normalized test) to stablish non-toxic doses. Afterwards, fat deposit of embryos was stained with Nile Red and the reduction of fluorescence emission after different dose and time expositions to the lees was measured. Later, metabolic rate, an indicator of energy expenditure, was individually analyzed. Finally the impact of the extract on the expression of genes implicated in lipid metabolism was studied.

Results: Fat reduction effect was very pronounced (reached 40% compared to control) and was dose and time dependent. Furthermore, lees were able to alter expression of genes related with lipogenesis (FASN and SREBP), lipolysis (CPT1b) and lipid transport (MTP) after different exposures times and dilutions. Changes in metabolic rate could explain, at least in part, the oxidation of fat reserve.

Conclusions: Polyphenolic extract from wine lees is a potential ingredient for the development of new healthy products targeted to weight management therapies, and it deserves further research in zebrafish and higher animal models.

Keywords: (maximum 5): Wine lees, Lipid metabolism, Fat reduction, Gene Expression, Zebrafish

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149/311. Does early short-chain fructooligosaccharide (scFOS) supplementation impact responses to a high-fat diet later in life?

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Introduction: Perinatal nutrition impacts physiologic and metabolic functions, in a sustainable way, with consequences on susceptibility to developing metabolic diseases in adulthood. A key actor of the nutritional imprinting is the microbiota by its early colonization and its diversity. Prebiotics modulate intestinal microbiota and influence homeostatic systems, especially by reducing development of high-fat (HF) diet-related disorders. However, less is known about long-term consequences of prebiotic consumption in early life.

Objectives: We investigated effects of early scFOS supplementation on later adult responses to HF diet in a model of conventional pig. Due to its known similarities with Human, we hypothesised that this model was appropriate to provide new knowledge on the programming concept currently based on human epidemiological studies and experimental data from rodents.

Method / Design: Sows received a standard diet supplemented with scFOS (Profeed®) or not (CTRL) for the last 4 weeks of gestation and the lactation. At postnatal day (PND) 28, 10 piglets were weaned on a CTRL or scFOS diet until PND77. Then they were all fed a standard diet until PND180 and a HF diet until PND270. Glucose tolerance was assessed in vivo (IVGTT) and the other metabolic parameters were measured at sacrifice. Intestinal immune responses were analysed ex vivo using ileal explants stimulated with ConA.

Results: HF diet did not induce hyperphagia. Body weight tended to be lower in scFOS group. Insulin response to a glucose challenge was slightly higher in scFOS group, but no other metabolic parameters (lipid metabolism, basal glycaemia and insulinemia, pancreatic insulin content, gut and plasmatic GLP-1) were modified. Early scFOS supplementation reduced pro-inflammatory IFNg and TNFa secretion by stimulated ileal explants revealing a modulation of local immunity orientation.

Conclusions: Such results underline the key role of perinatal nutrition on adult responses to an adverse nutritional challenge.

Keywords: (maximum 5): perinatal nutrition, scFOS, glucose metabolism, intestinal immunity

149/326. Natural abundance of nitrogen isotopes in amino acids are biomarkers of the metabolic syndrome onset

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Introduction: The isotope effects associated with nitrogen metabolic pathways result in differences in the nitrogen stable isotope compositions (δ15N) of metabolic pools within individuals. Thus, inter-individual differences in some δ15N values can reflect differences in nitrogen metabolism

Objectives: Here, we evaluated in rats whether the metabolic syndrome (MS) onset involve some dysregulations of nitrogen metabolism which can be traced with δ15N values of individual amino acids in plasma and tissue proteins.

Method / Design: Sixty male Wistar rats were fed a high fat diet for 10 weeks and 2 groups were selected in either the upper (MS group, n=10) or the lower (Lean, control group, L, n=10) ends of body weight and fasting insulin distributions and killed for tissue collection. Plasma and tissue proteins were precipitated and hydrolyzed and δ15N values of Ala, Asx, Glx, Gly, Leu, Pro and Ser were determined using gas chromatograph combustion isotope ratio mass spectrometry.

Results: Body weight and fasting insulin were 1.3 and 8.2 fold higher in the MS compared with the L group, respectively. No difference was observed between groups for δ15N values of Asx, Glx, Leu, Pro and Ser, whereas δ15N values of Ala and Gly were significantly lower in plasma and muscle proteins of the MS group. A discriminant analysis showed that the difference between δ15N of Gly and Leu in plasma proteins is the main contributor to group separation. On the basis of this variable alone, 95% of the rats were correctly classified as MS or L.

Conclusions: These results evidence that nitrogen metabolism is affected during the onset of insulin resistance in a tissue-specific manner. They also suggest that the δ15N of some plasma amino acids represent promising early biomarkers of these metabolic changes.

Keywords: (maximum 5): compound-specific amino acid δ15N values, early biomarkers, metabolic syndrome, protein and amino acid metabolism

149/355. Bile acid plasma concentrations are associated with age, sex and lipid metabolism in healthy humans.

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Introduction: Bile acids (BA) are important for many physiological functions including the absorption of lipophilic nutrients. Investigations concerning the pleiotropic roles of BA in human metabolism require a thorough understanding of factors influencing plasma BA concentrations.

Objectives: To investigate whether age, sex, dietary fat intake and markers of lipid metabolism are associated with fasting plasma BA concentrations.

Method / Design: KarMeN (Karlsruhe Metabolomics and Nutrition) is a cross-sectional study performed at the Max Rubner-Institut in Karlsruhe, Germany. Fasted blood samples from 301 healthy male and female participants (age range 18 – 80 years) were collected and triglycerides, LDL, HDL and body fat % were determined. The percentage of energy intake from dietary fat of the day prior to blood sample drawing was assessed. BA were analyzed using an LC-MS stable isotope dilution assay. Subsequent statistical data processing was done by means of a median regression model.

Results: Fasting plasma BA concentrations showed a large interindividual variation. Overall, median concentrations of the majority of BA were higher in men. Results of the quantile regression revealed significant interactions of selected BA with age and sex. The highest concentrations of these BA were found in young men. Primarily, chenodeoxycholic acid, a primary BA, was affected. Quantile regression accounting for sex and age revealed associations between secondary BA and plasma levels of triglycerides, HDL and body fat. No associations were found for LDL and dietary fat intake.

Conclusions: Fasting plasma concentrations of selected BA are age and sex dependent. Triglycerides, HDL and body fat are associated with secondary BA plasma concentrations whereas no effect of LDL and dietary fat intake was observed. These significant associations have to be taken into account in studies investigating the influence of BA on human metabolism.

Keywords: (maximum 5): bile acids, age, sex, lipid metabolism

149/373. Metabolite patterns characterising age and sex in participants of the "KarMeN"-study

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Introduction: Investigations on the impact of food on the human metabolome requires information on the background variation of the human metabolome.

Objectives: To investigate whether age and sex are associated with metabolite patterns in healthy humans.

Method / Design: KarMeN (Karlsruhe Metabolomics and Nutrition) is a cross-sectional study performed at the Max Rubner-Institut in Karlsruhe, Germany with more than 300 healthy male and female participants (age range 18 – 80 years). Fasted blood and 24h urine samples were collected and analysed by targeted and untargeted GC×GC-MS, LC-MS and NMR. Predictive modelling was applied using the following machine learning algorithms: SVM, glmnet and PLS.

Results: Based on metabolite profiles from urine and plasma obtained with different analytical platforms, it was possible to identify metabolite patterns which predict age in men with high accuracy. In women, classification according to age groups (based on their menopause status) was possible from both, urine and plasma metabolome data with high accuracy. Besides a number of unknown analytes, some metabolites important for this prediction could be identified, such as glycine and creatinine in urine. Classification of volunteers according to sex was also possible with high accuracy based on urine and plasma metabolite profiles. Plasma metabolites important for correct classification included creatinine and the branched-chain amino acids valine, leucine and isoleucine.

Conclusions: The metabolite profile of human urine and plasma allows prediction of age and sex with high accuracy, which means that age and sex are associated with metabolite patterns of healthy humans. This needs to be considered in studies looking for the effect of food and diets on the human metabolome.

Keywords: (maximum 5): metabolomics, age, sex, predictive modelling

149/376. Effect of caloric restriction on transcriptional response in metabolic challenge tests in PBMCs of humans

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Introduction: Health has recently been redefined as an organism's ability to adapt and to implement own control in light of physical, emotional and social challenges of life. Within the NutriTech project we defined health as 'phenotypic flexibility': the capacity to adapt to the continuously changing environment in time and space. Examples of metabolic challenges to study phenotypic flexibility are the oral glucose tolerance test (OGTT) and the mixed meal test (MMT). Caloric restriction (CR), the consumption of less energy without malnutrition, is hypothesised to increase health and has been used as a model to investigate the response to metabolic challenges in different health-states.

Objectives: We aimed to study phenotypic flexibility by means of whole genome transcriptional response in human peripheral blood mononuclear cells (PBMCs) upon an OGTT and a MMT challenge before and after a CR diet intervention. As CR is expected to result in a healthier state, we expect an improved response to metabolic challenges and a change towards a healthier gene expression profile.

Method / Design: 72 healthy, overweight men and women, aged 50-65, were subjected to an OGTT and a MMT, before and after a 12

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week intervention with either a 20% CR diet or a control diet. Total RNA was isolated from PBMCs during the OGTT at time points: 0, 30, 60, 120 min, and during the MMT at time points: 0, 60, 120, 240, 460 min. PBMC RNA of all time points was used to evaluate whole genome gene expression response using Affymetrix microarrays.

Results: A total number of 1247 microarrays are currently analysed.

Conclusions: Results will be available at the time of the conference.

Keywords: (maximum 5): phenotypic flexibility, challenge test, caloric restriction, PBMCs, gene expression

149/399. C-ANP4-23 modulates gene expression associated with signaling pathway insulin and inflammation in human adipocytes

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Introduction: In obesity there is an excessive store of triacylglycerols and a production of proinflammatory adipocytokines in adipose tissue that provoke insulin resistance. Obesity has also been associated with an increased expression of NPR-3 (natriuretic peptide receptor 3). This receptor was proposed as a clearance receptor committed to remove natriuretic peptides from the circulation; however, NPR-3 plays additional roles. It has been described that. C-ANP4-23, a specific agonist of NPR3, decreased cAMP (cyclic adenosine monophosphate) in vascular smooth muscle cells from rats. On the other hand, Selliti et al. 2001 showed that C-ANP4-23 increase cAMP production in human thyroids cells.

Objectives: The aim of this work was to investigate the activation effects of NPR3 in human adipocytes.

Method / Design: Human adipose derived stem cells (ADSC, Lonza, Switzerland) were differentiated into adipocytes during 10 days. Adipogenic differentiation was validated by Oil Red O staining. Differentiated adipocytes were incubated with C-ANP4-23 [1 μM] for 4 hours and the intracellular cAMP levels were determinate by an ELISA kit (Enzolifescience). The differential expression of nineteen genes related to insulin signalling and inflammatory pathway was carried out by a human customized PCR Arrays (Bio-Rad Laboratories). Gene expression was analysed using PCR Array Data Analysis software (Prime PCR analysis version 1.0; Bio-Rad Laboratories). All experiments were repeated five times.

Results: The treatment with C-ANP4-23 increased intracellular cAMP levels in the adipocytes (P=0.046). Furthermore, C-ANP4-23 up-regulated the gene expression levels of AMPK (Protein kinase, AMP-activated, alpha 1 catalytic subunit) and GLUT4 (Transporter glucose 4) (P=0.0001 and P=0.0046, respectively); and down-regulated the gene expression levels of IL1B (Interleukin 1, beta) and CASP1 (Caspase 1) (P=0.0188 and P=0.0014, respectively).

Conclusions: These results indicate that C-ANP4-23 treatment modified the expression levels of genes in fully differentiated adipocytes.

Keywords: (maximum 5): adipocyte, NPR-3, obesity

149/435. Microbial metabolites as potential markers for health benefits of prebiotics

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Introduction: The intestinal gut microbial ecosystem produces a wide range of metabolites that interact with the host's cells and in this way influence the physiological processes in the colon.

Objectives: To evaluate the available evidence on the bioactive, nutritional and putative detrimental properties of gut microbial metabolites to support a more integrated view of how prebiotics might affect host health throughout life.

Method / Design: A literature inventory was performed that targeted evidence for the physiological and nutritional effects of metabolites, e.g. short chain fatty acids (SCFA), the potential toxicity of other metabolites and attempted to determine normal concentration ranges. Furthermore, the biological relevance of more holistic approaches like faecal water toxicity assays and metabolomics and the limitations of faecal measurements were addressed.

Results: Existing literature indicates that protein fermentation metabolites (phenol, p-cresol, indole, ammonia), typically considered as potentially harmful, occur at concentration ranges in the colon such that no toxic effects are expected either locally or following systemic absorption. The end products of saccharolytic fermentation, SCFA, may have effects on colonic health, host physiology, immunity, lipid and protein metabolism and appetite control. However, measuring SCFA concentrations in faeces is insufficient to assess the dynamic processes of their nutrikinetics. Existing literature on the usefulness of faecal water toxicity measures as indicators of cancer risk seems limited.

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Conclusions: At present there is insufficient evidence to use changes in individual faecal bacterial metabolite concentrations as markers of prebiotic effectiveness. Integration of results from metabolomics and metagenomics holds promise for understanding the health implications of prebiotic microbiome modulation but adequate tools for data integration and interpretation are currently lacking. Similarly, studies measuring metabolite fluxes in different body compartments to provide a more accurate picture of their nutrikinetics are needed.

Keywords: (maximum 5): microbial metabolites, prebiotic health benefits, metagenome, nutrikinetics

149/442. Effects of chia seed (SALVIA HISPANICA L.) In local and systemic inflammation in obese rats

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Introduction: Chia seed (Salvia hispanica L.) is an herbaceous plant that belongs to the Lamiaceae family, and is a good source of oil, protein, dietary fiber, minerals and polyphenolic compounds. The chia seed contain the highest proportion of omega-3-linolenic acid of any known natural source and is becoming the object of increasing attention as a food ingredient with beneficial effects on human health.

Objectives: This study investigated the effects of chia seed intake on hormonal and inflammatory status, and visceral adipose tissue weight in the prevention and treatment of diet-induced obese rats.

Method / Design: Thirty-two Wistar rats were divided in four groups: lean control (Control), high-fat and high-fructose diet (HFF), HFF with chia seed in short (6-wk) and long (12-wk) treatments. Liver, epididymal adipose tissue (EAT), mesenteric adipose tissue and retroperitoneal adipose tissue were removed and weighed. The EAT was used for quantification of tumor necrosis factor alpha (TNF-α), interleukin-1 beta (IL-1β) and interleukin-10 (IL-10) by protein immunoblotting analysis. Serum adiponectin, ghrelin, insulin, leptin, TNF-α, C-reactive protein (CRP) and monocyte chemoattractant protein-1 (MCP-1) were analyzed using enzyme-linked immunosorbent assay method. The limit of significance was set at $P<0.05$.

Results: The HFF diet induced obesity and serum inflammation compared to the lean control. The consumption of chia seed diet did not modify weight gain, adipose tissues weight, and serum leptin and insulin levels compared to HFF diet. However, chia seed groups were able to reduce serum TNF-α, CRP and MCP-1 levels, and increase serum adiponectin level compared to HFF group. Chia seed intake was able to normalize serum inflammatory state in obese animals, although it was not effective in modulating local inflammation of adipose tissue.

Conclusions: Therefore, dietary chia seed can be an important alternative to improve people's health suggesting its use as a functional food in human daily diet.

Keywords: (maximum 5): bioactive compounds, functional food, obesity, inflammation

149/468. Anti-obesogenic and anti-diabetic effects of freeze-dried jaboticaba peel and jaboticaba peel tea in rats

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Introduction: Jaboticaba (Myrciaria spp.) is a typical Brazilian fruit with high levels of anthocyanins, ellagic and gallic acid. The chemical characteristics of jaboticaba peel show possible health applications.

Objectives: This study evaluated the anti-obesogenic and anti-diabetic effects of freeze-dried jaboticaba peel (FJP) and jaboticaba peel tea (JPT) in rats.

Method / Design: Thirty-six Wistar rats were divided in six groups: AIN-93M normal control diet; HFF (obese control) feed a high-fat and fructose diet; FJP-12wk and FJP-6wk feed HFF diet with 2% of FJP powder, for 12 and 6 weeks respectively; JPT-12wk and JPT-6wk feed HFF diet and had the water substituted by JPT, for 12 and 6 weeks respectively. Glucose Tolerance Test (GTT) and Insulin Tolerance Test (kITT) were done. The animals were dead by decapitation and blood was collected to measure serum glucose by commercial kit and plasma insulin by radio immune assay (RIA). The islets were collected immediately after decapitation in collagenase solution. The islet insulin concentration was measured by RIA after stimulation with different glucose concentrations. The limit of significance was set at $P<0.05$.

Results: The area under curve of the GTT was higher in HFF, FJP and JPT groups compared to AIN-93M group. The decay rate of glucose curve in kITT was higher in AIN-93M, FJP and JPT groups than in HFF group. The HFF group presented higher values of weight gain, glucose and insulin, as well as higher levels of islet insulin and static insulin secretion compared to AIN-93M. The FJP and JPT groups (12 and 6 weeks) reduced these parameters at same levels in AIN-93M group.

Conclusions: The FJP and JPT prevented the weight gain, plasma and islet hyperinsulinemia and improved insulin utilization by pancreatic islets, thus the jaboticaba peel can have a positive effect on the prevention and treatment of obesity and diabetes.

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Keywords: (maximum 5): JABOTICABA; ANTI-OBESOGENIC; ANTI-DIABETIC; PHENOLIC COMPOUNDS

149/506. Influence of a new dietary strategy for weight loss on the expression of inflammation-related miRNAs and genes in white blood cells from individuals with metabolic syndrome.

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Introduction: MicroRNAs (miRNAs) are essential to maintaining the metabolic homeostasis. Some of them could be used as therapeutic targets for metabolic disorders and as prognostic biomarkers of the response to hypocaloric diets.

Objectives: The aim of this randomized study was to evaluate the effect of two dietary strategies for weight loss on the expression of inflammation-related miRNAs and genes in white blood cells (WBC) from individuals with metabolic syndrome (MetS).

Method / Design: The clinical, anthropometric and biochemical characteristics of 80 individuals (40 men and 40 women; age: 48.84 ± 10.02 y.o.; body mass index: 35.41 ± 4.42 kg/m2) were evaluated before and after following two different 8-week hypocaloric diets. The RESMENA diet provided higher protein intake (24.6 ±2.8%), average intake (7 meals/day) and total antioxidant capacity than the American Heart Association recommendations (Control diet). RESMENA included a control of the cholesterol content and focused on low glycemic index and glycemic load foods. Total RNA was isolated from WBC and the expression of some miRNAs and genes was assessed by quantitative real-time PCR.

Results: Both nutritional interventions improved most anthropometric and biochemical features. However, the expression of miR-155-3p was decreased in WBC, whereas Let-7b was strongly upregulated as a consequence of the RESMENA diet. The changes in the expression of Let-7b, miR-125b, miR-130a, miR-132-3p and miR-422b were statistically associated with changes in the diet quality, when assessed by the Healthy Eating Index. Moreover, low consumption of lipids and saturated fat (g/day) were associated with higher expression of Let-7b after the RESMENA intervention.

Conclusions: The RESMENA diet was able to induce changes in the expression of Let-7b and miR-155-3p in WBC from patients with MetS after 8 weeks. The content and the quality of the lipids from the diet may influence of the expression of Let-7b, an anti-inflammatory mediator.

Keywords: (maximum 5): miRNAs, Metabolic Syndrome, Inflammation, Weight Loss

149/585. Metabolic patterns for quality traits in tomato fruits

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Introduction: Tomato (Solanum lycopersicum) is one of the most widely consumed fruit and consequently germplasm selection is a very intense process. However, small farmers have preserved part of the gene pool by heritage and tradition. Complex regulatory pathways of primary and secondary metabolism impact on the nutritional and sensory properties of the fruits. Thus, the variability found in landraces offers new sources that can be exploited in breeding programs aimed to enhance these traits.

Objectives: To identify quality traits in local tomato accession by integrating different metabolite profile analyses.

Method / Design: 52 tomato varieties were evaluated including landraces commercial cultivars and reference genotypes (M82 –S. lycopersicum- and LA1589 –S. pimpinellifollium, wild specie-), cultivated under field conditions. Ripe fruits were profiled by GC-MS to identify and quantify (in relative terms) primary (PMets) and volatile (VMets) metabolites. Non-parametric statistical analyses were applied.

Results: 90 different PMet compounds were identified. Among organic acids, pyroglutamic, butyric acid, 4-amino (GABA), dehydroascorbic and malic were those showing the higher variability within cultivars. In the case of sugars, sucrose showed changes of 250X. Analytes of unknown identity also presented marked variability among different cultivars. PCA and HCA of PMets and 47 VMets were efficient to classify the genotypes by their morphology (round, elongated and cherry). The elongated cultivars stand up for the content of some aminoacids , while cherries showed more abundance of unknown metabolites. Spearman correlation analyses showed positive correlation (r>0.8) of glutamine metabolism with the VMets 3-methyl-1-butanol and 3-methylbutanal and negative correlation with heptanal. Glutamic acid pathway appears as a critical point of

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divergence because both, this aminoacid and GABA were highly variable in the analyzed varieties. VMets from the butanoate metabolism also showed high variability.

Conclusions: Metabolic profiles resulted in valuable tools to identify quality traits in tomato fruits for breeding purposes.

Keywords: (maximum 5): metabolomics; tomato; quality traits

149/621. Title: Genotypic Diversity and Morphological Markers for Pod Yield in Cowpea (Vigna unguiculata (L.) walp).

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Introduction: INTRODUCTION: Cowpea is the major protein source in the nutrition of millions of low-income tropical homes. The most effective solution to crop productivity constraints is to develop high-yielding genotypes from existing materials.

Objectives: OBJECTIVE: This study investigated genotypic diversity in cowpea, and inter-character relationships among traits in order to identify morphological markers for cowpea yield.

Method / Design: METHOD/DESIGN: Thirteen genotypes of cowpea were grown in single rows laid out in randomized complete blocks with three replicates in October, 2014. Data collected were subjected to analysis of variance (ANOVA). Means were separated using Duncan's multiple range test ($P \leq 0.05$). Broad-sense heritability (HB), genotypic (GCV) and phenotypic (PCV) coefficients of variation were estimated. Genotypic and phenotypic correlation coefficients were also estimated from covariance analysis.

Results: RESULT: ANOVA revealed significant mean squares for number of days to 50% flowering, plant height, pod length and number of pods/plant. UAM1046-6-1 exhibited the least number of days to 50% flowering (36.33) while IFE-82-12 gave the highest number of pods per plant (23.07). GCVs and PCVs were low for all traits considered and PCVs were highest for plant height, pod length and number of pods/plant. HB was highest for number of days to 50% flowering (90%) and pod length (80%). Both genotypic and phenotypic correlation coefficients were significant in the association of number of pods/plant with number of days to 50% flowering (-0.50 and -0.43), plant height (0.48 and 0.44) and number of branches/plant (1.00 and 0.54).

Conclusions: CONCLUSIONS: Sufficient genetic diversity existed to enhance effective selection. Improvement can be achieved through selection for pod length and number of days to 50% flowering. Number of days to 50% flowering and plant height were recommended as morphological markers for high yield in cowpea.

Keywords: (maximum 5): Keywords: Nutrition, diversity, morphological marker, covariance.

149/622. Metabolically Healthy Obesity in older Australian adults: A bi-ethnic cohort study

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Introduction: While vast resources are being justifiably directed to address the global obesity epidemic, simple strategies are desperately needed for metabolic risk reduction for the millions with long-term or permanent obesity. For almost six decades Australia's Greek-born migrants have been obese yet long-lived relative to the broader Australian population, which is in turn long-lived by global standards.

Objectives: Compare metabolic risk profiles of a cohort of Greek-born and Australian-born older people to determine whether there are protective factors that may have contributed to the positive health profile of Greek-born migrants.

Method / Design: Australian-born and Greek-born community-based adults (448), approximately equal numbers with (207) and without type 2 diabetes (239), were recruited to this observational study. An extensive clinical evaluation after an overnight fast was undertaken. This included measurement of a suite of established and novel CVD risk factors and DXA for body composition and fat distribution measures. Principal Components Analysis [PCA] was used to identify metabolic risk profiles.

Results: PCA was applied to a broad range of CVD risk factors and 3 dominant risk factor profiles were identified: diabetes-like, pre-diabetes with renal dysfunction, and metabolically healthy obese (MHO). Participants who scored high on the MHO factor (Q4) were mostly female (78%) and Greek-born (64%), had significantly higher body fat % (45% vs 25%; $p<0.001$), better glycaemic parameters (HbA1c 5.5% vs 7.7%; $p<0.001$), higher HDL cholesterol (1.5 vs 0.9 mmol/L; $p<0.001$), lower triglycerides (1.1 vs 2.0 mmol/L; $p<0.001$), and lower homocysteine (8.9 vs 10.9 mmol/L; $p<0.001$) compared with low scorers (Q1).

Conclusions: A metabolically healthy obese risk profile was identified, with high scorers more likely to be Greek, notably Greek women. Whether this association is dependent on modifiable lifestyle behaviours, including diet and/or smoking, warrants evaluation.

Keywords: (maximum 5): Greek Migrants, Metabolically Health Obese, Mediterranean Diet

149/701. A screening of the anti-adipogenic effect of polyphenols showing different chemical structure

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Introduction: Obesity has reached epidemic proportions worldwide. Noticeable attention has been paid in recent years to natural bioactive molecules present widely in the plant kingdom. These molecules, have been reported to induce potential health benefits by preventing some chronic disorders, such as obesity. In this context, cellular studies have demonstrated that phenolic compounds can suppress adipocyte differentiation and triglyceride accumulation.

Objectives: To identify phenolic compounds effective for preventing adipogenesis and thus, triglyceride accumulation, in 3T3-L1 preadipocytes.

Method / Design: 3T3-L1 pre-adipocytes were treated from day 0 to day 8 of differentiation with 25µM of each of these phenolic compounds: gallic acid and vanilic acid (phenolic acids), kaempferol and quercetin (flavonols), (−) epicatechin, (+) catechin and epigallocatechin (flavan-3-ols), hesperidin and naringenin (flavanones), apigenin and luteolin (flavones), daidzein and genistein (isoflavones), cyaniding (anthocyanidin), resveratrol, piceatannol and pterostilbene (stilbenes). Triglycerides were measured by spectrophotometry. Protein measurements were performed using the BCA reagent (Thermo Scientific). Statistical analysis was performed using SPSS 19.0 (SPSS, Chicago, IL, USA). Comparisons between each treatment and the control were analyzed by Student's t-test. Statistical significance was set up at the $P < 0.05$ level.

Results: (−) epicatechin, (+) catechin, epigallocatechin, pterostilbene and cyanidin did not induce triglyceride reduction. The rest of the analyzed phenolic compounds were effective molecules: apigenin (−23.3%), daidzein (−31.4%), genistein (−40.3%), kaempferol (−43.5%), luteolin (−43.4%), naringenin (−38.9%), gallic acid (−28.1%), hesperidin (−55.7%), vanilic acid (−38.7%), quercetin (−46.2%), resveratrol (−32.9%), and piceatannol (−31.6%).

Conclusions: Regardless of the specific characteristics of each chemical structure, 12 of the 17 phenolic compounds analyzed can prevent lipid accumulation in 3T3-L1 preadipocytes.

Keywords: (maximum 5): phenolic compounds, 3T3-L1 preadipocytes, adipogenesis, triglycerides.

149/708. Colonic ferementation differs in subjects with lactase deficiency with and without abdominal complaints.

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Introduction: Small intestinal lactose malabsorption mostly occurs due to lactase non-persistence or primary hypolactasia and results in lactose becoming available for fermentation by the colonic microbiota. Some people with lactose malabsorption experience abdominal discomfort whereas others do not.

Objectives: We characterized colonic fermentation in subjects with lactase deficiency with abdominal complaints (LW), or without abdominal complaints (LWO) and subjects with normal lactose digestion (NLD) and investigated the link between colonic fermentation and fecal water cytotoxicity.

Method / Design: Faecal samples were collected from 15 NLD (5m/10f, age: 30±10 years, BMI : 23,4±2,4 kg/m²), 11 LW (6m/5f, age: 42±12 years, BMI : 24,1±2,1 kg/m²) and 8 LWO (4m/4f, age: 40±16 years, BMI : 23,5±2,4 kg/m²). Lactase deficiency was diagnosed using a 13C-lactose breath test. LW and LWO were distinguished based on the complaints experienced during the test. Colonic fermentation was characterized through an untargeted metabolomics approach using GC-MS. Fecal water cytotoxicity was analyzed using the colorimetric WST-1 assay. Clustering techniques were applied to detect fermentation metabolites associated with LW, LWO or NLD and cytotoxicity.

Results: Cluster analysis of the metabolite patterns according to NLD, LW and LWO revealed separate clusters for each group. Short chain fatty acids (SCFA), aldehydes and alcohols were more prevalent in LW and LWO samples, while protein fermentation metabolites (indols, branched chain fatty acids and phenols) were more prevalent in NLD samples. Faecal water cytotoxicity was not different between the 3 groups (Kruskall Wallis p=0.164). Clustering of the samples according to cytotoxicity shows that the samples with highest cytotoxicity are associated with protein fermentation metabolites whereas SCFA were associated with medium cytotoxicity and cycloalkanes and −alkenes with low cytotoxicity.

Conclusions: Faecal metabolite patterns differ in subjects with LW, LWO and NLD but do not affect faecal water cytotoxicity.

Keywords: (maximum 5): Lactose intolerance, fermentation, faecal water cytotoxicity, metabolomics

149/741. Dietary conjugated linoleic acid upregulates detoxification genes in non-alcoholic fatty liver of isa brown hens

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Introduction: The supplements containing synthetic conjugated linoleic acid (CLA) are available on the market but scientists agree that the best way to get the nutrients is through a balanced diet. Enhancing CLA concentration in food products such as eggs, chosen dairy products and meat could then become an alternative to synthetic supplements.

Objectives: In this study, we aimed to evaluate the effect of CLA-enriched diets on health status of Isa Brown laying hens; specifically, for the first time we focused on morphological changes of liver and selective hepatic genes expression

Method / Design: A total of 48 ISA Brown hens, were allocated to the control and experimental diets (0.0 and 0.75% CLA respectively) for a total period of 4 months. At the end of the experiment, we performed histological analysis and examined the expression of selected hepatic genes involved in fatty acid synthesis and oxidation.

Results: Morphological changes of the liver specimen obtained from hens fed with CLA-fortified diet were classified as serious non-alcoholic hepatic steatosis. Total serum cholesterol was not significantly affected in the experimental group; however, increase in triacylglycerol's concentration ($P<0.01$) was observed compared to control. The activity of ALT was significantly increased in experimental group ($P<0.01$) while AST showed increasing tendency. The expression of ACLY, FASN, SCD1 and CPT1a genes was significantly increased in the group fed with CLA-fortified diet ($P<0.01$). The expression of CYP and FMO3 genes, as involved in detoxification, was also significantly increased in the experimental group ($P<0.01$).

Conclusions: Our results indicate that CLA-enriched diet promoted the development of fatty liver in experimental Isa Brown hens. Increased expression of CYP and FMO3 may indicate the induction of oxidative stress and inflammation, which requires further study, especially to assess the role of FMO3.

ACKNOWLEDGMENTS: This work was financed by the Polish National Science Center grant no. DEC-2011/03/B/NZ9/01423.

Keywords: (maximum 5): CLA, fatty liver, CYP, FMO3

149/777. A CpG-SNP in SH2B1, rs7359397, is associated with the response to a Mediterranean-based weight loss program

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Introduction: Increased DNA methylation in gene promoters has been generally associated with gene silencing. A CpG-SNPs is a SNP that introduces a CpG site. Some CpG-SNPs may affect the expression of the gene by interfering with the binding of certain proteins or by altering DNA methylation, and some of them have been associated with insulin resistance and diabetes. This study examines, in obese subjects under dietary restriction, several CpG-SNPs previously associated with obesity-related traits

Objectives: The objective was to analyse if these CpG-SNPs add or remove potential sites of DNA methylation and if they are associated with differential DNA methylation or mRNA expression levels. Also, this investigation examined the relationship of these CpG-SNPs with anthropometric changes and inflammatory parameters

Method / Design: Fourty-seven volunteers (mean age 49±1 y) were selected within the RESMENA study (Navarra, Spain). Anthropometric and inflammatory measurements were assessed at the beginning and after 8 weeks of weight-loss treatment. DNA was isolated from white blood cells at baseline and 9 obesity-related trait CpG-SNPs were genotyped by TaqMan-PCR. DNA methylation levels of the selected CpG-SNPs were quantified by Sequenom MassArray® EpiTyper™ and MS-HRM approaches

Results: Seven of these CpG-SNPs, located in the candidate genes UCP1, POMC, BDNF, SH2B1, FTO, IL6R and CRP, were associated with differential DNA methylation of the CpG-SNPs or surrounding CpG sites. The CpG-SNP rs7359397, located in the SH2B1 gene, was associated with the body weight change and the response to the energy-restricted program. In addition, some specific CpG-SNPs were related with circulating inflammatory markers, such as PAI-1, TNFα and CRP

Conclusions: Our results reveal the interaction of epigenetic and genetic variations in CpG-SNPs, especially in SH2B1, and that differential methylation levels may contribute to elucidate the molecular mechanisms through which some SNPs are affecting gene expression and contributing to inflammation and body weight control

Keywords: (maximum 5): CpG-SNP, DNA methylation, obesity, body weight, inflammation

149/782. The effect of carrots biofortified with iodine on thyroid hormons level in rats' serum

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Introduction: It is well known that almost two billion people around the World suffer from iodine deficieny (among this less than 300 million children). Data on iodine content in vegetables and possibility of their enrichment in this element are relatively uncommon.

Objectives: The aim of this study was to investigate the effect of the addition to the experimental diets carrots biofortified with iodine on the level of triiodothyronine (T3), thyroxine (T4), the thyroid stimulating hormone (TSH) in the serum of laboratory rats.

Method / Design: Five week old albino Wistar rats, were divided into 6 experimental groups (n=8). Group I was fed AIN-93G diet. Group II was fed AIN-93G diet in which the iodine was added as solution of KI directly to diet (mineral mixture without iodine). Group III was fed AIN-93G diet with raw biofortified carrots, group IV - AIN-93G diet with raw non-biofortified carrots, group V – AIN-93G diet with cooked biofortified carrots, group VI - AIN-93G diet with cooked non-biofortified carrots. In diets containing biofortified carrots, the only source of iodine were carrots (mineral mixture was without iodine). After 5 weeks rats were anaesthetized and blood was collected to obtain serum. The level of T3, T4, TSH was measured with commercially available kits.

Results: T3 level was significant increased in serum of rats from group III as compared to the rodents from groups I-II and IV-VI. T4 level was the highest also in group III, and the lowest level was determined in rats from group VI. The highest level of TSH was observed in group VI (with cooked non-biofortified carrots).

Conclusions: The biofortified carrots changed the level of thyroids hormones which are necessary proper function of human body.

This work was financed by the 2012–2015 Polish National Science Center grant no. DEC-2011/03/D/NZ9/05560

Keywords: (maximum 5): iodine, biofortification, thyroid hormones, carrot

149/790. Variations in metabolic and inflammatory biomarkers during pregnancy: a new nutritional perspective

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Introduction: Many metabolic and inflammatory parameters vary during pregnancy. Platelet-activating factor (PAF) is a mediator of platelet aggregation and degranulation, inflammation and anaphylaxis. B cell activating factor (BAFF) is a member of the TNF superfamily and an important regulator of peripheral B cell survival and immunoglobulin class-switch recombination. Adiponectin is one of the most abundant adipose-derived hormones, well-known for its insulin-sensitizing activity. All of them can be modulated by nutritional habits.

Objectives: The aim of this study is to evaluate the trend of these inflammatory markers over the three trimesters of pregnancy. The present work is a part of a wider research (GRAAL) about mechanisms underlying changes in immune system and their relation with nutrition during pregnancy.

Method / Design: We measured the concentration of PAF, BAFF and adiponectin in sera of 98 pregnant women (mean age 33.4 ± 0.5 years) at the 16th, 32nd and 39th week of gestation.

Results: PAF decreases from 5.09 pg/ml in the first trimester to 3.84 pg/ml and 3.86 pg/ml in the second and third trimester ($p<0.05$). Similarly, BAFF decreases from 0.71 ng/ml in the first trimester to 0.59 ng/ml and 0.55 ng/ml in second and third trimester ($p<0.05$). These significnat changes are paralleled by adiponectin that decrease from 11687 ng/ml in the first trimester to 8543 ng/ml and 7560 ng/ml in the second and third trimester ($p<0.001$).

Conclusions: A reduced concentration of BAFF and PAF during the second and the third trimester, should be interpreted as the reduction of inflammation leading to a better tolerance towards the fetus. From the evolutionary point of view, the corresponding reduction of adiponectin levels should favor the storage of energy of the mother, to allow for a protected fetal growth.

Keywords: (maximum 5): Pregnancy, Inflammation, BAFF, PAF, Adiponectin

149/791. Tomato in the diet and the impact on GALT

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Introduction: Bioactive compounds present in tomato fruits would have an impact on the immune-competence, especially in lamina propria of the intestinal villi.

Objectives: Our aim was to evaluate the effect of tomato intake on GALT by means of a Wistar rat model in active growth period and protein malnutrition status.

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Method / Design: Four groups of well-nourished rats at weaning were used; two of them were fed with a protein-free diet until 25% of initial body weight loss. The re-nutrition was achieved with an experimental diet containing 20% of casein (Re-nourished group = R). The second group received the same diet plus tomato (+5% of alpha-tocopherol according to AIN93; RT group) during 42 days. Two well nourished groups were fed 20% casein diet with and without tomato (CT and C) during the experimental period. IgA+B cells in intestinal villi and the proinflamatory cytokines IFNgamma and TNFalpha were measured.

Results: The IgA+B cells resulted significantly lower ($p<0,05$) for the CT group (63.6±4.7) vs. the C (83.6±4.7) one but no difference were observed between the RT vs. R groups. TNFalpha showed a different pattern between well and mal-nourished groups; it was significantly lower in CT vs. C (991±319 vs. 2012±319 pg/ml; $p<0,05$) and more than 3X higher in RT vs. R (1757±285 vs. 548±319; $p<0.05$). IFNgamma presented the same pattern when comparing CT vs. C (160±44 vs. 860±75 pg/ml; $p<0.05$). These data suggest that tomato intake in well-nourished rats resulted in an antiinflamatory status that was no evident in mal-nourished rats. In this latter, the regulation of biochemical pathways involved in secretory immunity could be permanently affected during the protein deprivation period.

Conclusions: This suggests that previous nutritional status have to be taken into account for future recommendation of foods with recognized benefits for health due to their bioactive compound content.

Keywords: (maximum 5): tomato, gut associated lymphoid tissue (GALT), malnutrition

149/805. 1, 2, 3, 4, 6-penta-o-galloyl-β-d-glucose (pgg) a plant derivative substance as pepck (phosphoenolpyruvate carboxykinase) transcription inhibitor : a systematic review

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Introduction: Type 2 diabetes mellitus (T2DM) is the most common type of diabetes mellitus which accounts for 90% of cases globally and affecting more than 150 million people worldwide.1 Individual with T2DM is failed to suppress gluconeogenesis which then promote fasting hyperglycemia.2 Recent trials on plant derived 1,2,3,4,6-Penta-O-galloyl-β-D-glucose (PGG) highlight gluconeogenesis attenuation by PEPCK (Phosphoenolpyruvate Carboxynase) transcription inhibition.

Objectives: This review aims to identify the effect and mechanism of PGG to PEPCK transcription as a potential novel treatment for T2DM.

Method / Design: we conducted a systematic review in studies listed on PubMed, Science Direct, and Proquest. We included randomized controlled trials which investigate the effect of plants extracted PGG to PEPCK production in both in-vivo and in-vitro studies.

Results: 279 studies are screened, and 3 studies fulfilled the inclusion criteria. All studies show significant result on PEPCK transcription suppression by PGG. Two studies prove PEPCK transcription inhibition via insulin receptor (INR) activation and one study show via 11β-Hydroxysteroid dehydrogenase-1 (11β-HSD-1) inhibition.

Conclusions: Though more research is needed, it can be concluded that PGG inhibit PEPCK transcription by INR activation and 11β-HSD-1 inhibition. These findings prove that PGG is a potential herbal based novel therapeutic agent for T2DM.

Keywords: (maximum 5): pgg, pepck, nutrigenomic, diabetes mellitus, gluconeogenesis

149/835. Association between leptin and cortisol levels with craving in individuals under treatment for smoking cessation

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Introduction: Leptin inhibits cortisol release and may increase the craving for cigarettes, hindering the process of smoking cessation.

Objectives: Evaluate the influence of the initial concentration of cortisol and serum leptin on craving and smoking status in individuals after one month of treatment for smoking cessation.

Method / Design: Intervention study made in 2014 involving non-probabilistic sample of smokers in treatment for smoking cessation at the Interdisciplinary Center for Research and Intervention on Tobacco, University Hospital, Federal University of Juiz de Fora (CIPIT-HU/UFJF). The concentration of serum leptin at the beginning of treatment was determined by ELISA (Enzyme Linked Immuno Sorbent Assay) using specific kit of Millipore® brand. The leptin concentration was adjusted by the Initial Body Mass Index (BMI) (leptin/BMI) and the initial percentage of body fat (%BF) (leptin/%BF). The craving was assessed using the Questionnaire of Smoking Urges-Brief (QSU-Brief). The QSU-Brief was assessed about a score of factor 1 (positive reinforcement by tobacco), and factor 2 (negative reinforcement by tobacco).

Results: There was a correlation between the QSU-Brief initial (factors 1 and 2) with the initial concentration of leptin/BF% among those who continued smoking after 1 month (QSU-Brief: $r=0,497$; $p=0,014$; Factor 1: $r=0,434$; $p=0,034$; Factor 2: $r=0,042$; $p=0,030$). There was a negative correlation between cortisol levels and leptin/%BF in individuals who remained smokers after 1 month ($r=-0,442$; $p=0,031$). The individuals who presented higher leptin concentrations showed

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higher scores of QSU-Brief (Factor 2), after 1 month of treatment (n=15 - 53.6%; p=0.030). There was a positive correlation between leptin/BMI and leptin/%BF with the QSU-Brief (Factor 2) of 1 month in women who remained smokers (r=0.565; p=0.023) and the QSU-Brief (Factor 2) initial among the abstinent women (r=0.551; p=0.033).

Conclusions: The highest concentrations of leptin were associated with greater craving and difficulty in achieve abstinence.

Keywords: (maximum 5): leptin, smoking, behavior addictive, substance withdrawal syndrome.

149/878. Betaine homocysteine methyltransferase exerts metabolic effects beyond controlling methionine homeostasis.

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Introduction: Betaine homocysteine methyltransferase (Bhmt) catalyses methionine production from homocysteine in liver. Methionine can be converted to S-adenosyl methionine (SAM), a methyl-donor for a multitude of methylation reactions. Bhmt deficient mice have been shown to have altered concentrations of liver and serum lipids. Upon dietary protein restriction (DPR) Bhmt expression is paradoxically downregulated in spite of a proposed methionine sparing effect of Bhmt.

Objectives: The aim of the study was to elucidate the effects of a reintroduction of Bhmt in a natural setting of low Bhmt expression, i.e. during DPR, and evaluate its metabolic effects.

Method / Design: Adenoviral mediated overexpression of Bhmt in male C57Bl6/N mice fed a standard protein diet (20% protein) or a protein restricted diet (5% protein): Eight week old mice received either Ad-Bhmt or Ad-NC. Experimental diets were switched the day after and given ad libitum for eight consecutive days until sacrifice. Six mice were assigned to each of the four conditions (n=24).

Results: Overexpression of Bhmt in the liver of mice results in liver enlargements by ~15-20%. Liver SAM, SAH and SAM:SAH ratio as well as plasma and liver methionine and homocysteine were not affected. Similarly, lipid metabolites such as triglycerides and choline containing phospholipids were largely unaffected by overexpression of Bhmt. However, plasma levels of glycine and serine were reduced in protein restricted mice overexpressing Bhmt.

Conclusions: Bhmt overexpression resulted in only subtle changes in metabolic outcomes normally associated with the function of Bhmt. During DPR Bhmt may help to regulate plasma glycine and serine levels, a novel function of Bhmt beyond controlling methionine homeostasis.

Keywords: (maximum 5): Bhmt, amino acid metabolism, dietary protein

149/888. Effects of three probiotic strains on the intestinal microbiota composition of Zucker rats

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Introduction: Current attempts to manipulate the gastrointestinal microbiota focus on finding remedies for several health disorders. Probiotics are consumed as treatments for various gastrointestinal tract dysfunctions. However, their actual ability to affect gut microbiota is still under debate

Objectives: We investigated the effects of L. paracasei CNCM I-4034, L. rhamnosus CNCM I-4036 and B. breve CNCM I-4035 feeding on the fecal microbiota composition in a genetic animal model of obesity

Method / Design: Forty-eight Zucker-Leprfa/fa and 16 Zucker-lean+/fa male rats weighing 168-180 g were used. Eight Zucker-lean+/fa and 8 Zucker-Leprfa/fa rats were euthanized (baseline). The remaining 40 Zucker-Leprfa/fa rats were randomly assigned to receive 1010 CFUs of one of the three strains, a mixture or a placebo by oral administration each day for 30 days. An additional group of 8 Zucker-lean+/fa rats received placebo for 30 days. Fecal samples were taken to perform fluorescence in situ hybridization (FISH) and 16S rRNA gene pyrosequencing. Lipopolysaccharide binding protein (LBP) was measured in serum

Results: FISH analysis of the feces revealed changes in bacterial groups. Bacteroides group increased in obese rats that received B. breve, L. rhamnosus or the mixture of two probiotic strains. Closdridium perfringens and Closdridium difficile increased in the feces of both obese rats fed L. paracasei and lean rats fed the placebo. Compared with obese rats fed the placebo, 16S rRNA sequencing found the following reductions: Parabacteroides in rats fed L. rhamnosus, Leptospiraceae in rats fed L. paracasei, Halanaerobiaceae in rats fed B.

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breve, and Anaplasmataceae in rats fed the mixture. LBP significantly decreased in rats fed L. rhamnosus or the mixture.

Conclusions: Results obtained suggest that feeding Zucker-Leprfa/fa rats with these probiotic strains modified the fecal microbiota composition and reduced the serum levels of LBP.

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Keywords: (maximum 5): Intestinal microbiota, probiotics

149/898. Energy expenditure in patients with short bowel syndrome: a doubly labeled water study

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Introduction: Short Bowel Syndrome (SBS) is a set of signs and symptoms resulting from nutritional and metabolic alterations due to extensive resection of the small intestine, and represent one of the most severe states of malabsorption.

Objectives: To compare the total energy expenditure (TEE) measured by the doubly labeled water (DLW) method with its estimate by an activity monitor in SBS volunteers and control group.

Method / Design: Eleven volunteers (6 women, 5 men) were evaluated with SBS and a control group (CG) with volunteers without SBS, with similar characteristics (gender, age, ethnicity, BMI) of SBS group. Dose of DLW (2g of 10%18O-labelled and 0.12g of 99.9%deuterium-labelled water/Kg estimated total body water) was ingested by the volunteers after collecting a dose of basal urine. TEE measured (DLW) was compared with its estimate by activity monitor activPALTM (14 days). MET obtained by the monitor was multiplied by the resting energy expenditure (REE), measured by indirect calorimetry and was considered the thermic effect of food (10%). Pearson´s correlation and Intraclass Correlation Coefficient to compare energy expenditure (p- 0.05).

Results: Age was 53±8 years for both groups. REE showed no significant differences. TEE (DLW) showed a significant difference between groups (p< 0.01): 1835±276kcal for SBS and 2396±448kcal for CG. Estimated TEE was 2058±301kcal for the SBS and 2199±340kcal for the CG without significant difference between groups. There was a moderate positive correlation between TEE (DLW) and estimated in both groups (r=0.726, p=0.01 in the GC; r=0.771, p=0.005 in SBS).

Conclusions: TEE estimated overestimates energy expenditure by 9.8% of the measured value in SBS group, and underestimates at 8.2% in CG. Use of activPALTM monitor could be considered a good method for the determination of TEE in these individuals, once presented a good correlation with the values recorded by the DLW method.

Keywords: (maximum 5): short bowel syndrome, energy expenditure, doubly labeled water

149/909. Effect of maternal low quality protein diet on fetal growth and development

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Introduction: A large body of evidence have shown the adverse effects of sub-optimal intra-uterine environment on fetal growth and development in epidemiological and animal studies. In this context many studies have indicated the influence of maternal low protein diets on fetal programming. However the effect of a maternal low quality protein diet on fetal growth and development is unknown.

Objectives: The main objective of this study was to examine the effect of maternal low quality protein diet on fetal growth and development

Method / Design: Wistar rats (11 weeks old) were mated and maintained on either chow diet with 20 % casein (n=6) as the control group (C), or low quality protein diet with 20 % wheat gluten as the experimental group (W). At the end of lactation offspring were kept on chow diet with 20 % casein until 20 weeks old. Food intake and body weight were recorded daily. Plasma and tissue samples were stored at -80°C after culling.

Results: Maternal body weights were similar in both groups throughout the study (C:245.06±6.46 g, W: 249.28±5.46, P>0.05). Despite similar body weights, W group consumed significantly lower amount of food when compared to C (C:25.09±0.51 g, W: 23.59±0.43, P=0.03). Although birth weight of offspring was significantly higher in W group (C:5.65±0.06 g, W: 5.81±0.05, P<0.001), their body weight decreased during lactation when compared to C group (C:21.88±0.43 g, W: 20.79±0.36, P=0.05).

Conclusions: Plant based protein comprises important part of protein intake in developing countries such as Turkey. It is well-known that these diets can be inadequate in terms of essential amino acids. Current study showed differential effects of maternal low quality protein diets on fetal outcomes. Future studies will examine further aspects of the influence of maternal low quality protein diets on fetal growth and development.

Keywords: (maximum 5): fetal programming, low protein quality, pregnancy

149/964. Effects of weight loss on lipoproteins oxidizability in adult male with metabolic syndrome

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Introduction: Patients with metabolic syndrome have an increase of general low grade inflammation and consequently an increase of oxidative stress that affects properties and functions of lipoproteins. Intentional weight loss can improve or prevent many of the obesity-related risk factors and these metabolic benefits are often found after weight loss of 5% of initial weigh.

Objectives: The aim of this study was investigate the composition and the oxidizability of lipoproteins in a group of 25 adult males with metabolic syndrome before and after weight loss of at least 5% of their initial weight following a hypocaloric diet.

Method / Design: Core and surface of LDL and HDL were labeled with selective pyrenic probes. Susceptibility to 2,2'-azobis-2-methyl-propanimidamide-dihydrochloride-induced peroxidation was measured following kinetically the decrease of fluorescence of the probes. Lipoprotein contents of proteins, cholesterol, phospholipids and triglycerides were determined by colorimetric assays.

Results: After weight loss there was an improvement in the core of HDL oxidizability with an increase of lag-time (from 3.9 minutes to 8 minutes) and a reduction of the velocity of propagation of peroxidation (from 1.74% decrease/min to 1.42% decrease/min). Parallel but opposite, there was a worsening in the susceptibility to peroxidation of the core of LDL with a reduction in lag-time (from 17.8 minutes to 8.5 minutes) and an increased propagation rate of peroxidation (from 0.82% decrease/min to 1.16% decrease/min). The susceptibility to peroxidation of the core of LDL and HDL appears to be especially influenced by their content of triglycerides.

Conclusions: The changes described here result in a redistribution of plasma lipids in the different lipoproteins classes, tending towards a more physiological condition and reversing the alterations induced by metabolic syndrome. After weight loss, the anti-atherogenic properties of HDL might appear enhanced, whereas LDL might seem more atherogenic.

Keywords: (maximum 5): Metabolic syndrome, Oxidative stress, Peroxidation, HDL, LDL

149/978. Shifts and functions of GI microbiota effecting epigenetic regulation of inflammatory mediators in metabolic syndrome

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Introduction: Metabolic syndrome is already known to be associated with an aberrant gut microbiota, and a systemic low-grade inflammation, which is also outlined by a differing epigenetic pattern.

Objectives: Thus, structural changes of gut microbiota leading to an aberrant DNA methylation pattern in metabolic syndrome, using weight loss intervention as a basis for potential therapeutic approaches and also for predictive therapies were of research interest.

Method / Design: We evaluated changes of the microbiota and epigenetic DNA methylation of TLR2 and TLR4 in three groups of subjects: type 2 diabetics under GLP1-Agonist therapy, obese individuals without established insulin resistance, and a lean control group. The fecal microbiota composition was analyzed for abundance and diversity by quantitative real-time polymerase chain reaction, and high throughput sequencing. The epigenetic methylation was analyzed using bisulfite conversion and pyrosequencing.

Results: An established indicator of the disparities in gut microbiota of metabolic syndrome is the ratio of Firmicutes /Bacteroidetes, known to be higher in obesity compared to lean phenotype. Main contributions derive from Lactobacilli, which are known together with Enterobacteria to affect low-grade inflammation in obesity and type 2 diabetes. However, other species, namely P. anaerobius, B. vulgatus, B. theatiotaomicron, F. prausnitzii, and A. muciniphila, Archaea, and genera (Alistipes spp., Prevotella) are also of interest.

The profile of bioactive microbial metabolites is known to affect epigenetic modification of receptors such as FFAR3 and inflammatory mediators (TLR4, TLR2). The Firmicutes/Bacteroidetes ratio affects low-grade inflammation by influencing the distribution of TLRs, affecting NFκ-B pathways. Butyrate, a well-known epigenetic modifier, influences the host via FFAR3, leptin and PYY and thus the hunger-satiety cycle.

Conclusions: In conclusion interventions on gut microbiota modulation affecting host metabolism via epigenetic regulation are of central importance in complex disease, not only in metabolic syndrome but also in diseases of e.g. the central nervous system.

Keywords: (maximum 5): Firmicutes/Bacteroidetes ratio, Lactobacilli, TLR4, TLR2, FFAR3

149/984. Ankle brachial index for the assessment of peripheral atherosclerotic disease in HIV-infected patients

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Introduction: Highly active antiretroviral therapy (HAART) has unquestionable benefits for HIV-infected patients. However, it has been observed some adverse effects related to it, such as body fat redistribution, changes in lipid and glucose metabolism and hypertension. This set of changes called lipodystrophy led to an increase in the risk of atherosclerotic disease.

Objectives: To evaluate the prevalence of peripheral atherosclerotic disease (PAD) through the ankle brachial index (ABI) in HIV-infected patients on HAART.

Method / Design: We evaluated patients of both genders aged 18 to 60 years. For the examination of ABI were measured systolic blood pressure in upper and lower limbs with the aid of a cuff and a portable Doppler apparatus 8 MHz. To calculate the right and left ABI was made the division between the highest value of systolic pressure of lower and upper limb. The ABI values were correlated with lipid and glucose tests.

Results: We evaluated 330 patients (43.0% female and 57.0% male) with a mean age of 43.98 (± 10.12) years. The mean ABI was 1.14 (± 0.32), whereas for females was 1.06 (± 0.34) and for male was 1.20 (± 0.31). PAD (ABI ≤0,9 or> 1.3) was present in 27.56% of patients (26.04% in females and 28.72% in males). The group with the highest prevalence of PAD was in males aged 51 to 60 years (43.33%). Among the patients, 11,8% had diabetes mellitus or impaired glucose tolerance, 25.45% hypertension, 26.66% high total cholesterol, 40.30% high triglycerides, 56.96% HDL cholesterol reduced, 31.51 % high LDL cholesterol and 30.60% impaired fasting glucose.

Conclusions: Our data are in agreement with previous studies, since the studied patients have a higher prevalence of PAD due of metabolic changes in HIV lipodystrophy syndrome.

Keywords: (maximum 5): HIV; lipodystrophy; peripheral atherosclerotic disease

149/1027. Modifications in the body due to chronic use of sucralose in young CD1 mice

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Introduction: Currently sucralose is used in many products, studies regarding its chronic use and effect on young subjects is limited, as well as changes in cell populations such as lymphocytes.

Objectives: To evaluate modifications in blood and lymphocytes due to chronic use of sucralose in young CD1 mice.

Method / Design: Thirty-two young (21 days old) male mice were divided into two groups: i) Control (CL), ii) Sucralose (SUC). 10g of sucralose in 240ml of water were administered for 9 weeks, water and food were offered ad libitum and registered, as well as body weight and length. Blood, spleen and Peyer's patches (PP) lymphocytes were obtained, calculating percentages. We analyzed blood glucose and carbonylated proteins in all tissues.

Results: Body weight in mice decreased with SUC consumption ($t=30.11$, $p<0.001$). BMI ($t=7.34$, $p<0.001$) food ($t=7.58$, $p<0.001$) and water intake ($t=7.26$, $p<0.001$) increased. Blood glucose did not change with SUC consumption ($t=1.85$, $p<0.107$). The percentage of lymphocytes from blood ($t=10.89$, $p<0.001$) and spleen ($t=6.29$, $p<0.001$) decreased, without differences in PP ($t=1.26$, $p<0.248$). The concentration of carbonylated proteins in lymphocytes ($t=0.781$, $p<0.460$), spleen ($t=0.035$, $p<0.973$) and PP ($t=0.509$, $p<0.627$) did not change significantly.

Conclusions: The chronic consumption of sucralose reduced body weight and increased BMI maybe due to the high food and water intake. In addition, the percentage of lymphocytes decreased significantly in blood and spleen. The carbonylated proteins, which are a biomarker of oxidative stress, did not increase. No changes in blood glucose were observed. Sucralose intake caused important changes in cells of the immune system.

Keywords: (maximum 5): Sucralose, consumption, young

149/1032. Postprandial chylomicron transport of endotoxins is modified by fat amount and structure in obese men

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Introduction: LPS, so-called endotoxins, are now recognized as a triggering factor of the low-grade inflammation observed in obesity. Recent findings revealed that digestion of a lipid-rich meal induces a postprandial endotoxemia contributing to increased metabolic risk. However, the possible nutritional modulation of postprandial endotoxemia by various fat amounts and emulsified structure remains largely unknown in humans, especially regarding the impact of BMI.

Objectives: We tested the hypothesis that the dietary fat amount and emulsified structure can modulate the postprandial endotoxemia by varying postprandial lipemia in humans of different metabolic status.

Method / Design: In a cross-over design, normal-weight (NW) and obese men ingested meals containing 10g or 40g spread fat or 40g emulsified fat. Endotoxemia was measured in plasma and chylomicrons during 8h, together with inflammatory mediators and LPS transporters.

Results: Chylomicrons increased in all subjects according to ingested fat amount ($P<0.01$), but only obese men had higher post-

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prandial endotoxemia after 40g fat (P<0.05). Their chylomicrons also got more enriched with LPS than in NW, with an earlier enrichment when fat was emulsified parallel to a faster intestinal lipid absorption (P<0.05). We observed neither NFkB translocation, nor IL-6 gene expression in leukocytes, regardless of BMI or meal. In both groups, fat amount did not modify postprandial response of plasma IL-6. However, postprandial AUC of IL-6 in obese was higher than in NW subjects (P<0.05) parallel to their higher fasting LPS-Binding Protein (LBP, P<0.05). In fact, postprandial AUC of IL-6 was correlated with LBP (P<0.01).

Conclusions: Fat amount contributes to modulate postprandial endotoxemia in obese subjects. The further endotoxin handling in plasma through chylomicrons can also be modulated by fat emulsified structure. Ultimately, LPS transporters appears to be critical in driving the acute inflammatory response. This can contribute to the long term low-grade inflammation in high cardiometabolic risk individuals.

Keywords: (maximum 5): Obesity; Endotoxin; Lipid; Intestinal absorption; Inflammation

149/1035. Serum fatty acids content of physical trained rats, fed low-protein diet supplemented with selected vitamins B

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Introduction: Protein malnutrition modifies composition and content of fatty acids (FAs) in tissues and body fluids. One of the supplements which may reduce negative role of protein deficiency are vitamins from B group.

Objectives: The aim of present study was to examine the effect of protein-deficient diet enriched with vitamin B2 or B6 on content and composition of FAs in the blood serum of rats treated with dosed physical exercise.

Method / Design: Two experiments there were conducted. Experiments lasted for 90 days and were performed on male Wistar rats. Animals were fed ad libitum with diet of energy value of 350 kcal/100 g in which 4.5% of energy was provided by protein. In control diet 20% of energy was provided by protein. Vitamin B2 and B6 have been added to the diet of 4.5 % energy from protein in amount 300% of their contents in the control diet. Half of rats from each group (20%, 4.5% or 4.5% with vitamins) were trained (1-hour run on a treadmill at a speed of 20 m/min) for 5 days a week.

Results: After 90 days of experiments protein deficient diet caused an increase of saturated fatty acids (SFA) and decrease of mono (MUFA) and polyunsaturated fatty acid (PUFA) sum. Supplementation of vitamin B2 did not affected SFA, MUFA or PUFA content, however vitamin B6 significantly decreased SFA sum in comparison to the diet of 4.5% from protein. Generally training caused an increase of SFA and decrease of MUFA content in all examined groups, except 4.5% group supplemented with vitamin B6.

Conclusions: Results of this study suggest that all investigated factors (protein deficiency, physical exercise and supplementation of vitamin B2 or vitamin B6) have a significant impact on fatty acids content of serum in rats.

Keywords: (maximum 5): Protein malnutrition, vitamin B2, vitamin B6, training, fatty acids

149/1052. The MAP3K4 SNP rs1534020 is associated with obesity and blood pressure in prepubertal children

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Introduction: The mitogen-activated protein kinases (MAPKs) pathways are activated by diverse extracellular and intracellular stimuli including oxidative stress and endoplasmic reticulum stress. Variations in genes encoding MAPKs (MAP2K5 and MAP3K1) have been previously associated with obesity. The gene MAP3K4 encodes the protein MEKK4 also called MTK1. Expression of MTK1 in mammalian cells activated the c-Jun N-terminal kinase pathway by environmental stresses.

Objectives: The aim of this study was to evaluate the association of 21 MAP3K4 polymorphisms with obesity risk and estimate the relationship with obesity-related phenotypes.

Method / Design: 532 children (292 obese and 240 with normal-BMI) were genotyped. Anthropometric data were measured and clinical, metabolic, inflammation and CVD biomarkers were analysed.

Results: All anthropometric, clinical and metabolic factors as well as inflammatory and CVD risk biomarkers were higher in the obese than in the normal-BMI group, except glucose, LDL-c and matrix metalloproteinase-9. We found four intronic polymorphisms (rs9355867, rs4559074, rs9365248 and rs1534020) associated with obesity. When we performed a Bonferroni correction only the rs1534020 maintained the association ((p = 0,034; OR = 2,17 (95% CI: 1,40–3,36)). Interestingly, the carriers of the rs1534020 risk allele had higher weight, diastolic and systolic blood pressure, and plasma fasting leptin levels after adjustment by sex and age. The variant in the MAP3K4 gene were not associated with any of the inflammation biomarkers analyzed, that would empathises the activation of the MAPK pathway by oxidative stress stimulus in the obesity and metabolic syndrome.

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Conclusions: We found a novel association of the rs1534020 MAP3K4 SNP with obesity in Spanish children. The risk of obesity in children carrying the minor allele G was double than in non-carriers. Additionally, the association of this allele with higher diastolic and systolic blood pressure could support the implication of MTK1 on blood pressure and oxidative stress previously described in vitro.

Keywords: (maximum 5): MAPKinases, oxidative stress, inflammation, childhood obesity

149/1100. Amylase gene CNV and carbohydrate digestion – A postprandial metabolic study

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Introduction: Human copy number variation (CNV) in salivary amylase genes (AMY1) is directly correlated to amylase expression in saliva. Increased quantities of salivary amylase may impact the rate and extent of starch digestion and glucose absorption, and the total energy obtained from available (digestible) carbohydrate. Persistently elevated levels of postprandial glycaemia and insulinemia can result in the development of insulin resistance, which may lead to weight-gain and increased body fat percentage which may increase predisposition to type-2 diabetes mellitus.

Objectives: To investigate whether CNV in AMY1 affects postprandial glycaemia and insulinaemia in healthy individuals, or is correlated to anthropometric markers including; Body Mass Index (BMI), percentage body fat, waist-to-hip ratio and waist circumference. Finally, we investigate whether there is a relationship between AMY1 CNV and habitual dietary consumption.

Method / Design: Healthy British subjects were recruited to a randomised, cross-over study. Participants were subject to two stages of recruitment; genetic screening and baseline health screening (n=71) prior to enrolment onto the postprandial study (n=42). Treatment order was randomly assigned, but each participant underwent a 4-hour oral glucose tolerance test (75g), and underwent the same procedures but with an equivalent dose starch meal, with a minimum 7-day washout period.

Results: Positive correlations were found between AMY1 copy number (CN) and BMI (kg/m2) (P= 0.0193, linear regression, adjusted for sex and age), AMY1 CN and dietary CHO intake as starch (%TE) (P = 0.0181). Whilst no linear relationship was found between glycaemic response iAUCstarch or iAUCglucose and CN using regression analysis, MANOVA analysis has revealed differences in peak c-peptidestarch response P = 0.009049).

Conclusions: Increased CN of AMY1 associates with increased starch consumption, which may be related to the observed increase BMI and body fat percentage. However, the relationship between AMY1 CN and postprandial glycaemia and insulinaemia presents a more complex relationship.

Keywords: (maximum 5): Genetics. Amylase. Carbohydrates. Glycaemia Obesity

149/1129. Untargeted metabolomics – methodology, pitfalls and recommendations for large-scale studies

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Introduction: Untargeted metabolomics is an increasingly popular approach for studying the effects of nutrition and other factors on human health and diseases as well as for the safety and quality evaluation of food. However, untargeted metabolomics is still demanding and many methodological, technical and statistical pitfalls have to be avoided to obtain valid and meaningful results, especially in case of large-scale studies. Here, some of the most crucial issues are discussed in order to encourage the community to scrutinise the outcomes of metabolomics studies critically.

Objectives: We summarize briefly the advantages of a multiplatform approach combining targeted and untargeted LC-MS, GC×GC-MS and 1H-NMR methods for comprehensive metabolome analyses. Additionally, issues like analytical variation, drift and offset effects, the number of detected metabolites, normalization strategies (e.g., for urine), quality control and the choice of the statistical tool will be discussed and their impact will be demonstrated based on selected results from our recent metabolomics studies. Finally, we present recommendations based on our own experience with the KarMeN (Karlsruhe Metabolomics and Nutrition) study as well as food metabolomics studies.

Method / Design: n/a

Results: n/a

Conclusions: Metabolomics is a powerful approach for all biological research disciplines, but it is still a developing field of work. An appropriate methodology, tight quality control measures and an experienced interdisciplinary team are indispensable in order to ensure valid results.

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Keywords: (maximum 5): untargeted metabolomics, large-scale studies, methodology, pitfalls, recommendations

149/1145. Evaluation of total energy expenditure in hiv-infected patients with lipodystrophy

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Introduction: Several studies have associated body composition changes found in the HIV lipodystrophy syndrome (HLS) with increased resting energy expenditure (REE). However, limited data exist on total energy expenditure (TEE).

Objectives: The aim of this study was to evaluate REE and TEE in HIV-infected patients using the doubly labeled water method (DLW).

Method / Design: We evaluate men on antiretroviral therapy (ART). The volunteers were divided into 2 groups: LIPO- (without HLS) and LIPO+ (with HLS). We measured: weight, height, BMI, body composition by bioelectrical impedance, REE by indirect calorimetry and the TEE by DLW. The viral load, TCD-4 and ART were obtained from the patients records. Data were processed using SPSS, $p<0.05$. To evaluate the correlation between the variables, we employed Pearson correlation test.

Results: We evaluate forty-five men with a mean age of 45,9 (± 7,2) years. The groups LIPO- (n:18) and LIPO+ (n:27) were similar for CD4 count, viral load and ART time. There were no difference between the groups in BMI, %FM and FFM. REE of the groups LIPO- and LIPO+ was 25,2 ± 3,3 versus 26,9 ± 3,1 kcal/Kg FFM, respectively and TEE was 44,7 ± 9,6 versus 45,4 ±7,4 kcal/ kg FFM, respectively. REE was positively correlated with BMI and FM (kg) ($r = 0.36$ and $r = 0.52$, respectively) and TEE was positively correlated with FM (kg) and FFM (kg) ($r = 0.5$ and $r = 0.7$, respectively).

Conclusions: HIV lipodystrophy syndrome did not change the REE and TEE. REE contributed with 56.5% of TEE in HIV-infected patients.

Keywords: (maximum 5): lipodystrophy, HIV, total energy expenditure, doubly labeled water

149/1155. Vitamin D analogue's effect on Metabolic Measurements in obese participants

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Introduction: Compelling evidences demonstrated that metabolism disorders considered as main factor contributing to the obesity. Previous studies shown that the intake of some nutrients could influence on the involved proteins in metabolism pathways.

Objectives: The aim of this double blind clinical trial study is to investigate the alphacalcidol treatment affected on metabolic rate through changes of involved protein in 3 pathways: PGC1α and important involved enzymes in metabolism including ACC and FASN, PPARγ and nesfatin-1 and finally oxidant balance in obese subjects.

Method / Design: A total of 96 obese participants (BMI ≥30) were recruited for the current double blind clinical trial study. Patients were divided into two intervention (N=51) and control groups (N=41) based on the stratified randomized method. One-Alpha®: alfacalcidol (1-α hydroxyvitamin D3) capsules 0.25 microgram (n=15), 0.5 microgram (n=15), and 1 microgram (n=25), and placebo were given to subjects once a day for 8 weeks.

Results: Our results demonstrated that RMR level was increased significantly in group that received the 0.5 mg/day alfacalcidol. We also found a significant association between weight, BMI and circulating 25-OH vitamin D changes in the mentioned group. Our results demonstrated the significant interaction between circulating PGC1α and 25-OH vitamin D on RMR change. We also found a significant association between PGC1α and PPARγ alterations among groups. Regarding to antioxidant enzymes levels, there was significant correlation among all of them. The glutathione reductase and glutathione peroxidase were significantly decreased in intervention group that received the 0.5 mg/day alfacalcidol in comparison with the control group.

Conclusions: We conclude that alfacalcidol treatment with 0.5 mg/day may be effective in amelioration of the weight reduction state and involved pathways in metabolic rate in obesity. Further experimental study may clarify the alfacalcidol role in weight loss etiology through metabolism regulation.

Keywords: (maximum 5): Obesity, Alfacalcidol, PPARγ, PGC1α, nesfatin-1, antioxidant enzymes

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149/1188. Evolutionary Physiology: Deducing Selection Pressure of Cyp2R1, a Vitamin D Metabolizing gene

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Introduction: The downstream metabolism of vitamin D involves a enzyme, Cyp2R1, which converts cholecalciferol to 25-dehydroxy cholocalciferol. The product than subsequently metabolize to multiple intermediates that manifest the effect of vitamin D in human physiology.

Objectives: The present study is designed to purpose potential structurally and functionally important residues by calculating the selection pressure on amino acids of Cyp2R1 protein.

Method / Design: Nucleotide sequences of orthologues of Cyp2R1 were retrieved from the NCBI database. The sequences were aligned using ClustalX and indels were removed in line with codon alignment to avoid the artificial frame shift. The alignment files were further subjected to deduce the synonymous (dS) and non-synonymous (dN) mutations. The integral ratio was employed to quantify the nature of selection pressure using HyPhy. Finally, the atomic coordinates of the molecule were used to plot the positively selected sites on the three dimensional structure of the protein.

Results: In the Cyp2R1, of total 501 residues, 9 amino acids were found under positive selection which includes: Tyr149, Asp167, Glu216, Glu298, Trp321, Ile340, Asp410, Arg424 and Phe459. This reflects much constrained selection pressure in the Cyp2R1 protein. Of the 9 positively selected sites, 3 sites (Trp321, Ile340 and Phe459) are located inside the cavity(ies) and clefts. The presence of two aromatic amino acids in the clefts further points that these sites are potentially important for the catalytic activity of the enzyme. The remaining positively selected residues are the part of helices and side chain pointed to the surface of the molecule indicating their structural significance.

Conclusions: The results here suggest points to the structurally and functionally important sites in the Cyp2R1 molecule, which could be used to determine the mechanistic detail of its working.

Keywords: (maximum 5): Vitamin D, Cyp2R1, Cyp27B, natural selection, mutations

149/1214. Hepatic AMPK and its role in energy metabolism under high-protein diet

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Introduction: High protein diets are recognized to reduce food intake, body fat gain and hepatic lipogenesis. The protein kinase AMPK is involved in the transduction of both amino acid signals and energy sensing in the liver.

Objectives: This study aims to define the role of this protein in energy metabolism adaptation in response to the variation of amino acid intake. We, therefore, compared the metabolic responses of wild type (WT) and liver-specific AMPK-KO (KO) mice to a low, normal and high-protein diet.

Method / Design: 48 WT and 48 KO 7-week-old male mice were respectively split in 3 groups (N=16/group) fed during 3 weeks on a low (5%, LP) normal (14%, NP) and high (55%, HP) protein diet. Food intake was measured, body composition was followed by DEXA and changes in the rates of glucose and lipid oxidation were assessed by indirect calorimetry in the fed state. At the end of the test, two or four hours after meal onset, mice were euthanized and organs were collected for biomolecular analyses.

Results: At the end of the test, KO mice exhibited and lean mass weight than WT mice. When fed the NP diet, KO mice ate more and deposited less triglycerides in the liver compared to WT mice. Results from indirect calorimetry showed that in KO mice fed the HP and LP diets the increase in glucose oxidation in the fed state were of lower amplitude than in WT mice.

Conclusions: The consequences of the deletion of liver AMPK on energy metabolism depend on amino acid intake. Indeed, it leads to a decrease in glucose oxidation in KO mice under LP and HP diets but not under NP. Besides that, KO mice exhibited a blunted ability to deposit lean mass proving a central role of liver AMPK in whole body metabolism

Keywords: (maximum 5): amino acids, AMPK, high-protein diet, energy metabolism

149/1231. FNDC5 polymorphisms and cardiovascular risk factors and disease. Modulation by Mediterranean diet and physical activity

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Introduction: Irisin, also called the exercise hormone, is a novel myokine that drives adipose tissue 'browning', increases energy expenditure, and improves obesity and insulin resistance in high fat-fed mice. However, its role in humans is only now emerging with the limitation that ELISA kits used to measure plasma concentrations are not specific. Irisin is released upon cleavage of the plasma membrane protein fibronectin type III domain-containing protein 5 (FNDC5).

Objectives: To study the association between FNDC5 gene variants (as proxies of their functionality) and cardiovascular risk factors and disease (CVD), as well as their modulation by diet and physical activity (PA).

Method / Design: We analyzed the participants in the PREDIMED-Valencia Study (n=1094, aged 67+/-7 years), a randomized controlled trial aimed at assessing the effects of the Mediterranean diet (MedDiet) in the prevention of CVD. Risk factors were measured at baseline and incidence CVDs was assessed after a median of 4.8 years follow-up. FNDC5 variants (rs1746661, rs3480 and rs12074852) were determined. PA and adherence to MedDiet at baseline were measured by validated questionnaires.

Results: The rs12074852 variant was not polymorphic. The rs1746661 C>A (MAF:0.2) and rs3480 C>G (MAF:0.41) polymorphisms were in partial LD. These polymorphisms were not associated with diabetes or incidence of CVD (P>0.05 for both). At baseline, various significant associations were found with lipids (i.e. rs3480 and HDL-C: 52.1+/-0.5 in CC+CG vs 49.2+/-0.9 mg/dL in GG; P=0.006, in the adjusted model for sex, age and diabetes), and oxidative stress markers (rs3480 and glutathione peroxidase: P<0.006). Moreover, PA modulated the association of the rs3480 with HDL-C, fasting glucose and triglycerides, being higher with higher PA. MedDiet modulated the association with lipids.

Conclusions: Our results suggest that the association between FNDC5 polymorphisms and metabolic parameters is modulated by PA and, to a lesser degree, adherence to MedDiet.

Keywords: (maximum 5): Irisin, Mediterranean diet, physical activity, genes, cardiometabolic

149/1248. Pectin decreases the postprandial blood glucose increment by decreasing free water in the intestinal contents

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Introduction: Pectin increased the viscosity of the digesta supernatant and slowed the diffusion of glucose in the intestinal lumen, lowering the postprandial blood glucose. The diffusion of glucose, which modulates glucose absorption and postprandial blood glucose, depends negatively on the levels of solid particles. Therefore, the viscosity of the digesta including particles is important when discussing postprandial blood glucose.

Objectives: This study examined the association between the diffusion of glucose in the intestinal lumen and the viscosity and free water content of the digesta, including solid particles, in the intestinal lumen when pectin is added.

Method / Design: We measured the viscosity of the gastric, small intestinal, and cecal contents in Sprague–Dawley rats fed pectin or nothing additional using a cone-plate viscometer (Brookfield), and measured the postprandial plasma glucose in anesthetized rats. The diffusion coefficient of glucose in artificial digesta was measured using capillary methods. The free water content (T1 and T2), diffusion coefficient of water (ADC), and viscosity of the artificial digesta were measured using MRI (Toshiba) and a viscometer. The effects of T1, T2, ADC, and viscosity on the diffusion coefficient of glucose were analyzed using a Bayesian network and regression tree.

Results: The addition of pectin reduced the viscosity of the gastrointestinal contents, including solid particles (p<0.05). The postprandial plasma glucose level was lower with added pectin compared with the control (p<0.05). The Bayesian network showed that the diffusion of glucose in the artificial digesta was affected by free water, ADC, and viscosity. The regression tree showed that the diffusion of glucose depended mainly on the free water content and ADC.

Conclusions: Viscosity cannot explain the diffusion of glucose in the lumen when pectin is added. The lower free water content with pectin decreases the postprandial increment in the blood glucose level.

Keywords: (maximum 5): Free water, viscosity, behavior of glucose, postprandial blood glucose, rats

149/1270. Determination of Hippuric acid by LC-MS: Results from NUHEAL cohort.

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Introduction: Profiling of urine has found hippuric acid (HPPA) as a distinguishing feature with a strong association with diet and the intestinal microbiota, so its accurate determination results very interesting.

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Objectives: Our aim was to evaluate HPPA levels in urine samples from children to establish possible relationships between HPPA levels, children's country of origin (diet, lifestyle, etc.) and mothers' type of supplementation received by during pregnancy.

Method / Design: 136 German and Spanish urine samples obtained from children aged 7.5, participants in the NUHEAL trial, and born to mothers who received fish oil (FO), 5-methyl-tetrahydrofolate (5-MTHF), both or placebo (from gestation week 20 until delivery), were analyzed by a powerful reverse-phase LC-ESI-IT MS method by using a Zorbax C18 analytical column (4.6x150 mm, 1.8 µm particle size). Apart MS, DAD and fluorescence were used as detectors. A systematic evaluation of the analytical parameters describing the performance of the method was carried out to establish HPPA detection and quantification limits, linearity, calibration range, repeatability, etc.

Results: In German samples HPPA concentration fluctuated within the range 34.6-649.88 mg/l (being the mean value 295.99 mg/l), whilst in Spanish samples the levels varied between 10.80 and 599.81 mg/l, with a mean value of 146.30 mg/l, presenting a distribution with most of the samples laying at lower levels than in the German extracts; this fact is in agreement with previously published results. Relationships among HPPA levels, diet and country of origin is under evaluation, as well than possible long-lasting effects on HPPA levels in relation to the different supplementations received by the mothers during pregnancy.

Conclusions: The data obtained indicate that HPPA concentrations are influenced by lifestyle, diet and country of origin.

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Keywords: (maximum 5): Hippuric acid, metabolomics, LC-MS.

149/1281. Taste perception and weight in children - gender differences

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Introduction: Childhood obesity is an increasing problem, and is affected by a multitude of interacting factors. Recent evidence suggests that taste perception may differ between obese and normal weight children. Evidence also suggests that perception of sweet and bitter taste is linked to differential food liking of various foods. Genetic variation in bitter taste perception may affect overall taste, but evidence has been mixed. Gender has also been suggested to play a role in taste perception.

Objectives: To determine whether children classified as overweight or obese, vs normal weight, differ in their taste perception.

Method / Design: Data was collected from the Tastebuddies Study, which examined detailed dietary intake, healthy eating awareness, and anthropometry in 525 children aged 7-13 in Ireland. A range of detailed taste intensity perception measures were collected, using 5 and 15% w/v sucrose solutions, filter paper discs containing 3.2mM PROP solution, and discs containing 1 M NaCl solution. Children were trained on how to use a generalized Labelled Magnitude Scale (gLMS) and rated their intensity of the sweet, bitter and salt stimuli. To gauge overall perception, a total taste perception (TTP) measure was calculated from all the ratings. Children were grouped into normal weight, and overweight/obese, based on z-scores. TTP was examined across groups stratified by gender, using t-tests in SPSS v20 for Mac (IBM).

Results: Overweight/obese males had a significantly greater TTP than normal weight boys. This effect was not observed in females.

Conclusions: Taste intensity perception is linked to risk of overweight/obesity in boys. Gender differences are also an important consideration for future taste research.

Keywords: (maximum 5): Taste, sweet, bitter, PROP, BMI

149/1315. Functional dynamics of gut microbiome after dietary intervention in obese.

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Introduction: During the last years, the wealth of biological information aimed at understanding the complex dynamics and molecular mechanisms of the beneficial effects of gut microbiome transfer on insulin resistance in obese has primarily relied on 16S rRNA gene sequencing that have failed to provide any conclusive identification. Our previous work showed that gut microbial glycoside-hydrolases (GH) activity is 10-times higher in obese and significantly correlate with fasting glucose, insulin resistance and body mass index (BMI) in obese.

Objectives: We hypothesized that a functional approach is needed to characterize the active microbial community that transmits this metabolic capacity.

Method / Design: To ascertain who they are by what they do, we sorted fluorescencently-activated beta-galactosidase positive cells from 8 lean and 13 obese subjects that followed a dietary intervention for 1 year.

Results: In total gut microbial community, dietary intervention only increased taxa and reduced evenness in obese. Concerning active

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microbiota, four key observations were made. Active community is less shared among indivuals. Second, the active community possess a higher degree of plasticity than previously assumed. Third, dietary intervention is a strong driving force that completely reshapes the obese active microbial community. β-diversity Unifrac metrics show that dietary intervention generates a microbial community similar to lean assembly. Actinobacteria were 19.7-fold concentrated in the active community. Bacteroidetes 4.3-fold; Proteobacteria 5.3-fold; Cyanobacteria 213-fold; Verrumicrobia 6860-fold. Highly abundant Firmicutes cluster contributed 0.62-fold. Still, lean and obese-treated communities possessed significantly different levels of GH activity, BMI>24.5 acting as a functional frontier.

Conclusions: This is the first report to identify the functional gut microbiome and its membership contribution. Our findings indicate that dietary intervention strongly reshapes the active gut microbiome while retaining different functionality levels depending on host BMI.

Keywords: (maximum 5): gut microbiome, functional bacteria, community dynamics, glycoside-hydrolase

149/1361. Hepatoprotective effect of winter savory extracts obtained by supercritical extraction and spray drying

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Introduction: Satureja montana L. belongs to a very important family of medicinal plants, the Lamiaceae family. This herbal species, commonly known as winter savory, is widely spread in the Balkan region. Due to pharmacologically significant chemical composition, S. montana and its extracts possess noteworthy biological activity which was proved in numerous articles.

Objectives: The aim of this study was to evaluate the hepatoprotective potential of extracts, obtained by the spray drying process and supercritical fluid extraction, in a carbon tetrachloride (CTC)-induced liver toxicity mouse model.

Method / Design: In vivo investigation of antioxidant properties of S. montana extracts encompassed monitoring of biochemical parameters (derived from liver homogenate and blood hydrolyzate) and examination of potential hepatoprotective effect after intoxication with CTC. Biochemical tests included determination of activity of several antioxidant enzymes: xanthine oxidase, catalase, peroxidase, glutathione peroxidase, amount of reduced glutathione and intensity of lipid peroxidation. In order to obtain data about potent hepatoprotective effect of examined extracts, following parameters were determined: AST, ALT, bilirubin, hepatic DNA and hydroxyprolin. Both extract were chemically characterized by chromatography/mass spectrometry (GC/MS) analysis.

Results: The results of this study indicate that SDE(spray dried extract) and SFE(supercritical fluid extract) have a potent hepatoprotective action against CTC-induced hepatic damage in mice.

Conclusions: Despite the fact that in vitro results have confirmed direct antioxidant activity of examined extracts, it is not transparent whether this might also be the case in vivo. In addition to in vitro antioxidant effect, a possible mechanism of S. montana extracts as hepatoprotective agents may reduce the activation of CTC into the reactive form. The changes noticed in various enzyme activities may also indicate an indirect antioxidant effect due to engagement of both CTC and extract component(s).

Keywords: (maximum 5): winter savory, hepatoprotective, spray drying, supercritical extraction

149/1363. A Human Model? Analyzing Vitamins A, D and E in Dogs

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Introduction: Dogs suffer spontaneously from many of the diseases that humans have but as they live shorter lives they get them sooner. Dogs live in homes, so diet interventions can be conducted in the human environment and they eat only what humans give them and can eat the same food for years. All these reduce confounding factors and allow possible generalisations onto humans.

Objectives: To establish canine reference values for vitamins and to see how they compare with human values so that pet dogs could be used as a model in diseases that humans and dogs share and where lipid-soluble vitamins would be analyzed.

Method / Design: Serum samples for vitamin analysis were collected from 28 healthy dogs. Dogs were diagnosed as healthy using clinical examinations, haematology and serum biochemistry. Vitamins A, D and E from the serum were measured with human protocols using reversed phase high-performance liquid chromatography in a human laboratory.

Results: Canine reference values compared well with human values for vitamins A: 3.92 µmol/l (95% CI; 3.49-4.35) and D: 63.26 nmol/l (95% CI; 54.83-71.69). Vitamin E was a bit higher than normal human values 112.25 µmol/l (95% CI; 91.47-133.03), maybe due to Vitamin E enriched oil supplements frequently used by the dogs.

Conclusions: As the canine serum concentrations of vitamins A, D and E are similar to those of humans and can be measured using the human protocols this could be an indication of an at least somewhat similar metabolism. This needs, however, to be studied further. Canine diet interventions could offer valuable results in a simpler and

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quicker format compared to human studies and it would be possible to evaluate lipid-soluble vitamins in these trials.

Keywords: (maximum 5): Diet intervention; animal model; vitamin reference range; canine vitamin metabolism; vitamin requirements

149/1368. Sardine and bogue protein hydrolysates improve the ability of HDL to protect LDL from oxidation in hypercholesterolemic rat

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Introduction: The oxidative modification of lipoprotein fractions particularly LDL and VLDL is thought to play an important role in atherogenesis.

Objectives: In this study, the protective effect of HDL against LDL oxidation was evaluated in hypercholesterolemic-rat diet treated with bogue or sardine protein hydrolysates

Method / Design: 18 adult male Wistar rats fed 20% casein, 1% cholesterol and 0.5% cholic acid where divided into three groups and received a daily gavage of 250 mg of sardine (SPH) or bogue (BPH) protein hydrolysates. The third group, named control group (CG) received in the same conditions water. Lipoproteins where fractionated by FPLC and antioxidant properties of HDL related to their apolipoproteins and enzymes were analysed.

Results: At d30 of experiment, SPH and BPH lowered cholesterolemia (-66%). With SPH, Cholesterol-HDL was 1.3-fold higher then CG values. EC-HDL contents were 1.6-fold higher with BPH but 1.6-fold lower with SPH. Compared with CG, phosphatidylcholine-HDL amounts were 1.3-fold higher with SPH whereas those of BPH where 1.3-fold lower. Sphyngomyelin-HDL contents where significantly increased by BPH.

APOA1-HDL amounts remained unchanged. However, BPH increased APOA4-HDL concentrations.and exhibited the highest activities of LCAT, paraoxonase and glutathione peroxidase.

LDL Malondialdehyde levels were markedly reduced by BPH treatment. After incubating LDL of each group with its own HDL, the lowest DCF-based fluorescent was found with BPH. The lowest oxidant HDL index was found in BPH group

Conclusions: The lowest LDL peroxidation obtained with BPH could be explained by the higher paraoxonase and glutathione peroxidase activity. It was also probably due to the high shingomyelin-HDL levels which represent the resistant phospholipids pool against oxidation. Thus, bogue protein hydrolysates may have great potential for use as a nutraceutical to prevent oxidative stress by improving cholesterol efflux and the ability of HDL to protect LDL from oxidation in hypercholesterolemic-rat

Keywords: (maximum 5): hypercholesterolemia; antioxidant; HDL; fish protein hydrolysate

149/1371. Metabolomics from a Diet Intervention in Atopic Dogs, a Model for Human Research?

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Introduction: Like humans, dogs suffer from atopy and anecdotal data suggest that a non-heated raw diet helps the disease. Strict diet intervention studies are easy to do on pet dogs as dog owners anyway tend to give their dogs the same food daily for months or years. Targeted metabolomics might shed light on common diet related physiology on a biochemical level.

Objectives: To use targeted metabolomics to study the changes in dogs after a diet intervention in dogs suffering from atopy.

Method / Design: A five month randomized controlled diet intervention study comprising either a commercial high protein, fat and mineral raw (n=13) or a more carbohydrate dense dry food (n=9). 102 metabolites were measured at baseline and end of study. The change from start to end (as %) was calculated for each metabolite as the diet group mean and compared between groups. For significance, Independent samples T-test was used with a $P<0.05$.

Results: The following metabolites significantly increased in the raw food group while they decreased in the dry food group: Creatine (p=0.007), Carnitine (p=0.007), Acetylcarnitine (p= 0.004), Hexanoylcarnitine (p= 0.046), and Decanoylcarnitine (p=0.019). The following metabolites decreased in the raw food group while they increased in the dry food group: Glycine (p<0.001), Dimethyl Glycine (p=0.004), Aminoisobutyric acid (p=0.004), Cytosine (p<0.001), Proline (p<0.001), Methionine (p<0.001), Citrulline (p<0001), 4-Pyridoxic Acid (p=0.005), Cystathionine (p=0.001), and Chenodeoxycholic Acid (p=0.011).

Conclusions: Metabolites connected to the high animal protein food could be seen in the raw food, whereas Glycine, Porhyrin, Vitamin B6, methionine and betaine metabolism had changed in the dry food group. It is unclear if the fact that the food was different and raw had an impact on the results and further research is needed. We

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propose that the dog should be further studied as a model for human research.

Keywords: (maximum 5): metabolomics, canine, raw, dry, atopy

149/1384. Influence of sex and seasonal variation on the immune system

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Introduction: The immune system itself experiences a series of modifications from birth until adulthood, but in addition it may suffer from diverse factors related to physiological changes, ethnicity and environmental conditions.

Objectives: This study was aimed to evaluate the effects of sex and seasonal variations on several immunocompetent cells in healthy adults.

Method / Design: This study was performed in one hundred twenty-one healthy young adults (25-45 age range, 69% women) from Madrid. Blood samples were collected from all volunteers in order to analyze lymphocyte subsets using flow cytometry. Volunteers were classified considering the seasonal period of immune assessment: May-June (MJ; N=19); October-December (OD; N=59) and February-April (FA; N=43). Sex proportions were similar across these three groups. Two ways ANOVA and post-hoc Bonferroni test were used to analyze the interaction between sex and seasonal variations, and the differences due to sex and seasonal variations.

Results: There were no interactions between fixed factors in all lymphocyte subsets evaluated. Regarding differences between sexes, CD3+ and CD4+ percentages ($P<0.001$), as well as CD4 cell counts ($P<0.028$) were found higher, meanwhile natural killer cell percentages and counts were lower in women than in men ($P<0.001$ and $P<0.002$, respectively). Regarding seasonal variations, naïve CD4+ percentages ($P<0.024$) were higher in OD, while memory CD8+ percentages ($P<0.005$) were lower compared to FA period. In addition, total CD8+ percentages reached the lowest values in OD compared to the other two periods ($P<0.023$ vs MJ and $P<0.008$ vs FA).

Conclusions: These results suggest the key role of sex and seasonal variations on lymphocyte subset behaviour, two important factors to take into account when planning preventing actions and to better understand differences in the susceptibility to get infected.

Keywords: (maximum 5): sex, seasonal variation, immune system, healthy adults.

149/1389. Effects of perinatal lc-pufa supplementation on neurochemical and functional changes of forebrain during lifespan in rats

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Introduction: Among long chain polyunsaturated fatty acids (LC-PUFAs) docosahexaenoic (DHA) and arachidonic (ARA) acids have prominent roles during brain development. Accumulation of DHA in the brain is highest during synaptogenesis, besides, ARA also needed for the developing synaptic functions. Regarding human condition of brain development, especially the n-3 LC-PUFAs' deficiency is alarming.

Objectives: The aim of this study was to investigate the effects of perinatal DHA and ARA supplementation on functional and neurochemical changes of brain in later life.

Method / Design: Wistar rats were maintained on two types of diets: 'LC-PUFA supplement' contained DHA, eicosapentaenoic acid (EPA), ARA and the precursors (alpha-linolenic acid-ALA, linoleic acid-LA) while the other 'LC-PUFA deficient' diet was abundant in MUFA, contained the precursors in decreased amount with a very low yield of end product LC-PUFAs. Effects of diets on phospholipid fatty acid composition of forebrain membrane and behavioral development were followed up to old age. Fatty acids were measured by gas chromatography at four ages: 7th postnatal day, puberty, adult (13-month) and old (24-month). We assessed spatial learning behavior in Morris water maze at both sexes in the adult and old ages.

Results: Regarding structural effects, we demonstrated that fatty acid composition in brain changed during lifespan: the DHA content was still higher in the forebrain tissue at 13 months in the supplemented group, however, the existing differences disappeared by old age of 24-month. Regarding cognitive performance, the beneficial cognitive consequences of n-3 LC-PUFAs supplementation during development could be detected even at the 24 months of age.

Conclusions: Results stress the importance of adequate diet with optimal n-3 LC-PUFA intake before, during and after pregnancy. The neurochemical and especially the functional consequences are beneficial which may contribute to a healthier brain aging.

Keywords: (maximum 5): LC-PUFAs, DHA, brain development and aging, fatty acids, cognition

149/1398. Effect of beer intake on LC-MS plasma and urine profiles

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Introduction: Moderate beer consumption has been associated with beneficial health effects, potentially related to specific beer constituents: hop and malt-related substances, yet the casual mechanisms are not well described.

Objectives: To identify the plasma and urine metabolic patterns related to beer intake and utilize those to explore for the potential underlying mechanisms of health associated effects of beer intake.

Method / Design: A meal study - randomized crossover, single-blinded intervention with a study period of 4 x 3 days - was conducted with three different beers, and a soft drink. 18 healthy men and women in the age group 18-60 were enrolled in the study. Plasma and urine samples were collected before and at various time points after the intervention (45, 120, and 180 min for plasma and 90 min, 90-180 min and 180 min-24 h for urine). The metabolic profiles of not only samples but also test beverages, wort and hops extract used in the production of the beer were obtained with UPLC-QTOF. The metabolites related to beer intake were extracted using anova simultaneous component analysis (ASCA) and PLSDA.

Results: Comparison of markers of beer intake with metabolic profiles of test beers and beer components revealed 14 metabolites originated from hops extract (2 in plasma and 14 in urine), nine from wort (five in plasma and urine), 25 from fermentation (only in urine) and 41 from human metabolism (1 in plasma and 40 in urine). Related to hop content of the beer, iso-cohumulone and mixture of iso-humulone and iso-adhumulone were identified as markers of beer intake both in urine and plasma. In plasma iso/leucine and tyrosine are identified as wort originated markers of beer intake.

Conclusions: Beer intake leads to subtle changes in plasma and urine metabolic profiles, comprised of beer components and metabolites derived from human metabolism.

Keywords: (maximum 5): beer, plasma, urine, LC-MS

149/1407. High fat diets with sugary drinks increase the biochemical markers for type-2 diabetes and coronary vascular diseases in rat model

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Introduction: High fat diets have been associated with weight gain and biochemical markers of obesity, type-2 diabetes and coronary vascular diseases (CVD) risk factors. However their mechanism of action is in developing insulin resistance and dyslipidemia is still not clear.

Objectives: To evaluate the impact of consuming low fat-high carbohydrate (LFHC) and high fat-low carbohydrate (HFLC) diets with and without sugary drinks on the growth, and biochemical markers of type-2 diabetes and coronary vascular diseases in rat model.

Method / Design: Forty two, 5-6 weeks old male Sprague-Dawley rats (104.5 ± 8.6g) were randomly divided into 6 groups containing 7 rats in each. Two isonitrogenous and isocaloric experimental diets (LFHC and HFLC) were prepared and the 3rd diet was normal rat chow that acted as control. The diets were allotted randomly to each group and were fed for 6 weeks with 24-hours continuous excess to either water (Treatment 1) or sugar sweetened beverage (Treatment 2).

Results: HFLC-diet significantly increased weight gain, in particular when given with sugar sweetened beverage. Similarly fasting plasma glucose and glycated hemoglobin (HbA1c) values and all biochemical markers of dyslipidemia i.e., total cholesterol, triglycerides, HDL-C and LDL-C, TC/HDL-C ratio, LDL-C/HDL-C ratio and atherogenic index increased significantly in rats fed HFLC-diet as compared to LFHC-diet and control. All 3 diets when given with sugar sweetened beverage showed significantly ($P < 0.05$) increased levels of biochemical markers as compared to when given with normal water. Significant differences were also observed in the weight of various body organs.

Conclusions: Consuming HFLC-diet, in particular with sugar sweetened beverages increased the various biochemical risk factors for type-2 diabetes and CVD in rat model. This model can be used further to study hyperlipidemia and mechanisms of multi-organ dysfunction in rats.

Keywords: (maximum 5): High-fat low carbohydrate diets, rats, sugary drinks, biochemical markers

149/1410. Body composition patterning in Asians and their corresponding cardiometabolic risk

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Introduction: Asia has witnessed major transformation in its demography in the last four decades, giving rise to changes in food availability, food habits and lifestyle. A significant consequence of these changes has been the continuing rise in overweight and obesity across Asia. Parallel to this, increases in the incidence of cardiometabolic disorders including insulin resistance, hypertension, metabolic syndrome, type 2 diabetes and cardiovascular disease have also been observed.

Objectives: To date, majority of the evidence reporting associations between adiposity and cardiometabolic disease risk has

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been obtained from studies undertaken either in European or North American Caucasians. We therefore conducted a systematic review to establish differences in body fat content and distribution between East Asians, South Asians and Caucasians.

Method / Design: Results Existing studies indicated that the content and distribution of body fat are markedly different between various Asian ethnic sub-groups and Caucasians as well as between Asian sub-groups themselves. We also found that Asians had a greater predisposition towards abdominal adiposity, including visceral abdominal adiposity (VAT), particularly at a higher BMI, than in Caucasians. Moreover, at any given level of adiposity, Asians had a much greater predisposition to risk of cardiometabolic disorders than Caucasians. Our analyses demonstrated that the cut-offs for anthropometric measures such as body mass index (BMI) and waist circumference (WC) are significantly lower in Asians than in Caucasians. Using the distribution of mean cut-offs for metabolic syndrome in various ethnic sub-groups within Asia, we have developed specific BMI and WC cut-offs for Asian male and female separately. Using data collated in Singapore, we have further evaluated the predictive abilities of various body composition measures to determine risk of cardiometabolic disorders in different Asian sub-groups, including Chinese, Malays and Indians

Conclusions: Ethnic specific cut-offs need to be utilized in Asians to better assess risk of cardiometabolic disorders.

Keywords: (maximum 5): Ethnic diversity, Body composition, Cut-offs, Asians, Caucasians, Cardiometabolic risk

149/1412. The effect of tomato juice supplementation on gene expression of fatty protein transport in rats

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Introduction: Tomato juice is a dietary source of lycopene, which accumulates in the liver, where it can exert different antioxidant biological effects, and also modulate the lipid metabolism, improving the β-oxidation of fatty acids.

Objectives: The aim of the present study was to ascertain the effect of tomato consumption and the amount of lycopene on gene expression related to steatosis in rats with induced hepatic fat accumulation through a fatty diet.

Method / Design: Adult male Sprague-Dawley rats (8 weeks old) were randomly grouped (n=8 rats/group) in six experimental groups: HA (high fat diet and water), HLL (high fat diet and tomato juice with low content of lycopene) and HLH (high fat diet and tomato juice with low content of lycopene), with the corresponding control groups fed maintenance rodent diet. After five weeks rats were euthanized and liver were sampled to analyze the gene expression related to steatosis.

Results: The intake of tomato juice led to an accumulation of all-trans and cis lycopene and its metabolites in the livers of these animals, according to the amounts of lycopene in the liver. The intake of tomato leads to a significant effect in transmembrane and intracellular transport proteins, such as Fabp, Abcg1 and Slc27a1 families. This fact could facilitate the transport of fatty acids and other lipophillic molecules, improving the lipid metabolism in the liver.

Conclusions: We concluded that the consumption of tomato juice could reduce hallmarks of steatosis, increasing lipid metabolism by inducing an over-expression of genes involved in the transport of lipids.

Keywords: (maximum 5): steatosis, gene-expression, transport protein, lycopene, tomato

149/1413. Antiproliferative and antioxidant effects of tomato on hepatocellular carcinomas HepG2

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Introduction: Some human studies indicate that the consumption of vegetables and fruits can prevent liver carcinoma formation, mainly due to their content of antioxidant phytochemicals, such as phenolic compounds and carotenoids. Lycopene is the main carotenoids in raw tomato and tomato products and it is considered as antioxidant compounds to improve liver health.

Objectives: The aim of the present study was to determine the antiproliferative and antioxidant effects of tomato extracts (lipophillic, containing lycopene and hydrophilic with chlorogenic acid, caffeic acid, ferulic acid and naringenin) on human hepatoma cells (HepG2).

Method / Design: Different concentrations of the tomato extracts and the corresponding pure compounds were added to the cell culture, measuring the viability by MTT assay. The intracellular level of reactive oxygen species (ROS) in the HepG2 cells was monitored with H2DCFDA, after inducing the oxidation with tBOOH to ascertain the antioxidant activity of the extracts and pure compounds. The cell apoptotic was measured using an annexin V-FITC/PI kit only with tomato extract

Results: MTT showed that the viability of HepG2 cells was only decreased in the presence of lipophillic extract tomato. The bioactive compounds tested are capable of decreasing the generation of ROS, being more effective the fraction of phenolic compounds. The combination of lycopene with phenolic compounds exerts a slight sinergistic effect, resulting in increased effectiveness of antioxidant activity. In addition, extracts of tomato induce apoptosis, being higher after addition of lycopene.

Conclusions: Tomato extracts exhibit antiproliferative effects, induce apoptotic cells death and decreased the oxidative stress status in HepG2 cell.

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Keywords: (maximum 5): HepG2 cells, phenolic compounds, lycopene, tomato

149/1414. Hypocholesterolemic effect of tomato juice: in vivo and in silico study.

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Introduction: Several studies have indicated a relationship between the consumption of tomato and the prevention of cardiovascular diseases CVD, mainly related to their content of antioxidant compounds.

Objectives: The aim of the present study was to investigate the hypocholesterolemic effect of tomato juice in an intervention study with rats and to elucidate the possible mechanisms action of the main bioactive compounds of tomato juice

Method / Design: Adult male Sprague-Dawley rats (8 weeks old) were randomly grouped (n=6 rats/group) in four experimental groups: HA (high fat diet and water), HL (high fat diet and tomato juice), NA (normal diet and water) and NL (Normal diet and tomato juice). After five weeks rats were euthanized and liver were sampled to analyze the gene expression and determination of HMGCR activity, the rate-limiting enzyme of cholesterol biosynthesis. To study interactions at molecular level between HMGCR and the main bioactive compounds of tomato juice (lycopene, chlorogenic acid and naringenin), docking simulations were performed

Results: The intake of fat and tomato juice, and the presence of lycopene in the rat liver did not reduce the expression of HMGCR but decreased the activity of this enzyme. Molecular modelling study revealed that lycopene, chlorogenic acid and naringenin, can bind to the active site of the enzyme, with higher energy than substrate HMG.

Conclusions: The cholesterol-lowering effect of tomato is mainly due to the lycopene content, since it is accumulated in the liver and can inhibit the activity of HMGCR. We propose a novel putative molecular mechanism, showing that lycopene has a similar mechanism to statins

Keywords: (maximum 5): HMGCR, phenolic compounds, lycopene, tomato

149/1415. Bioavailability of carotenoids of spinach in rat fed normal and fatty diets

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Introduction: Vegetables are a dietary source of carotenoids, bioactive compound that can exert different activities in vivo, such as pro-vitamin A activity, inmunomodulatory effects and antioxidant activity preventing different pathologies related to oxidative stress.

Objectives: The aim of this research was to determine the bioavailabilty of carotenoids of spinach and their accumulation in different organs, according to the fat content of the diet.

Method / Design: Adult male Sprague-Dawley rats (8 weeks old) were randomly grouped (n=8 rats/group) in six experimental groups according to the diet (maintenance diet for rodents and fatty diet, T-02028, Harland Laboratories) and the content of lyophilized spinach in the fed (2.5% and 5%). After five weeks, rats were euthanized and plasma, liver and spleen were sampled to quantify the content of carotenoids by HPLC. In addition, spinach, diets and feces were analysed to determine the apparent absorption of carotenoids.

Results: The content of carotenoids in spinach as function of their concentration were lutein>β-carotene>violaxhantin>neoxhanti n>α-carotene. The content of carotenoids in feces was related to the concentration of spinach in the feed and the content of fat. However, lutein was lesser accumulated in liver than carotene, but in contrast higher concentration of the former was detected in spleen.

Conclusions: The accumulation of carotenoids in the liver and spleen depend significantly on the content of fat, and hence the in vivo activity of these compounds will depend on this fact.

Keywords: (maximum 5): spinach, carotenoids and bioavailability

149/1416. Tomato juice consumption modifies the urinary peptide profile in rats with induced hepatic steatosis

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Introduction: Non-alcoholic fatty liver disease (NALFD) has a high prevalence in most countries and it increases the risk of type 2 diabetes, cardiovascular disease, etc. Tomato products are rich in bioactive compounds, which have been attributed numerous beneficial effects in the prevention of different diseases. The analysis of urinary peptidomic biomarkers could be considered an interesting way for the early detection or progression of NALFD.

Objectives: The aim of this study was to evaluate whether the tomato juice consumption can modify the urine peptide profile in rats with induced hepatic steatosis.

Method / Design: 24 male SD rats were randomly divided in four groups (NA: standard diet and water, NL: standard diet and tomato juice, HA: high fat diet and water, HL: high fat and diet and tomato juice). Urine samples were collected weekly for the assessment of the urinary proteomic biomarkers of NAFLD using a capillary electrophoresis coupled to a mass spectrometer.

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Results: A PCA was carried out to observe the distribution of samples in each group. Not statistically significant differences were obtained in groups NA and NL and, consequently, further statistical treatment was carried out comparing only between three groups (N, HA and HL). A total of 22 peptides were significantly different between groups after applying a statistical treatment based on a partial least squares-discriminant analysis followed by an orthogonal signal correction.

Conclusions: Our results suggest that the tomato juice intake by rats with steatosis modifies the urinary peptide profile leading to a status closer to the healthy group.

Keywords: (maximum 5): tomato, CE-MS, biomarkers, NALFD

149/1417. Effect of diet on body composition and blood biomarkers in a pig model to analyze human metabolic diseases.

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Introduction: Commercial pig lines have large anatomical, physiological and ethological similarities with humans and pigs models are increasingly used to analyze genetic, immunological, physiological disorders such as cardiovascular diseases, cancer, obesity and neurological and metabolic syndrome in humans. Pig models can fill the gap between rodents and non human primates in biomedical research.

Objectives: The main goal was to investigate a obesity human mimic model using a commercial pig line feed with differentiated energy and fat diets and establish the equivalences with human anatomical body composition measurements and metabolic disease biomarker differences.

Method / Design: A subset of 21 of a total of 48 female littermates from a high intramuscular Duroc line were fed "ad libitum" with two different diets (ST and HE: 2480 vs 3660 Kcal/Kg) from 60 to 130 days of age. Daily consumption and weekly weight where individually measured. A estimation (at 18 weeks of age) using computed tomography image analysis the different fat types was obtained and referred to the total cross section image area (PFAT). In addition blood samples were obtained to analyze: Total (TC), HDL, LDL cholesterol and triacylglycerides (TG).

Results: Daily growth (from week 9 to18) was significantly ($P<0.05$) higher in pigs with HE than ST treatments (687 vs. 583 g/d), with same daily food intake (but with 1.4 times more kilocalories ingested). Perirenal fat weight was 2.5 higher in HT vs ST animals and differences in all scanner fat area images and PFAT (19 vs 12 %) was found. Blood metabolic indicators as TC, TG (155 vs 125, and 29 vs 2 mg/dl) was significantly higher in the animals with a hiper-caloric diet.

Conclusions: Growth, body fat distribution and obesity blood metabolic indicators are diet depending in this pig model like in human metabolic syndrome studies.

Keywords: (maximum 5): pig model, obesity, biomarkers, metabolic diseases

149/1422. Dietary Intakes of Zinc and Its Absorption Modifiers in Young and Older Saudi Adults

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Introduction: Zinc is one of several micronutrients for which deficiencies are highly prevalent in the Arab region. In Saudi Arabia, there have been few studies of zinc intake and zinc status.

Objectives: 1) To quantify the intakes of zinc and of its absorption modifiers and to estimate the prevalence of inadequate intakes of dietary zinc in younger and older Saudi adults of both genders. 2) To assess the impact of phytate intake on the predicted bioavailability of zinc. 3) To investigate associations between other factors including BMI, smoking, household annual income and education and intakes of zinc and of its absorption modifiers.5) To identify food groups that contribute most to intakes of zinc and of its absorption modifiers in Saudi adults

Method / Design: 202 males and females aged 20 - 30 years and 55 - 75 years participated and completed a validated FFQ. Zinc, protein, phytic acid and phytate to zinc molar ratio (PZR) were calculated.

Results: There were no differences in intakes of zinc and its absorption modifiers between young and older adults ($P>0.05$). In contrast, zinc and protein intakes were higher in males than in females ($P<0.05$). The prevalence of inadequate zinc intake was high (42% of young males, 33%of young females, 33% of older males and 31% of older females had a dietary zinc intake below the estimated average requirement). PZR were low and were expected to have little effect on zinc bioavailability. Zinc intake was significantly higher among smokers ($p<0.05$) but there were no significant associations between

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zinc intake and BMI or socioeconomic status (including education and income) (p>0.05). The major food group contributing to zinc and protein intake was meat whereas cereals contributed to phytate intake.

Conclusions: The present study highlighted the prevalence of inadequate dietary intakes of zinc among young and older Saudi adults.

Keywords: (maximum 5): Zinc intake, PZR, Zinc deficiency, food intake

149/1438. An integrated approach including metabolomics for identifying predictive markers of health evolution toward metabolic syndrome

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Introduction: Human health is determined by a complex interplay between intrinsic and extrinsic factors. Its evolution is a continuum of transitions, involving multifaceted processes at multiple levels. However, the trajectory and underlying mechanisms are still far from being understood and there is an urgent need for integrative (bio)markers that can characterize and predict health status evolution.

Objectives: Our objective was to identify accurate and robust markers, predictive of metabolic syndrome (MetS) development, by using a multidisciplinary approach putting together sociology, epidemiology, nutrition, metabolomics, and statistics.

Method / Design: A case-control approach was used within GAZEL, a French population-based cohort (n~20,000). Male subjects (n=112, 52-64 y.o) with high BMI (25≤BMI<30), free of MetS at baseline, were selected. Cases who developed MetS (NCEP criteria) at the follow-up were compared for several parameters (socio-demographic, clinical, biochemical parameters, and food habits) with Controls (matched for BMI, age, sex). Baseline serum samples were analyzed using mass spectrometry-based untargeted metabolomics. Univariate and multivariate statistics were performed to identify early discriminant metabolites predictive of MetS. Analyses of correlations between the different parameters and metabolic signatures were done to build models and determine whether the integration of multidimensional parameters improves prediction.

Results: The at-risk sub-cohort appears to be representative of the whole cohort from the 22 food items. From 80 variables collected at baseline, vegetables, sugar consumptions, and monthly income were identified as predictive after logistic regressions. Fifteen metabolites were found discriminant 5 years before SMet established phenotype. Three of them were selected as predictive to build the multidimensional model. Associations between diet, socio-demographic parameters and serum metabolites were investigated using correlation networks.

Conclusions: These results show the interest of an integrated approach including untargeted metabolomics in the discovery of predictive (bio)markers. They should provide new tools to better stratify at-risk populations, as well as additional knowledge on MetS etiology.

Keywords: (maximum 5): metabolomics, biomarkers, prediction, metabolic syndrome, cohort

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Topic 4: Nutrition, public health, chronic diseases

149/1. Effect of soy milk on hematological and histological parameters of liver and kidney

Author(s): Addou Samia; Zériouh Ilhem Fatima; Mébara Hasni; Saidi Djamel; Khéroua Omar.

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Introduction: Soy milk is a dietary product, rich of phytoestrogens whose safety is not totally approved. For the time being we ignore its adverse effects on the human health.

Objectives: Our study aims to assess the consequences of the soy milk consumption on the hematological and histological settings,by testing it using Swiss mice as a toxicological sample.

Method / Design: We have used 40 male mice aged 4 weeks, weighing an average of (22.47±0.93) g. These were divided into 4 groups 10 mice per each. Of first group are the ones whose the mother fed only with soy milk from calving to weaning. Mice of this group start to get fed with soy milk during 30 days.The second group contains animals coming from a mother that was fed only with soy milk during lactation, then after they start to receive a standard food and water. The third group contains mice coming from a mother that consumed a standard food during the lactation period, and these mice will receive soy milk for 30 days. Animals of the fourth group are as witnesses. These mice come from a mother who consumed a standard food. At the 8 weeks of experiment, blood was collected and kidneys and liver are taken to verify the existence of any alterations.

Results: Treated mice with soy milk represent significant reduction GB, GR, PLT, for experimenting animals get an aplastic anemia. Noticed lesions at the level of liver: dystrophy of hepatocytes and inflammatory infiltrate of spaces are implanting a subacute hepatitis. At the level of kidneys some glomerulus of atrophic Malpighi and collapses, Bowman space is reduced as well.

Conclusions: Results indicate that ingestion of soy milk cause some alterations in certain hematological and histological settings of Swiss mice.

Keywords: (maximum 5): Milk; soya; Swiss Mice;Liver; Kidney

149/2. Immunological response and intestinal immune response of balb / c mice sensitized

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Introduction: Sublingual immunotherapy (SLIT) allergens, is a treatment that has developed and whose mechanisms consist of a reprogramming of the immune response. SLIT is to redirect the immune system by administering increasing doses of allergen to induce a specific tolerance to long term. This therapeutic intervention is a major opportunity to improve the quality of life of patients with persistent food allergy especially in children with allergy to cow's milk protein.

Objectives: the ITS cow's milk is actively studied; it is a subject of multiple research.

Method / Design: We determined the levels of serum IgG by ELISA of Balb / C mice immunized with bovine proteins (α-Lac and ß-Lg) , and treated with SLIT for 2 months with the doses of allergen administered (50 to 100 mu.l). The effect of immunization and treatment on the integrity of the epithelial structure is evaluated by the histological study of the intestinal mucosa.

Results: Note that immunization with (β-Lg) and the (α-la) stimulates the production of IgG serum. After two months of "SLIT", there is a simultaneous decrease in the rate of the specific IgG against ß-Lg and α-La.The bowel Histological study reveals in immunized mice ("positive witness" to the α-and ß-Lg) a very significant decrease in villus height accompanied by an enlargement of the villi and a significant lymphocytic infiltration epithelial .

After 95 days of treatment with cow's milk, there are no damage to the villous structure,on the contrary it has well serrated villi with normal LIE.

Conclusions: In two months the treatment efficiency of SLIT cow milk was

confirmed after the administration of increasing doses of allergen, it remains to confirm these results on patients with CMPA.

Keywords: (maximum 5): CMPA-SLIT-Cow Milk - IgG-Intestine

149/4. Effect of prebiotics on the intestinal flora

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Affiliation: *Researcher. Laboratory of Physiology of Nutrition and Food Safety. University of Oran. Algeria.*

Introduction: Prebiotics are indigestible natural food components (oligosaccharides) supposed to improve health by favorably influencing the intestinal flora by stimulating certain bacteria in probiotic activity.

Objectives: Our work aims to study the effect of prebiotics on the intestinal flora of rats Wistar especially on lactic acid bacteria.

Method / Design: We used Wistar rats divided into two groups. A control group gavaged with physiological saline and another group that is stuffed full of oligosaccharide solution experimental group and that for 14 days.

Results: The results indicate that there is an increase in bacterial growth in the feces and intestinal chyme in rats supplemented with

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prebiotic compared to those who do not. According to our results the FOS stimulates the proliferation of lactic acid bacteria in the intestine which reduces the ferment to short chain fatty acids, thus forming acetate, butyrate, propionate and lactate.

Conclusions: We concluded, that prebiotics stimulate selectively in the colon, multiplication or activity of one or a limited number of bacterial groups that enhance the physiology of the host. The relevant bacterial groups are lactic acid bacteria and bifidobacteria essentially.

Keywords: (maximum 5): Prebiotic, bacterial growth, lactic acid bacteria, the intestinal flora.

149/7. Changing diet and physical activity behaviour in nurses using Intervention Mapping: Study protocol

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Introduction: Nursing is a stressful occupation, in which overtime and irregular shifts are common, and challenge the maintenance of a healthy lifestyle. In fact, with 60% of nurses being overweight or obese, and 55% being classified as insufficiently active, the risk for non-communicable diseases (NCD) is increased in this group. Because staff shortage and high turn-over are a common and currently issue in this workforce, improving nurses' health could play an important role for job retention. So far, there is a lack in number and quality of studies promoting healthy lifestyles in this population.

Objectives: To design a tailored intervention to promote healthy diet and PA behaviour in nurses

Method / Design: Following the Intervention Mapping (IM) protocol, an initial Needs Assessment was performed combining literature review and focus groups (FG) data, to explore barriers to healthy diet and PA experienced by nurses. Selection of intervention strategies and behavioural change theoretical frameworks, were selected based on the needs assessment data and desirable outcomes. Intervention materials were developed using both an evidence-based approach and suggestions from FG participants.

Results: The intervention will be implemented and evaluated in a 12-week pre-post-test study with n=50 nurses working full-time. Efficacy and uptake will be evaluated using the primary outcomes physical activity (including sedentary behaviour), and improved diet quality. Secondary outcomes will include changes in NCDs risk factors like BMI, blood pressure, and waist circumference.

Conclusions: The use of a tailored intervention, developed in collaboration with future participants, has the potential to ensure participation, flexibility and sustainability in this hard-to-reach group. The adoption and maintenance of a healthy diet and PA, can improve nurses' long-term health, hence potentially improving job retention. Limiting turn-over can contribute to overcome the current nursing shortage, which is predicted to increase in the next years.

Keywords: (maximum 5): diet, physical activity, nurses, health promotion

149/9. Prevalence of zinc deficiency among preschool children aged 3-5 years in Vhembe district, Limpopo province, South Africa

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Introduction: Diet of many South Africans consists of porridge as staple food which is usually consumed with vegetables, legumes and a small amount of animal derived food.

Objectives: To determine the prevalence of zinc and iron deficiency among preschool children aged 3-5 years in Vhembe district, Limpopo province, South Africa.

Method / Design: This study was carried out on 400 preschool children in Vhembe district, Limpopo province, South Africa. Municipalities were purposively selected and subjects were chosen by simple random sampling methods. Anthropometric measurements were made following standard techniques. Serum zinc, iron, ferritin, T saturation, transferrin and CRP levels were measured by atomic absorption spectrophotometery.

Results: Of the 400 children, 349 were included in this study. The prevalence of wasting, stunting and underweight was 1.4%, 18.6% and 0.3% respectively while 20.9% of the children were overweight and 9.7% were obese. The prevalence of zinc deficiency was 42.6% and anemia was 28%, both were significantly higher in females as compared to males. When using both serum ferritin and Tsaturation levels as markers of iron deficiency 7(2%) children were found to have IDA. Combined iron and zinc deficiencies using ferritin as a marker of iron deficiency was found in 8(2.3%) of the children while when using Tsaturation as a marker of iron 42(12%) of the children had combined iron and zinc deficiencies.

Conclusions: Limpopo province. Iron and zinc deficiency in children is associated with poor growth development, alteration in neurological function, immunological response and behaviour changes.

Keywords: (maximum 5): Iron deficiency, zinc deficiency, preschool children, stunting, overweight

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149/12. Obesity and overweight in preschool children in urban area of Kenitra City, Morocco

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Affiliation: *(1) Nutritionist. Nutrition and Health Laboratory. Ibn Tofail University Kenitra. Morocco; (2) Nutritionist. Ibn Tofail University. Kenitra. Morocco.*

Introduction: Morocco is undergoing nutrition transition and rapid urbanization. Childhood obesity is an important issue in the context of food habits and globalization especially in urban areas.

Objectives: Objective: this study aim to estimate the prevalence of overweight and obesity among 's preschool children in urban schools of Kenitra, North west of Morocco.

Method / Design: A Cross-sectional study of a representative sample of 247 preschool children, aged 60 to 84 months who were randomly recruited from Kenitra city, Morocco. Children's height and weight were measured using a standardized protocol. Overweight, obesity was defined by Body Mass Index (BMI) according to World Health Organization (WHO) standards published in 2007

Results: The sample was composed of 127 girls (51.4%) and 120 boys (48.6%). Among them 14.2% are overweight (boys (15.0%), girls (13.4%)) , and 5.7% are obese (boys(5.8%), girls(5.5%)). Chi-Squared test revealed no relationship between classes of body mass index z scores forb age and sex (p= 0.93.>0.05). The rates of obesity and overweight were higher in the private schools.

Conclusions: The prevalence of overweight and obesity in these observed preschool children is slightly high. Preschool children are at risk of developing obesity-related diseases that can persist into adolescence and age of adult. Several studies on the nutritional status will be recommended in preschool children in Morocco. to develop strategies for prevention

Keywords: (maximum 5): Obesity; Overweight; Preschool; Children; Morocco

149/15. Behavior, temperament & food intake of urban Indian adolescents

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Introduction: Recent studies have indicated challenges that hamper health & wellbeing of a vast majority of adolescents in developing countries. Many modifiable factors like behavior & temperament related to food intake among adolescents have not been adequately explored. The aim of the proposed research is to study the impact of behavior & temperament on food intake & diet quality of adolescents.

Objectives: In the present study data on dietary behavior & anthropometry of adolescent boys & girls (aged 13-16 years) studying in public schools of Delhi will be gathered to ascertain the quality of diet among adolescent boys & girls and to study the effect of behavior & temperament on diet quality of adolescents.

Method / Design: In total, 400 adolescents will participate in this cross-sectional study. Weight & height of adolescents will be measured and BMI will be calculated. Information will be obtained on their socio-demographic profile & various factors influencing their Food Choices & Diet Quality such as Body image perception, Behavior, Temperament, Locus of control & Parental Influence.

Results: Expected RESULTS – Several direct effects of adolescent traits & behavior on food intake will be observed. Maturational patterns & gender differences in behavior traits will be assessed. By profiling of the behavior & temperament traits, we will have a better understanding of impact of these factors on weight and eating behaviors in overweight/obese or even underweight adolescents.

Conclusions: The proposed study will highlight the association of behavioral factors with nutritional status of adolescents. It will also serve as a strategic approach for obesity prevention & health management policies designed for adolescents.

Keywords: (maximum 5): BEHAVIOR, TEMPERAMENT, FOOD INTAKE & ADOLESCENTS

149/19. Political measures to prevent obesity – What can we learn from tobacco control?

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Introduction: In Germany, obesity is on the rise. All projects aiming at a change of the behaviour of individuals that took place in Germany in the last years could not halt this trend yet. These projects need to be supported by political measures to change the external conditions in the society and to promote a healthy lifestyle. Several political measures proved to be successful in curbing the tobacco epidemic. Some of these – if adapted to obesity - may prove effective in obesity prevention, too.

Objectives: To evaluate which political measures of tobacco control can be adapted to obesity prevention.

Method / Design: Evaluation of the effectiveness of tobacco control measures in Germany and of two political measures recommended by WHO to reduce obesity.

Results: In Germany, in the preceding ten years, several tobacco control measures have been introduced. Intense scientific information of politics did promote their introduction. Smoking prevalence markedly decreased since then, especially among youth. Most effective proved to be tax increases, smoke-free laws, advertising bans and health warnings.

In obesity prevention, taxes on unhealthy food may help to reduce the consumption of unhealthy food. Germany has no such a tax, but some countries recently introduced taxes on unhealthy food. The marketing of food and beverages high in fat, sugar and salt to children is recognized as promoting child obesity. Currently, most countries,

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including Germany, rely on self-regulatory actions of the food industry to limit marketing of unhealthy food.

Conclusions: Intensive information from science to politics improves the introduction of political prevention measures. A package of several measures may influence consumer behaviour. Some of the measures proven to be effective in tobacco control can be adapted to obesity prevention. These include taxes on unhealthy food and a comprehensive ban on advertising of unhealthy food and beverages to children.

Keywords: (maximum 5): Obesity prevention, setting-based prevention

149/26. Total phenolics compound, total flavonoids, tocopherols and gamma-oryzanol in pigmented Thai rice varieties

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Introduction: There are numerous traditional rice varieties and rice specialists are producing many improved varieties. However, only a few varieties can be registered with the National Thai Department of Rice due to their unique hereditary characteristics and quality. Currently, the high bioactivities of some varieties are attracting interest among researchers and consumers.

Objectives: This study determined the contents of total phenolics compound, total flavonoids, vitamin E isomers, gamma-oryzanol in fifteen varieties of half-milled pigmented Thai rice.

Method / Design: The improved pigmented (n=12) and white (n=3) rice varieties were collected from various rice research centers throughout Thailand.

Results: The total phenolics content in pigmented varieties was significant higher than white. The highest total phenolics content was found in black rice (Niew-Dam Leum Pua) with 288 mg (gallic acid equivalent) per 100 g (half-milled rice). The high content of total phenolic was found in black rice (Hom-Dam Sukhothai 2) and in red rice (Hom-Mali Dang). All pigmented varieties of rice had high contents of total flavonoid, especially Hom-Dang and Niew-Dam Leum Pua varieties. The total flavonoid content in black rice was significant higher than red rice, where as white rice varieties had low levels of total flavonoid. All varieties of rice showed high contents of alpha-tocopherol while they had low amounts of beta, gamma, delta-tocopherols and tocotrienols. Gamma-oryzanol was noticeably higher in black rice and some kinds of deep red rice. The remaining varieties of deep red, purple and red rice had a lower amount of gamma-oryzanol, while orange and white rice had the lowest content.

Conclusions: The total phenolics content, total flavonoid and gamma-oryzanol in pigmented varieties were significant higher than white.

Keywords: (maximum 5): Pigmented rice, Oryza sativa, Phytonutrients

149/29. The investigation of changes some blood profiles with oral apple cinder vinegar intake in type 1 diabetic rats

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Introduction: Diabetic mellitus (DM) is multifactorial disease which is characterized by hyperglycemia, Lipoprotein abnormalities and Altered intermediary metabolism of major food substrates.Vinegar is made in a two-step process, related to how alcohol is made . The first step exposes crushed apples (or apple cider) to yeast, which ferment the sugars and turn them into alcohol. In the second step, bacteria are added to the alcohol solution, which further ferment the alcohol and turn it into acetic acid, the main active compound in vinegar.

Objectives: In this study , we have investigated effects of oral apple cider vinegar on some blood profiles like: Serum glucose, hemoglobin A1C (HbA1C), Triglyceride (TG), low density cholesterol (LDL-c), high density cholesterol (HDL-C) and Total Cholesterol (TC) in Type 1 Diabetic Rats.

Method / Design: Diabetes was induced by injection of alloxan (120mg/kg) to male rats (200-220 g). Animals showing glucosuria more than 2% or blood glucose level (>140 mg/dl) 48 h after alloxan injection were selected for experiment. Animals divided into three groups (n=42) : diabetic group without apple cider vinegar (ACV) , diabetic group with 5ml oral ACV, diabetic group with 10ml oral ACV for eight weeks. The some blood profiles like: Serum glucose, HbA1C, TG, LDL-c, HDL-C and TC were measured before the experiment and by the end of period (10 weeks) in all groups.

Results: Consumption of 5ml and 10ml doses of ACV significantly lowered the levels of Serum glucose, hemoglobin A1C. TG, LDL-c and TC and HDL-C increased significantly compared with those of diabetic rats without ACV.

Conclusions: The results of this study Showed that oral AVC intake was beneficial effects on some blood factors of diabetes.

Keywords: (maximum 5): Type 1 diabetic, Apple Cinder Vinegar (ACV), Blood profiles

149/32. Nutrition Transition in Pakistan A Review

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Introduction: Nutrition Transition is a shift in eating and disease patterns towards diet- nutrition related non-communicable diseases. This shift in many developing countries has been accompanied with changes in behaviors, lifestyles, diets, physical inactivity, smoking and alcohol consumption. In addition to the burden of under nutrition, nutrition transition has caused a sudden rise in overweight/obesity related chronic diseases in developing countries.

Objectives: The current study attempts to investigate on the nutrition transition from under nutrition to over nutrition and its health related consequences among women of reproductive years in Pakistan.

Method / Design: A review of published literature related to nutrition transition, including overweight and obesity in Pakistan for a period of 10 years (2004-2014) was carried out. Also the data from NNS-2011 and PDHS-2013 was reviewed and used to supplement the published researches from Pakistan. For this purpose a computer based search was performed on PubMed and Google to retrieve relevant articles. The criteria used for defining overweight and obesity were chosen according to the World Health Organization (WHO) recommendation for South Asian populations.

Results: The major risk factors contributing to the risk of obesity were sedentary life style, lack of awareness, higher rates of urbanization along with shift in dietary pattern from high fiber diet to low fiber, high calorie diet. The preliminary analysis of data shows growing trend of

obesity and nutrition related diseases in Pakistan. The results of this review thus, highlight the need for formulation of national nutrition policy focused towards improving the awareness of determinants and consequences of nutrition related illness in Pakistan

Conclusions: All the studies reviewed revealed that further research is needed in this area to explore the factors contributing to nutrition transition in Pakistan and also highlights the strong need to implement nutrition policies to reduce the risk of nutrition led illness in Pakistan .

Keywords: (maximum 5): Obesity

149/33. Study of the effect of lipoic acid consumption on cytokine profile:a double-blind randomized clinical trial

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Introduction: A limited amount of data exists regarding the effect of lipoic acid (LA), an oral antioxidant supplement, on cytokine profiles among multiple sclerosis (MS) patients

Objectives: We aimed to assess the effect of daily consumption of LA on the cytokine profiles in MS patients.

Method / Design: In this double-blind, placebo-controlled, randomized clinical trial, 52 relapsing-remitting MS patients with an age range of 18-50 years were recruited into 2 groups: LA consumption (1,200 mg/day) or placebo. Patients followed their prescribed supplements for 12 weeks. Fasting blood samples for cytokine profile measurement were collected at baseline and after the intervention. Anthropometric parameters were measured based on the standard guidelines.

Results: INF-γ, ICAM-1, TGF-β and IL-4 were significantly reduced in the LA group compared to the placebo group [(INF-γ: 0.82 ± 0.2 vs. 0.2 ± 0.2 pg/ml, $p < 0.0001$), (ICAM-1: 20.2 ± 9.4 vs. 8 ± 10 ng/ml, $p = 0.0001$), (TGF-β: 103.1 ± 20.2 vs. 54.9 ± 26 ng/ml, $p < 0.0001$) and (IL-4: 0.1 ± 0.1 vs. 1.02 ± 1.7 ng/ml, $p = 0.0112$)]. No significant changes in TNF-α, IL-6, EDSS and MMP-9 were found between the LA and placebo groups ($p = 0.6$, $p = 0.8$, $p = 0.09$ and $p = 0.8$, respectively).

Conclusions: The results suggested that consumption of 1,200 mg LA per day beneficially affects several inflammatory cytokines including INF-γ, ICAM-1 ,TGF-β and IL-4. Further investigations are needed to verify the beneficial role of LA on other cytokine profiles among MS patients.

Keywords: (maximum 5): Lipoic acid,Multiple Sclerosis,Cytokines,Oxidative stress,Antioxidants

149/39. The effect of socioeconomic status on physical activity patterns in polish female. The Gebahealth study

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Introduction: Socioeconomic status (SES) may influence the level and type of physical activity, but not all aspects of the association are well-known in Polish females.

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Objectives: The aim of this study was to analyze the effect of SES on physical activity (PA) patterns among Polish girls and young women.

Method / Design: It was a cross-sectional study carried out in a representative sample 1107 of Polish females aged 13-21 years. Initially, 2104 females were randomly selected from the PESEL database. The response rate was 52.6%. All data were adjusted for survey weights. The SES was evaluated using four categorical variables: mother's education, father's education, self-declared economic status, description of household. Based on tertiles distribution of SES index, subjects were classified into three categories of SES. The International Physical Activity Questionnaire (IPAQ) was used. The four PA patterns were identified by Principal Component Analysis: 'School/work activity', 'Active recreation', 'Yard activity', 'Walking&home activity'. Multiple logistic regression analysis was used. Odds ratios (ORs) were adjusted for age, body mass index (BMI).

Results: According to IPAQ's criteria, 47.1% of females were classified to low PA category, 50.9% to moderate PA, 2.0% to high PA category. Among females with high SES the OR for upper tertile of 'School/work activity' pattern was 1.81 (95%CI:1.28-2.56; p<0.001) compared to bottom tertile of the DP (OR=1.00). The ORs for upper tertile of 'Active recreation' pattern were: 2.13 (95%CI:1.51-3.03; p<0.0001) for females with high SES, 1.74 (95%CI:1.22-2.48; p<0.01) for females with average SES. In females with average SES the OR for upper tertile of 'Walking&home activity' pattern was 0.71 (95%CI:0.51-0.99; p<0.05).

Conclusions: Polish girls and young women with higher socioeconomic status were more likely to have an active lifestyle during recreation, school or work. The results prove the positive effect of better socioeconomic situation on more active lifestyle.

Keywords: (maximum 5): socioeconomic status, physical activity, IPAQ, PCA, girls

149/47. The effect of water intake on body composition in young men.

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Introduction: One of the major health benefits seen in water is that it can prevent weight gain and help in weight loss. One of the suspected mechanisms caused by water is that it may promote weight loss by increasing fatty acid oxidation.

Objectives: The aim of this study was to determine the effect of water intake as the only source of hydration for selected anthropometric parameters.

Method / Design: Thirty three 20-30 year old healthy male volunteers were submitted to 7 day study period that included drinking 3 liters of water per day (no other beverages were allowed), body composition measuring fat tissue percentage (%F) and anthropometric indexes: weight (W), height, body mass index (BMI), waist circumference (WC) and hip circumference (HC). On the beginning of the assessment period subjects were instructed to maintain the same level of activity during the study.

Results: There was a significant reduction on W (77,05±8,82 kg vs 76,1±8,7 kg, P<0,0001), WC (86,1±7,68 cm vs 79,18±7,28 cm, P<0,00001), HC (101,97±5,03cm vs 98±4,81cm, P<0,00001), % F (19,41±3,88% vs 16,37±3,97%, P<0,00001) and BMI (23,7±2,47 kg/m2 vs 23,47±2,40 kg/m2, P<0,0004).

Conclusions: The water intake of 3 liters per day seem to reduce weight, waist and hip circumference and also the percentage of body fat and body mass index in the healthy young men. It is also necessary to confirm the effects in future studies and understand the mechanisms caused by increased water consumption and their impact on measured parameters. All observed changes were obtained without making any changes to the diet. If confirmed, the recommendation of drinking water can be helpful in maintaining a healthy body weight and the treatment of the overweight and obese.

Keywords: (maximum 5): water intake, fat mass, body weight, body mass index

149/48. The effect of water intake and hydration on the maximum oxygen uptake in men aged 20-30 years

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Introduction: Exercise tolerance is one of the basic sports-related parameters determining the capability of the body to perform a particular type of exercise, as well as defining its maximum exertion potential. It is most commonly defined as the maximum oxygen uptake (VO2 max) which is a marker of the body's capacity to absorb oxygen, usually expressed in l/min or ml/min/kg of body weight. This marker can be markedly influenced by level hydration/water intake.

Objectives: The objective of this study was to determine how different levels of water consumption and hydration affect the maximum oxygen uptake in young males aged 20 to 30.

Method / Design: The study comprised of 33 healthy males with normal body weight and normal fat mass percentage. Body water content was assessed using bioelectrical impedance analysis, and VO2 max was determined during a submaximal test on a Fitmate Med cycle ergometer manufactured by Cosmed. Participants were instructed to consume 1400 ml of water per day during the first (adaptation) week,

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and 3000 ml per day in the second week. The subjects drank water of low mineral content (up to 500 mg of mineral components per liter), served at a temperature of 22°C. Additional advice about not changing dietary habits during study period was given.

Results: After 7 days of drinking 3000 ml of water daily, a positive correlation between body water content and VO2 max could be observed. An overall increase in VO2 max was also noted.

Conclusions: Drinking 3000 ml of water a day affects the maximum oxygen uptake. It is now vital to corroborate this effect in further studies, and to understand the mechanisms by which a change in hydration, without a change in nutrition affects the discussed parameter.

Keywords: (maximum 5): maximum oxygen uptake, exercise tolerance, hydration, water intake

149/53. THe hypoglyceamic effect of cocoyam (Xanthosoma sagotrifolium) on alloxan-induced diabetes in wistar rats

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Introduction: Globally, the incidence of diabetes is increasing and the diabetic population had been projected to likely increase to 300 million or more by the year 2025. Prevalence of diabetes in adult Nigerians is about 3.1% of the population, ranking among the highest in sub-Saharan Africa.

Objectives: The objective of this study is therefore to determine the anti-diabetic potentials of cocoyam on the blood glucose concentration using non-diabetic and Alloxan-induced diabetes Wistar albino rats.

Method / Design: Seventy male (70) Wistar rats weighing between 120g-160g were purchased and kept in a specific pathogen free animal facility. The rats were acclimatized for one week to their diets and water prior to the commencement of the experiment maintained under a 12 h light and dark cycle and at room temperature. The rats were divided into different groups according to their weight and were introduced to the cocoyam feed at different percentages and a control with just the normal rat pellets. After the acclimatization, Alloxan was injected intraperitoneally at a dosage of 65 mg/kg body weight at fasting state, the fasting blood glucose concentration was checked and recorded prior to the commencement of the dietary treatment using a blood glucose meter, Dietary treatment commenced after confirmation of diabetes and blood samples of rats was checked.

Results: The dietary treatment had no hypoglycemic effect on non diabetic group. The diabetic group fed with (100%) cocoyam had a 44% decrease in the blood sugar concentration on the 14th day compared with the diabetic controls and non diabetic control.

Conclusions: Cocoyam possesses anti diabetic effect, However, the use of cocoyam as a dietary treatment for diabetes Mellitus has not been tested in human, so therefore, clinical evidence based trials are needed to evaluate the efficacy of cocoyam on diabetes.

Keywords: (maximum 5): Diabetes Mellitus, Dietary treatment, Cocoyam, Hypoglycemia, Blood sugar.

149/58. Glucose-lowering potential of cocoa powder- an avenue for positive management of diabetes mellitus

Author(s): Tolulope Olasope.

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Introduction: Diabetes mellitus is a public health problem which is increasing all over the world, various contributions to its prevention and management is crucial. Cocoa powder as a food ingredient has been discovered to have medicinal purposes most especially in the treatment of cardiovascular diseases.

Objectives: This study was conducted to determine the efficacy of cocoa powder in experimental diabetic albino rats

Method / Design: Thirty matured albino rats with an average weight of 200g housed in metabolic cages were randomly divided into 5 groups of 6 rats which include the control and 4 treatment groups. Diabetes was induced intraperitoneally and the treatments include 1-4% natural cocoa powder mixed-feed. Data on the consumption of food and water intake, body weight and fasting blood glucose were determined. The data collected was analyzed using Statistical Package for Social Sciences (SPSS) version 17.0.

Results: The study revealed a significant decrease in the fasting blood glucose and water intake as well as an increase in the final body weight when compared to the diabetic control group ($P<0.05$). The diabetic group fed with 4% cocoa powder feed showed the highest final body weight (-4±4.50g) and also had the lowest water intake (7.1±7.19ml) as well as the lowest final fasting blood glucose level (-291±25.24mg/dl) among all the groups. There was however no significant difference in the final feed intake across the group.

Conclusions: The results showed that cocoa powder treatments lowered the blood glucose of the diabetic albino rats, reduced polydipsia as well as reverse weight loss observed in diabetes mellitus.

Keywords: (maximum 5): DIABETES MELLITUS, COCOA POWDER, BLOOD GLUCOSE, BODY WEIGHT

149/63. Questionnaire on lifestyle for 8-10 year-old children: concordance of parent/child responses

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Introduction: Vivons en Forme (VIF) is a program aiming at supporting municipalities to implement actions in line with French Nutrition Recommendations. To evaluate actions directed towards

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school children we built a questionnaire on child lifestyle for 8-10 year old children and their parents.

Objectives: To compare the concordance between the responses given by parents and children.

Method / Design: The study was conducted in four schools, located in 3 different cities, one school was located in deprived area. The questionnaire was given to 99 children who filled it in the classroom. The same questionnaire was distributed to parents; 87 parents responded. Statistical analysis was made on 87 parent-child pairs. Concordance was analysed by percent concordance (C) and Kappa coefficient (K).

Results: Parents/children concordance is excellent for: i TV in bed room C 83%, K 0,63 (52% of children having TV in bed room),ii, computer in bed room C 85%,K 0,66 (29% of children having computer), iii °extracurricular physical activity C 89%, K 0,73 (72% of children having activity). Responses are discrepant for ; i snacking while watching TV C 59% K 0,0,10, (yes 42% children 22% parents) ii candy daily consumption: C 25%, K 0,11, (yes 39% children, 17%parents) iii chips daily consumption C 36% K 0,15(yes 21% children, 3% parents)

Conclusions: 1 More than half of the children have a screen in their bed room and this should be considered in public health promotion campaigns.

2 ° Discrepancies between parents and children relate to unhealthy behaviours that are underestimated and may be ignored by parents. Related actions targeting parents should be reinforced

Keywords: (maximum 5): evaluation, life-style intervention, Childhood obesity

149/64. Vitamin D treatment protects against and reverses oxidative stress induced muscle proteolysis

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Introduction: Vitamin D is known to have a biological role in many extra skeletal tissues in the body including muscle. Vitamin D deficiency has been associated with preferential atrophy of type II fibres in human muscle. Vitamin D at physiological concentrations has been reported to protect cells against oxidative damage.

Objectives: In this study we examined whether vitamin D deficiency induces muscle oxidative stress in a rat model and further if pre or post treatment of C2C12 muscle cells with vitamin D offers protection against oxidative stress induced muscle proteolysis.

Method / Design: For in vivo studies a vitamin D deficient rat model was employed. Vitamin D deficient rats were fed a diet devoid of vitamin D, while control rats were given the same diet containing 1000IU vitamin D3/Kg diet. For in vitro studies the C2C12 mouse myoblast cell line was used.

Results: Protein carbonylation as a marker of protein oxidation was significantly increased in both the deficient muscle and vehicle-treated C2C12 cells. Vitamin D deficiency led to an increase in activities of the glutathione-dependent enzymes and decrease in SOD and catalase enzymes in the rat muscle. Higher nitrate levels indicative of nitrosative stress was observed in the deficient muscle compared to control muscle. Rehabilitation with vitamin D could reverse the alterations in oxidative and nitrosative stress parameters. Increase in total protein degradation, 20S proteasomal enzyme activity, muscle atrophy gene markers(Atrogin & MuRF) and expression of proteasome subunit genes(PSC2 & PSC8) induced by oxidative stress were corrected both by pre/post treatment of C2C12 muscle cells with vitamin D. SOD activity increased in presence of vitamin D.

Conclusions: The data presented indicates that vitamin D deficiency leads to mild oxidative stress in the muscle which may act as a trigger for increased proteolysis in the vitamin D deficient muscle.

Keywords: (maximum 5): Vitamin D, muscle wasting, C2C12 cells,Oxidative stress

149/65. Implementation of nutrition rehabilitation as part of rehabilitation courses organised by the SII

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Introduction: Nutrition rehabilitation (nutrition counselling and food service) is of particular importance in the treatment and prevention of many diseases. It also has a positive impact on functioning, work capacity and quality of life.

Objectives: The aim of this study was to discover how nutrition rehabilitation is implemented by rehabilitation institutions.

Method / Design: Seven types of rehabilitation courses were selected as special objects of study. The study was carried out as an electronic questionnaire. It was emailed to 55 institutions offering rehabilitation services organised by the SII (the Social Insurance Institution of Finland). The form was returned by 50 (91%) of the institutions.

Results: Nutrition counselling was given in 45 institutions, mainly by registered dieticians (80%) but also by other health personnel such as nurses and physicians. The key topics of the counselling were healthy eating habits, weight control, regular meal patterns, adequate intake of fibre, and quality and amount of fat. Food service was well or moderately well aligned with nutrition counselling in almost all institutions. The food plate model was on view in one out of four of the institutions. As for the standards guiding nutrition rehabilitation, the responses focused on the following suggestions: Ensure the quality of nutrition rehabilitation and increase flexibility and customer orientation.

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Conclusions: The results suggest the following: All rehabilitation institutions should have a nutrition expert who is responsible for ensuring that nutrition counselling and food service are in line with nutrition recommendations. The food service should be upgraded by improving the quality of fat and decreasing the amount of salt in food preparation. The healthy meal should be demonstrated by the food plate model in all institutions. Standards concerning nutrition rehabilitation should be defined and nutrition rehabilitation should be adopted by the SII as an audit criterion.

Keywords: (maximum 5): Nutrition, rehabilitation, councelling, food sercive

149/66. Health effects of consuming scottish farmed salmon raised on different feeding regimes in healthy subjects

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Introduction: Aquaculture has the potential to reduce pressure on wild fish stocks whilst meeting the dietary needs of the population for omega-3 fatty acids and key nutrients such as vitamin D. However, due to sustainability considerations farmed fish may have to be raised on diets containing some vegetable oils which may reduce its omega-3 content.

Objectives: We investigated the health effects of consuming Scottish farmed salmon raised on different feeding regimes in healthy subjects.

Method / Design: Salmon were grown on feeds containing either high (HPUFA) or more sustainable (SPUFA) levels of omega-3 fatty acids, resulting in an EPA+DHA content of 2.1 or 0.9g/100g, respectively. In a randomised parallel controlled trial, 51 subjects consumed either 2 portions/week of HPUFA salmon (n=17), 2 portions/week of SPUFA salmon (n=17) or no additional salmon (n=17) as part of their habitual diet, for 18 weeks. Blood samples were collected at t=0, 9 and 18 weeks of intervention to measure the omega-3 index and markers of lipoprotein metabolism, insulin sensitivity, inflammation, oxidative stress and micronutrient availability.

Results: After 18 weeks of intervention, the omega-3 index was significantly higher (>2%) in subjects consuming 2 portions/week of HPUFA or SPUFA salmon, compared with no salmon (both $p<0.05$). The omega-3 index significantly correlated with levels of serum 25OH-vitamin D3 in all subjects ($r=0.33$, $p<0.05$). Plasma triglyceride levels were significantly lower in subjects consuming SPUFA salmon after 18 weeks ($p<0.05$), whereas pulse was significantly lower in subjects consuming HPUFA salmon after 9 weeks ($p<0.01$), compared with no salmon.

Conclusions: As long as consumers eat 2 portions of oily fish per week, the beneficial effects of consuming salmon grown on traditional high fish meal fish oil feeds, or on feeds where part of the fish oil is replaced by vegetable oil, are comparable.

Funded by the Scottish Government (RESAS)

Keywords: (maximum 5): fish, cardiovascular health, omega-3 index

149/69. Whole milk and butter; clinically significant reduction of respiratory tract complaints in children

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Introduction: Recurrent respiratory tract complaints are a common phenomenon in children. They include wheezing, coughing, rasping and a runny or blocked nose. Whole milk and natural butter contain fat soluble vitamins, among others vitamin A and E, but also vitamin C, all vitamins with anti-oxidative capacities.

Objectives: We hypothesize that with a dietary change to these dairy products, respiratory tract complaints will decrease.

Method / Design: Children aged between 1-6 years with recurrent respiratory tract symptoms were included in a retrospective case-control study .

The intervention consisted of a dietary advice of daily whole milk/yoghurt and natural butter for 2 months. The control group could continue their usual semi skimmed milk and low fat margarine consumption as before. Respiratory symptoms were collected with 3-month diaries.

Results: 50 patients were included in the intervention group, 49 in the control group. After 3 months of following the dietary advice, the children were significantly less rasping; from 18 (SEM =1.5) to 9 (SEM=1.8) days a month ($p<0.000$). Also, days with fever (1.0 to 0.0 days a month, $p< 0.000$), coughing (18 to 10 days a month, $p<0.000$) and runny/blocked nose decreased significantly (18 to 11 days a month, $p=0.008$) in the intervention group. Wheezing was not affected by the dietary advice (1 to 0 days a month, $p>0.05$). The body mass index was not altered after the advice; it changed from 16.4 to 16.6 ($p=0.570$).

Conclusions: Consumption of whole milk and butter for 2 months significantly decreases respiratory tract complaints in children. Wheezing, the only symptom reactive to bronchodilatators, was not affected by the dietary advice.

We conclude a simple dietary change can significantly improve respiratory tract complaints without side effects.

Keywords: (maximum 5): children
respiratory tract
dairy products
coughing

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149/73. Depression and serum 25-hydroxyvitamin D in older adults living at northern latitudes–AGES-Reykjavik Study

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Introduction: Low vitamin D status may be associated with depression although few studies have investigated vitamin D status and depression in older adults living at northern latitudes. Additionally, among older adults, any association may be exacerbated by poor diet and adverse life changes.

Objectives: The present study investigates the association between serum 25-hydroxyvitamin D (25(OH)D) status and depression among community dwelling older persons living in Iceland (latitudes 64-66°N).

Method / Design: Cross-sectional analysis of data from 5006 participants (43% male, aged 66-96 years) of the Age, Gene/Environment Susceptibility (AGES)-Reykjavik Study, with serum 25(OH) D measures and detailed clinical profiles was performed. Lifetime occurrence of major depressive disorder was assessed according to DSM-IV criteria. Serum 25(OH)D was analysed using chemiluminescence immunoassay and categorized into three groups: deficient (<30 nmol/L), inadequate (30-49.9 nmol/L) and adequate (≥50 nmol/L). Logistic regression analyses were used to estimate the odds ratio (OR) and 95% confidence intervals (CI) for depression adjusting for potential confounders, including season of blood draw, supplement use, and health profile.

Results: There were 76 men and 144 women with lifetime major depressive disorder. Men who had deficient vs. adequate serum 25(OH)D concentrations were more likely to be depressed, adjusted OR (95% CI): 2.08 (1.12, 3.85). Associations among women were not significant.

Conclusions: In this older population living at a northern latitude, deficient serum 25(OH)D concentrations may be a risk factor for depression, particularly among older men. Investigations are warranted to evaluate the sex-specific pathways that may be associated with risk of depression among older adults.

Keywords: (maximum 5): vitamin D, depression, older adults, nutrition epidemiology

149/74. Effects of quercetin on oxidative and inflammatory markers and disease activity of rheumatoid arthritis patients

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Introduction: Quercetin is a flavonoid which has showed anti-oxidative, anti-inflammatory and anti-hypertensive properties in many studies.

Objectives: The aim was to determine the effects of quercetin on plasma total antioxidant capacity (TAC), lipid-peroxidation, blood pressure, inflammatory factors, disease activity and clinical outcomes in patients with Rheumatoid Arthritis.

Method / Design: The present study was a randomized, placebo-control and double-blind clinical trial, in which 51 patients with RA, aged 19-70 years, were recruited. Patients were randomly assigned to two groups and received either quercetin (500 mg/d) or placebo capsules for 8 weeks. Fasting blood samples were taken at the baseline and the end of the study. TAC , MDA, ox-LDL, hs-CRP, hs-TNFα , ESR and RF were measured. Blood pressure, morning stiffness and pain, night pain, after activity pain , swelling joint count (SJC), tender joint count (TJC), disease activity score (DAS-28) and PGA were assessed at baseline and after intervention.

Results: Quercetin had no significant effect on TAC, MDA, ox-LDL, hs-CRP, hs-TNFα, ESR, RF and blood pressure. Morning stiffness was significantly less in the quercetin group compared to placebo (P=0.03). Morning and night pain was significantly less in quercetin group compared to placebo (P=0.005 and P=0.01, respectively). Pain after physical activity and morning pain significantly decreased in quercetin group after intervention (P=0.001 and P=0.004, respectively). In quercetin group mean daily intake of NSAIDs and acetaminophen were less than placebo group (P=0.01). Quercetin decreased significantly TJC and DAS-28 (P=0.04 and P=0.001, respectively).

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Conclusions: Although quercetin supplementation for 8 weeks had no effect on blood pressure, oxidative and inflammatory biomarkers, but it could improve or alleviate clinical outcomes such as pain, morning stiffness and disease activity score in patients with RA.

Keywords: (maximum 5): Arthritis rheumatoid, quercetin, inflammation, clinical outcomes

149/80. The effects of glutamine supplementation on endothelial progenitor cell and lung injury in septic mice

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Introduction: Sepsis-induced endothelial cell (EC) injury is one of the causes that lead to lung injury. Circulating endothelial progenitor cells (cEPCs) are involved in mediating vascular repair under pathological conditions. Glutamine (GLN), a specific nutrient for rapid proliferation cell, is considered as essential amino acid for sepsis.

Objectives: To investigate the effects of GLN administration on regulating the population of cEPC and lung injury induced by sepsis.

Method / Design: Mice were randomly divided into three groups: normal group (NC), septic saline group (SS), and septic GLN group (SG). Sepsis was induced by cecal ligation and puncture (CLP). The SS group was injected with saline, and the SG group was given 0.75 g GLN/kg body weight once via a tail vein 1 h after CLP. Mice were sacrificed 24 and 48 h post-CLP. The blood and lungs were harvested. cEPCs distribution was analyzed based on the expressions of surface maker CD34, CD133, and CD309. The serum level of VEGF, the indicator of EC injury, was measured by ELISA. Lung injury was evaluated by analyzing the concentration of pro-inflammatory cytokines and histopathological examination.

Results: CLP result in higher cEPCs (CD34/CD133/CD309) distribution and VEGF production in serum. Also, the injury score and the concentration of interleukin-1 and interleukin-6 in lung tissue were higher compared with NC group. Septic mice with GLN supplementation had lower VEGF level at 24 h and lung injury score at 24 h and 48 h than those in the SS group. Compare with the SS group, the percentage of cEPC was significantly higher in the SG group after CLP.

Conclusions: In an experimental model of polymicrobial sepsis, a single intravenous dose of GLN administered after CLP modulate the distribution of cEPCs than may possibly involve in attenuating EC damage and lung injury.

Keywords: (maximum 5): Endothelial progenitor cell, Glutamine, Sepsis, Lung injury

149/81. Effect of nutrition intervention among young children suffering from iron deficiency anemia in rural Cameroon

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Introduction: In most developing countries and in Cameroon, iron deficiency anemia (IDA) is a public health problem. More than 47 % of Cameroonian toddlers are anemic. The impact of a nutrition intervention to treat IDA has never been studied in Cameroon.

Objectives: To evaluate the influence of an intensive dietary program for the treatment of IDA in 25 intervention and 25 control groups of young children aged 6 to 24 months from Cameroon.

Method / Design: A longitudinal study was conducted among children aged 6 to 24 months in six health centers in Bangang. A nutrition knowledge questionnaire, 24 hours dietary recalls, anthropometric measurements, hemoglobin levels and iron status indices were also taken. After confirmation of iron status, a quasi-experimental design comprising 20 weeks nutrition intervention including 4 weeks of nutrition education combined with an iron supplementation of 16 weeks carried out in 25 intervention and 25 control groups of young children suffering from mild iron deficiency anemia. All measurements mentioned above were repeated at the end of the 20 weeks period in both groups.

Results: Nutrition knowledge scores were higher in the intervention group ($p < 0.01$) compared to the control group after 20 weeks. Also, mean hemoglobin (11.46 vs. 10.63 g/dL; $p < 0.01$) and serum ferritin values (29.93 vs. 18.89 µg/L; $p < 0.05$) were higher in the intervention group, whereas the incidence of anemia (28 vs. 76 %; $p < 0.01$) and iron deficiency anemia (32 vs. 64 %; $p < 0.05$) was significantly lower. No significant differences were observed in iron deficiency and anthropometric indices ($p > 0.05$) between both groups in post intervention.

Conclusions: Nutrition education program with additional iron supplementation are good strategies to reduce childhood iron deficiency anemia. Therefore, the findings will be useful and adapted in other rural areas.

Keywords: (maximum 5): Iron deficiency, anemia, iron supplementation, young children, Cameroon.

149/85. The effect of daily egg-yolk consumption on the serum lipid profile of rabbits

Author(s): (1) Marshall Arebojie Azeke; (2) Mary Ugunushe Eigbobo.

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ria; (2) Team Member. Nutrition Biochemistry. Department of Biochemistry. Ambrose Alli University. Ekpoma. Nigeria.

Introduction: High intake of cholesterol-rich foods such as eggs could lead to hypercholesterolaemia and consequently atherosclerosis.

Objectives: This study was conducted to evaluate the effect of daily egg yolk consumption on the serum cholesterol of rabbit models.

Method / Design: Sixteen (16) adult Rabbit models of average weight 1.21 ± 0.71kg were divided into four groups of 4 rabbits per group. Group 1 rabbits (control) were fed normal growers mash while groups 2, 3 and 4 were administered normal growers mash supplemented with 5, 10 and 20% respectively egg yolk for 5 weeks. At the end of the feeding period, the feed intake, the changes in weight of rabbit as well as serum lipid profile (total cholesterol, total triglycerides, HDL-cholesterol and LDL-cholesterol) were determined.

Results: Only the feed intake of rabbits fed 20% egg yolk supplementation decreased significantly ($P<0.05$). There were significant increases in final body weights of rabbits compared to the basal weights of all the treatment groups ($P<0.05$). The 10% and 20% egg yolk supplementation group resulted in the highest weight gain (29%). Also, 5g of egg yolk per day for test rabbits with mean weight of 1.24 ± 0.02kg did not result in a significant increase in serum total-triglyceride and LDL-cholesterol. This would amount to about 282g of egg yolk for a 70 kg adult person. However, 10 and 20% egg yolk supplementation resulted in a significant increase in serum LDL-cholesterol ($P<0.05$).

Conclusions: The results show that the average level at which egg is consumed in Nigeria may not be a predisposing factor for atherosclerosis; therefore egg consumption should not be discouraged.

Keywords: (maximum 5): Egg-yolk, Serum-Cholesterol, Serum-Lipid, Atherosclerosis

149/87. Does a Low FODMAP Diet Reduce Symptoms Associated with Functional Gastrointestinal Disorders? – A Meta-Analysis

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Introduction: Functional gastrointestinal symptoms such as abdominal pain, bloating, constipation, diarrhea and flatulence are common in patients with Irritable Bowel Syndrome (IBS) or Inflammatory Bowel Disease (IBD). The diversity of symptoms presenting has meant finding an effective treatment challenging with most treatments alleviating only the primary symptom. A novel treatment for IBS and IBD currently generating excitement is the low FODMAP (Fermentable, Oligo-, Di-, Mono-saccharides And Polyols) diet.

Objectives: To determine the evidence of the efficacy of a low FODMAP diet in the treatment of such symptoms.

Method / Design: Electronic databases were searched. Pooled odds ratios (ORs) and 95% confidence intervals were calculated for the effect of a low FODMAP diet in the reduction of IBS Symptom Severity Score (SSS) and increase in IBS Quality of Life (QOL) score for both randomized clinical trials (RCTs) and non-randomized interventions using a random-effects model.

Results: Six RCTs and 16 non-randomized interventions were included in the analysis. There was a significant decrease in IBS SSS scores for those individuals on a low FODMAP diet in both RCTs (OR: 0.44, 95% CI: 0.25-0.76) and non-randomized interventions (OR: 0.03, 95% CI: 0.01-0.20). In addition, there was a significant improvement in the IBS QOL score for RCTs (OR: 1.84, 95% CI: 1.12-3.03) and for non-randomized interventions (OR: 3.18, 95% CI: 1.60-6.31). Moreover, following a low FODMAP diet was found to significantly reduce symptom severity for abdominal pain (OR: 1.81, 95% CI: 1.13-2.88), bloating (OR: 1.75, 95% CI: 1.07-2.87) and overall symptoms (OR: 1.81, 95% CI: 1.11-2.95) in the RCTs. In the non-randomized interventions similar findings were observed.

Conclusions: This meta-analysis supports the efficacy of a low FODMAP diet in the treatment of functional gastrointestinal symptoms. Further research should ensure studies include a dietary adherence assessment as part of a low FODMAP diet.

Keywords: (maximum 5): Irritable Bowel Syndrome, Functional Gastrointestinal Disorders, FODMAPs diet

149/90. Pre-diagnostic enterolactone levels and mortality among Danish men diagnosed with prostate cancer

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Introduction: Introduction: Prostate cancer is the most common cancer and the second most common cause of cancer related death among Northern European men. Currently there is a lack of knowledge about what men with prostate cancer can do to improve their prognosis. Lignans are phytoestrogens found as phenolic compounds in seeds, whole grains, nuts, and in some fruits and vegetables. Facilitated by the microbiota, plant lignans are converted to enterolignans (enterolactone and enterodiol) in the large intestine, and thereafter absorbed through the colonic barrier. Intervention trials have indicated that diets rich in whole-grain rye, and thereby also lignans, may have desired effects on disease progression in prostate cancer patients.

Objectives: Objectives: Our objective was to investigate the association between pre-diagnostic enterolactone levels and all-cause as well as prostate cancer-specific mortality among men diagnosed with prostate cancer.

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Method / Design: Method / Design: The association between pre-diagnostic plasma enterolactone levels and all-cause mortality as well as prostate cancer-specific mortality was investigated in 1431 men diagnosed with prostate cancer from the Danish "Diet, Cancer and Health" cohort study. Enterolactone levels were analysed using a LC-MS method, and information on vital status and cause of death was obtained through registries. Cox proportional hazards models with follow-up time as underlying time, stratified by 5-year intervals and adjusted for lifestyle factors, were used to estimate hazard ratios.

Results: Preliminary results: High levels of enterolactone were associated with lower all-cause mortality, but the association was no longer statistical significant after adjusting for potential confounders. No association was found with prostate cancer-specific mortality.

Conclusions: Preliminary conclusions: High enterolactone concentrations were not associated with improved survival in a population of Danish men diagnosed with prostate cancer.

Keywords: (maximum 5): prostate cancer, enterolactone, lignans, mortality, prognosis

149/94. Role of oral Cholecalciferol as adjuvant therapy in type 1 diabetes mellitus: randomized controlled trial

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Introduction: The vitamin D hormone system has been implicated in the pathogenesis of several autoimmune diseases, including Type 1 Diabetes Mellitus, as an adaptive immune system modulator

Objectives: The objective of this study is to examine the role of cholecalciferol in modulating the altered immune response in T1DM, thereby improving glycemic control and residual pancreatic Beta-cell function, measured objectively by Hemoglobin A1c levels, GAD65 antibody titers and C-peptide levels.

Method / Design: 52 T1DM patients aged 1-18 years attending JIPMER Pediatrics department in year 2014 were randomized into two groups. High dose oral cholecalciferol therapy (1.2 lakh IU per month) was instituted in addition to insulin in intervention arm, while only insulin was continued in other arm for 6 months.

Results: Prevalence of Vitamin D deficiency was as high as 63.5% among T1DM patients in our study. High dose oral cholecalciferol supplementation caused significant rise in serum vitamin D levels to sufficient range in cholecalciferol group. The Cholecalciferol group achieved significantly lower HbA1c levels at 3 and 6 months follow-up than controls ($p<0.05$). The mean C-peptide levels were significantly greater ($p <0.05$) and mean GAD65 antibody levels were significantly lower ($p<0.01$) for cholecalciferol group as compared to controls at end of 6 months. No adverse events due to cholecalciferol therapy were reported.

Conclusions: Our study shows that high dose oral cholecalciferol concomitant with insulin therapy is safe and is related to protective immunologic profile and slow decline of residual Beta-cell function in T1DM patients, thereby enhancing glycemic control. Cholecalciferol may become an interesting adjuvant in combination with insulin as an immune-modulator in T1DM patients. An affordable, safe and easily obtainable vitamin may serve as a novel approach in the fight against a costly, debilitating, chronic disease.

Keywords: (maximum 5): CHOLECALCIFEROL; DIABETES MELLITUS; HEMOGLOBIN A1C ;
C-PEPTIDE; GAD65

149/95. Zedoary – A medicinal spice in oblivion

Author(s): Andrea Jessen.

Affiliation: *Biologist. Tamm.Germany.*

Introduction: Zedoary (Curcuma zedoaria) is closely related to the well known curcuma (Curcuma longa) and was commonly used in traditional European medicine for many centuries for the treatment of gastro-intestinal disorders. Indications were based upon its characteristics as described by the humoral concept of medicine. In the Western world C. zedoaria has vanished as a remedy while it is still widely in use in traditional Asian medicine.

Objectives: To identify and compare traditional uses of zedoary in the Western and Asian medicine with modern Western academic medical concepts. Thus identifying possible evidence-based health benefits and to evaluate the re-implement of zedoary into modern Western diet.

Method / Design: A literature-based analysis on the use of C. zedoaria for gastro-intestinal disorders in the previously described medical concepts was conducted.

Results: The study revealed that zedoary was commonly used spice and herb in traditional European medicine for intestinal disorders. Curcuma zedoaria has vanished from the focus of Western complementary treatment in gastro-intestinal disorders (in contrast to the well known Curcuma longa) and was finally removed from German pharmacopoeias in the 1990s owing to a lack of evidence-based effects.

Conclusions: C. lzedoaria has been regarded a powerful herb in holistic medical concepts for many centuries. Recent research suggests that zedoary may have inhibitory effects on certain gastric cancer cell activities thus further studies and research could be promising to demonstrate its efficacy and restore it as nutritional supplement promoting health effects for the digestive system.

Keywords: (maximum 5): MEDICINAL HERBS, ZEDOARY, GASTRO-INTESTINAL DISORDERS, ALTERNATIVE MEDICINE

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149/96. Between plague and Ebola – Haemorrhagic diarrhea in early modern Germany, a forgotten disease

Author(s): Andrea Jessen.

Affiliation: *Biologist. Tamm. Germany.*

Introduction: Research revealed an aggressive type of haemorrhagic diarrhea commonly referred to as "Rote Ruhr" in Early Modern Germany. It ravaged poor rural populations, mainly affecting young and healthy individuals. It vanished by the end of the 17th century. Contemporary physicians commonly attributed it to the pestilential spectrum and sometimes named it "the true plague in disguise". Descriptions hint towards a – supposedly foodborne – haemorrhagic fever, affecting primarily the small intestines but then spreading throughout the body. Since it reached mortality rates of up to 50%, it was a major threat to public health.

Objectives: To point out parallels of current haemorrhagic epidemics in rural Africa and how we may learn from the past to find answers for today's challenges in remote and superstitious areas.

Method / Design: Analysis of vernacular medical treatises of Early modern Germany regarding description of causes, symptoms, prevention, treatment and prognosis. The most commonly advised remedies and strategies were compared to modern research to verify efficacy.

Results: "Rote Ruhr" may be attributed to the haemorrhagic fever spectrum or may display a manifestation of plague apart from the bubonic and lung type. Prevention and treatment had to be inexpensive, easily available and would have to be accepted by illiterate and highly superstitious individuals. The medical concept used a holistic approach and primarily herbal remedies.

Conclusions: Due to the holistic approach results may be adapted and transferred to non-European medical concepts and help to fight current epidemics in rural societies. Focus is on how to apply scholarly medicinal advice to different and suspicious environments and how to trigger changes in attitude and lifestyle.

Keywords: (maximum 5): HAEMORRHAGIC, PLAGUE, RURAL, EPIDEMIC, HERBAL REMEDIES

149/97. Dietary intake and quality of life in Irish women during pregnancy

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Introduction: Quality of life (QoL) during pregnancy is an important indicator of maternal health and may affect the outcomes of pregnancy including neonatal health. There is paucity in the literature with regards to the impact of nutrition on the perceived quality of life in pregnant women.

Objectives: This study examined the relationship between nutrient intake and the perception of quality of life during early pregnancy.

Method / Design: The present study was a cross-sectional analysis using 13-year follow-up data from the Lifeways Cross-Generation Cohort Study. Data was collected from 838 expectant mothers recruited during their first antenatal visit (mean age = 29 years). The WHOQOL-BREF Quality of Life instrument was completed by participants. QoL scores were calculated as a continuous value and a dichotomous score (low and high) was created. Dietary information was obtained from food-frequency questionnaires. Binary logistic regression analysis was conducted to test associations of intake with QoL.

Results: Mothers with high energy-adjusted fat intake had significantly lower QoL scores in the physical (OR 0.96 95% CI: 0.94 to 0.98), psychological (OR 0.97 95% CI: 0.94 to 0.99) and environmental (OR 0.967 95% CI: 0.95 to 0.99) domains. Women with high energy-adjusted carbohydrate intake had significantly high QoL in the physical (OR 1.02 95% CI: 1.00 to 1.04), psychological (OR 1.02 95% CI: 1.01 to 1.04) and environment (OR 1.02 95% CI: 1.00 to 1.04) domains. Women with high energy-adjusted protein intake had significantly high QoL only in the physical domain (OR 1.05 95% CI: 1.01 to 1.09).

Conclusions: Maternal dietary intake influences the perception of QoL during pregnancy independent of pre-pregnancy BMI. Adherence to suitable diet is suggested to enhance it.

Keywords: (maximum 5): pregnancy, dietary intake, quality of life

149/99. Nutritional status in advanced chronic kidney disease not on dyalisis

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Introduction: Malnutrition in ACKD is highly prevalent increasing morbidity.

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Objectives: To assess the nutritional status in patients not dialyzed with ACKD.

Method / Design: A descriptive, observational study to assess the nutritional status by global subjective assesment (GSA), remember intake 24 hours,biochemical parameters and body composition with anthropometric data and bioimpedance.

Results: 40 patients with a mean age of 58.9 years and 19.3 FG ml / min / 1.73m2.The average weight was 75 kg and BMI 27.94 kg / m2. The waist circumference was 99 cm. The mean arm circumference was 28.66 cm.By bioimpedance overhydration 0.2 l, 5.4 phase angle, lean mass 38.9 kg (52%) and fat mass 25.8 kg (34.3%), Index Na+/k+ 0.9. Hemoglobin 12.3mg / dl, transferrin 239.3 mg / dl, 1795 lymphocytes, total protein 6.9g / dl, 4.2 g albumin / dl, 27.1 mg prealbumin and C-reactive protein 6.36 mg. By GSA 22 patients (55%) good nutritional status, 16 (40%) moderately malnourished or at risk of malnutrition and 2 (5%) severe malnutrition. Mean total calories ingested was 1583(21.69 kcal / kg/ day).Carbohydrates 46.9%, protein 17.6%,35.7% fat,1319mg sodium and potassium1625 mg.

Conclusions: In our study 40% of patients are moderately malnourished.Malnutrition is presented as overweight. The biochemical parameters showed no special significance, only C-reactive protein was elevated. Our patientients diet is characterized to be a poor diet energy with abuse of fats and proteins. Malnutrition and inflammation are closely related and increase morbidity and mortality after starting dialysis, so we have to face it before starting dyalisis.

Keywords: (maximum 5): ACKD, malnutrition, nutritional assesment, bioimpedance

149/103. Effects of active and passive smoking on lipid peroxidation-a risk factor of cardiovascular disease

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Introduction: Disease risk due to smoking is not limited to smokers only. Passive smoking is associated with adverse health effect and increase risk of several diseases especially cardiovascular disease.

Objectives: To investigate the cardiovascular effects of tobacco smoking on serum cholesterol (C), HDL-C, LDL-C, malondialdehyde (MDA), conjugated diene (CD), vitamin B12, folate and homocysteine (Hcy) in healthy smokers, passive smokers and non-smokers.

Method / Design: 100 male (50 industrial tobacco smokers and 50 passive smokers) from a military unit in BKK and 50 local handmade tobacco smokers from a village in Phitsanulok who participated in the study, were investigated. 50 male non-smokers from the same unit were selected as controls. Fasting blood samples were collected for investigation of lipid profile, MDA, CD, B12, folate and Hcy.

Results: : Vitamin B12 and Hcy of smokers were significantly higher than non-smokers while C, LDL-C, TG and folate (all groups of smokers) were significantly lower than non-smokers. More detail of smoking groups, the industrial tobacco smokers had HDL-C and B12 lower than non-smokers whereas passive smokers and local handmade tobacco smokers had HDL-C and B12 higher than non-smokers. The industrial tobacco smokers had MDA significantly higher than non-smokers but lower in passive smokers and local handmade tobacco smokers. The industrial tobacco smokers and passive smokers had Hcy significantly higher than non-smokers but local handmade tobacco smokers had Hcy lower than non-smokers.

Conclusions: The results of this study suggested that there were low B12, folate with high MDA and Hcy in the industrial tobacco smokers compared with non-smokers, which might contribute to develop of vascular and cardiovascular diseases especially in the industrial tobacco smokers.

Keywords: (maximum 5): ACTIVE AND PASSIVE SMOKING: LIPID PEROXIDATION: CARDIOVASCULAR DISEASE

149/104. Effects of scFOS on rectal sensitivity and composition of the faecal microbiota in patients with IBS

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Introduction: Short-chain fructooligosaccharides from sucrose (scFOS) have beneficial effects in subjects with minor digestive complaints, but the potential mechanisms involved have not been elucidated.

Objectives: The aim of the present study was to demonstrate changes in rectal sensitivity related to the clinical effects of scFOS in a selected group of patients with Irritable Bowel Syndrome (IBS) and rectal hypersensitivity.

Method / Design: The study was performed in two centres: one in France and one in Spain with 79 IBS (defined by Rome III criteria) patients (18-60 years) showing rectal hypersensitivity (defined as discomfort threshold ≤44 g). In a parallel, placebo-controlled, randomized, and double-blind study design, the effects of a dietary supplementation (5 g/d) with scFOS versus placebo for 4 weeks were assessed on rectal sensitivity (primary outcome: tolerance to increasing wall tension applied by a tensostat), clinical outcomes (IBS, anxiety/depression and FDDQOL scores) and composition of faecal microbiota.

Results: Rectal discomfort threshold, as well as IBS and FDDQOL scores, significantly improved during treatment, but in a similar manner in scFOS and placebo groups; a post-hoc analysis showed

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that the effect of scFOS on rectal sensitivity was more pronounced in constipation-predominant-IBS patients (p=0.051 vs placebo). Contrary to placebo, scFOS significantly reduced anxiety scores and increased faecal Bifidobacteria (p<0.05 for both) without modifying other bacterial groups.

Conclusions: These data indicate that the effect of scFOS on anxiety may be related to modulation of the gut microbiota; demonstration of effects of scFOS on rectal sensitivity may require higher doses and may depend on the IBS subgroup.

Keywords: (maximum 5): IBS; bifidobacteria; fructooligosaccharides

149/106. CHRODIS – Joint Action on Chronic Diseases and Promoting Healthy Ageing across the Life Cycle

Author(s): (1) Elva Gisladottir; (2) Gigja Gunnarsdottir; (1) Thorgeirsdottir Holmfridur.

Affiliation: *(1) Nutritionist. Health Determinants. Directorate of Health in Iceland; (2) MPH. Health Determinants. Directorate of Health in Iceland.*

Introduction: Chronic diseases affect 80% of people aged over 65 in Europe. Approximately 75% of health care budgets across the EU are spent on the treatment of chronic diseases. There is a wealth of knowledge within EU Member States on effective ways to prevent and manage chronic conditions. JA-CHRODIS aims to capture the this knowledge and make it accessible across Europe.

Objectives: JA-CHRODIS is a European project, co-funded by the EU, with the aim to promote and facilitate exchange and transfer of good practices on chronic diseases between European countries. These good practices address chronic conditions, with a specific focus on health promotion and primary prevention, with the aim to make a strong contribution to reduce the burden of chronic diseases and to promote healthy living and active ageing in Europe.

Method / Design: In total 7 WPs, thereof 4 thematic:

WP 4 – Platform for Knowledge Exchange – will enable decision-makers, caregivers, patients, and researchers, to identify and exchange the best knowledge on healthy ageing and chronic care.

WP 5 – Health Promotion – identify highly promising, cost-effective and innovative policies as well as health promotion interventions to prevent the onset of cardiovascular diseases and type 2 diabetes. The work takes into account lifestyles and health-related behaviours as well as the socioeconomic determinants of health with the aim to validate and transfer these policies and interventions. A specific focus will be put on addressing the needs of elderly and socially disadvantaged groups.

WP 6 – Multimorbidity - review existing patient-centred comprehensive care programs.

WP 7 – Diabetes - improve coordination and cooperation among countries to act on diabetes, including the exchange of good practices across the EU, and to create ground for innovative approaches to reduce the burden of chronic diseases.

For more information: www.chrodis.eu

Results: none

Conclusions: none

Keywords: (maximum 5): Health Promotion, Healthy ageing, NCDs, Chronic diseases

149/107. Effects of weight reduction on serum lipid profile in obese ponies with metabolic syndrome

Author(s): (1) Ratchada Auyyuenyong; (1) Andrea Henze; (1) Jens Raila; (1) Florian J. Schweigert; (2) Ingrid Vervuert.

Affiliation: *(1) Department of Physiology and Pathophysiology of Nutrition. Institute of Nutritional Science. University of Potsdam. Germany.; (2) Nutrition Diseases and Dietetics. Institute of Animal Nutrition. University of Leipzig. Germany.*

Introduction: Obesity is a worldwide health problem affecting not only humans but also ponies. In this context the equine metabolic syndrome (EMS) resembles the metabolic syndrome present in humans and is characterized by dyslipidemia, hyperleptinemia and inflammation. Weight reduction has been recommended to avoid the detrimental effects of obesity and EMS in ponies. However, little is known about changes in the serum lipid patterns due weight reduction and its association with disease outcome.

Objectives: This study investigated the effect of a body weight reduction program (BWRP) on lipid profiles in serum of obese ponies and to analyze its association with insulin resistance.

Method / Design: Lipid profiles were determined by thin-layer chromatography in serum of sixteen mature ponies before and after a 14-week BWRP. Neutral lipids including cholesterol esters, cholesterol, triacylglycerides, monoacylglycerides and free fatty acids as well as the phospholipids phosphatidylcholine, lysophosphatidylcholine, sphingomyeline, phosphatidylethanolamine and phosphatidylserine were quantified densitometrically after separation with thin-layer chromatography. Additionally, insulin sensitivity, body condition score (BCS) and cresty neck score (CNS) were measured.

Results: The BWRP resulted in an average weight loss of 14.1 ± 3.64% or 171 ± 57.3 kg and was associated with an improvement in BCS and CNS. With regard to lipid composition levels of cholesterol, cholesterol esters, free fatty acids, triacylglycerides, and sphingomyeline increased during BWRP (p<0.01), while the other lipids were unaffected. In this context group-specific analyses revealed that particularly changes in free fatty acids was associated with an improvement of insulin sensitivity irrespective of the basal insulin resistance status.

Conclusions: BWRP significantly affects the serum lipid profile in obese ponies and is mainly characterized by mobilization of neutral lipids as well as the phospholipid sphingomyeline. These changes in serum lipid profile seem to be associated with changes in insulin sensitivity.

Keywords: (maximum 5): Weight reduction, obese ponies, neutral lipids, phospholipids, thin-layer chromatography

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149/111. Prevalence of Chronic Malnutrition (Stunting) and Associated Factors among Children Aged less than 24 Months in East Wollega Zone, Western Ethiopia

Author(s): Tsedeke Hailemariam; Alemu Melke; Emiru Gerbi.

Affiliation: *Ethiopia.*

Introduction: Poor growth especially stunting is associated with impaired development which is apparent in the relationship between growth status and school performance and intellectual achievement. Thus, previous studies in Western Ethiopia were not addressed factors associated with stunting.

Objectives: To assess prevalence and associated factors of stunting among less than 24 months children in East Wollega Zone, West Ethiopia.

Method / Design: A community based cross-sectional study design using two-stage cluster sampling survey was conducted on 593 households from April to May, 2014 in three randomly selected districts of East Wollega Zone to assess factors associated with stunting. A structured and pre-tested questionnaire was used to obtain information on demographic and socio economics characteristics, and anthropometric measurement of children aged less than two years. Bi-variate and multivariate logistic regression models were used to identify significant predictors of stunting at P<0.05.

Results: Prevalence of stunting and severe stunting were 15.7% (95% CI: 12.7-18.7) and 0.3% (95%CI: 0.1-0.5) for children aged <24 months. Stunting was associated with illiterate mothers (AOR = 3.84; 95% CI 1.49-9.91) and nonexclusive breast feeding (AOR = 2.12; 95% CI 1.19-7.79). Children who consumed vegetables and fruits (AOR =0.51; 95%CI 0.28-0.95) and boiling drinking water (AOR = 0.61, 95% CI: 0.39 - 0.97) were significantly reduced odds of being stunted. High dietary diversity scores (DDS) was associated with reduced the risk of being stunted compared to low dietary diversity scores (COR = 0.51; 95%CI: 0.26-0.99).

Conclusions: The prevalence rate of stunting in the study area was found low. Thus, an organized effort should be made at all levels to improve maternal education and exclusive breastfeeding practice of the poor rural population particularly mothers to curb the problems of chronic undernutrition (stunting) in children, especially in the first two years of life.

Keywords: (maximum 5): Stunting, Children, Western Ethiopia

149/113. Prevalence and determinant factors of overweight and obesity among preschool children living in Hawassa City, South Ethiopia: A double burden of disease

Author(s): Tsedeke Hailemariam; Tefera Belachew; Debebe Moges.

Affiliation: *Ethiopia.*

Introduction: Childhood obesity and its related adverse health effects have become major public health problems in developing countries. The prevalence of childhood obesity and overweight and their predictors are not well documented in the developing countries, especially in Ethiopia.

Objectives: This study was to assess the prevalence and predictors overweight and obesity among preschool children in Hawassa, Ethiopia.

Method / Design: A cross-sectional survey was conducted from February to March, 2012. Weight and height of the study children were measured. Logistic regression analyses were performed to identify predictors of obesity and overweight.

Results: The combined prevalence of childhood obesity and overweight was 10.7%. Children living with higher socioeconomic status (SES) were 3.5 times at higher risk for being overweight/obese as compared to children living with lower SES (AOR = 3.51 [95% CI: 1.30-9.50).

Conclusions: Prevalence of overweight and obesity among preschool children in the study area were lower than some reported elsewhere. Overweight/obesity was more common among children with wealthier parents, early introduction of formula feeding, having a wide diversity of foods, consumption of sweets and fast foods. Nutrition educations phasing the need for healthy dietary practices need to be instituted using various strategies to curb the consequences this emerging problem.

Keywords: (maximum 5): Preschool children, overweight, obesity, risk factors, South Ethiopia

149/134. Magnitude of childhood overweight and obesity in Sub-Saharan Africa

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Affiliation: *Epidemiologist, School of Public and Environmental Health, Ethiopia.*

Introduction: Recently childhood overweight/obesity is gaining more and more attention; nevertheless, in Sub-Saharan Africa limited evidence exists on its magnitude.

Objectives: To assess the prevalence of over-nutrition among under five years children in subcontinent.

Method / Design: The study was conducted based on the data of 22 DHS surveys carried out in similar number Sub-Saharan Africa countries between 2010 and 2014. Anthropometric data of 130,670 children were available. BMI-for-age was calculated using WHO growth reference. Based on the population size of the countries weighted prevalence was computed. Factors associated with over-nutrition were identified via logistic regression and the outputs are given using adjusted Odds Ratio (OR).

Results: The prevalence of overweight/obesity was 6.7%. In the subcontinent, for every wasted child approximately 0.6 over-nourished children exist. Among 22 countries represented in the study, higher prevalence was reported in Sierra Leone (16.9%), Comoros (15.9%) and Malawi (14.5%); whereas the opposite found in Ethiopia

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(3.0%) and Senegal (2.0%). Country-level data showed no significant correlation between obesity and average per-capita income (p=0.924). In the multivariate logistic model, household wealth index and place of residence (urban/rural) were not associated with Overweight/obesity. Compared to mothers who had higher level of education, children born to women with primary or secondary level of education had significantly reduced odds of over-nutrition (OR=0.8). Gender wise, the prevalence in boys (7.0%) was slightly higher than in girls (6.4%). Prevalence of over-nutrition tends to decrease with increasing birth order, and maternal and child's age (P<0.05). The odds of overweight/obesity were1.6 times increased in children born to mothers with high BMI (> 25kg/m2).

Conclusions: Double burden of malnutrition is evident in the region. Nutrition policies and intervention should target both sides of malnutrition.

Keywords: (maximum 5): Obesity, Overweight, Sub-Saharan Africa

149/137. Downward trends in the prevalence of childhood overweight in two pilot towns taking part in the VIASANO community-based programme in Belgium: data from a national school health monitoring system

Author(s): (1) Jan Vinck; (2) Christian Brohet; (3) Mireille Roillet; (4) Jean-Michel Borys; (3) Julie Beysens; (5) Michèle Dramaix; (6) Nele Jacobs; (7) Susan Jebb; (8) Corinne De Laet; (9) Jean Nève.

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Introduction: Multilevel approaches involving environmental strategies are considered to be good practice to help reduce the prevalence of childhood overweight.

Objectives: The objective of this study was to evaluate the effects of VIASANO,

a community-based programme using the EPODE methodology, on the prevalence of overweight in two pilot towns in Belgium.

Method / Design: We analysed data from a national school health monitoring system to

compare changes in the prevalence of overweight and obesity over a 3-year period (2007–2010) in children aged 3–4 and 5–6 years in the pilot towns with those of children of the same ages from the whole French-speaking community of Belgium. Heights and weights of all participants were measured by trained school nurses using a standardized method.

Results: The prevalence of overweight (−2.1%) and overweight + obesity (−2.4%) decreased in the pilot towns, but remained stable in the comparison population (+0.1% and +0.2%, respectively). After adjustment for lack of homogeneity between the study populations, there was a trend towards a decrease in overweight (P = 0.054) and overweight + obesity (P = 0.058) in the pilot towns compared with the general population.

Conclusions: These results suggest that a community-based programme, such

as VIASANO, may be a promising strategy for reducing the prevalence of childhood overweight even over a short period of time.

Keywords: (maximum 5): Childhood obesity, community-based intervention, EPODE, prevention, obesity

149/139. Diet-quality indexes and survival among men and women with colorectal cancer: The Multiethnic Cohort

Author(s): (1) Gertraud Maskarinec; (2) Brook Harmon; (3) Simone Jacobs; (4) Lynne Wilkens; (5) Loic Le Marchand; (6) Brian Henderson; (7) Laurence Kolonel; (8) Carol Boushey.

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Introduction: Given the increasing number of colorectal cancer (CRC) survivors, the possible effect of modifiable health behaviors, in particular optimal nutrition, on prognosis is critical.

Objectives: We investigated the association between four a priori dietary quality indexes assessed 6.0±4.7 years before diagnosis and CRC-specific survival in the Multiethnic Cohort (MEC).

Method / Design: At baseline, African American, Native Hawaiian, Japanese American, Latino, and white adults completed a validated quantitative food frequency questionnaire. Cases and deaths were identified through linkages to SEER cancer registries and the National Death Index. Cox proportional hazards regression was applied to estimate hazard ratios (HR) and 95% confidence intervals (CI) for the Healthy Eating Index-2010 (HEI-2010), the Alternative HEI-2010 (AHEI-2010), the Alternate Mediterranean Diet Score (aMED), and the Dietary Approaches to Stop Hypertension (DASH) while adjusting for relevant confounders.

Results: Among 4,204 MEC participants diagnosed with invasive CRC cases during follow-up, 1,976 all-cause and 1,095 CRC-specific deaths were identified. CRC-specific survival was significantly associated with higher scores on the HEI-2010 (ptrend=0.04); for one

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standard deviation increase in the HEI-2010, the HR was 0.93 (95%CI: 0.88-0.99). Individuals in the highest vs. lowest diet quality quartile experienced 20% lower mortality (HR=0.80; 95%CI: 0.67-0.97). A higher aMED score was associated with borderline lower CRC mortality (HR=0.94; 95%CI: 0.88-1.01; ptrend=0.09). No significant associations of CRC-specific survival with the DASH and AHEI-2010 indexes were detected.

Conclusions: The current findings may be related to the HEI-2010 inclusion of dairy intake as a positive dietary component and added sugars from all sources as a negative one. Also, scores for the HEI-2010 and aMED are positively influenced by fish intake and a higher ratio of unsaturated to saturated fatty acids, which are considered possible preventive factors. These results emphasize the merit of an overall healthful diet for optimal survival outcomes.

Keywords: (maximum 5): Colorectal cancer, nutrition, dietary indexes, survival

149/144. EPA prevents adipose tissue expansion in mice fed a high fat-high sucrose diet

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Introduction: Fat mass development and alterations in adipocyte metabolism lead to metabolic syndrome (MS) and insulin resistance (IR). IR is a key element in MS and results from ectopic fat depots in the liver and skeletal muscle when adipose tissue storage capacity is exceeded. Nutritional strategies using n-3 PUFA were proposed to limit adipocyte expansion and metabolic alterations associated to MS.

Objectives: The aim of the present work was to compare the effect of ALA, EPA and DHA on adipose tissue expansion and metabolism during a high fat-high sucrose (HFHS) challenge.

Method / Design: C57BL6 mice were fed with a HF (45% energy)-HS (17% energy) diet for 16 weeks, supplemented or not with ALA, EPA or DHA (1% w/w). Impact of each n-3 PUFA on the differentiation process of 3T3-L1 adipocytes was also evaluated.

Results: In vivo, n-3 PUFA did not affect final body weight nor energy intake. ALA did not alter mice metabolism compared to HFHS alone. EPA significantly reduced fat mass and slightly increased energy expenditure. By contrast, DHA induced adipose tissue hyperplasia and hypertrophy. DHA and EPA similarly maintained adiponectin plasma concentration compared to HFHS alone, but had opposite effects on leptin plasma concentration. Thus adiponectin to leptin ratio was improved only in mice fed a HFHS diet enriched with EPA. In vitro experiments confirmed a differential effect of EPA and DHA on the induction of leptin gene expression and on the expression of adipocyte-related genes in fully differentiated adipocytes.

Conclusions: Long chain omega 3 fatty acids have distinct effects on adipose tissue development. By contrast with DHA, EPA has interesting anti-obesogenic and anti-inflammatory effects in vivo potentially mediated through its impacts on adipose tissue metabolism.

Keywords: (maximum 5): Adipose tissue, n-3PUFA, obesity, metabolism

149/152. Diet in Tuscan population associated with lower depressive symptoms over time

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Introduction: There are indications that healthy diets high in fruit, vegetables, fish and olive oil, have a positive influence on depressive symptoms.

Objectives: This study aimed to investigate the association between dietary patterns and repeated measurements of depressive symptoms over time.

Method / Design: At baseline, 1,362 subjects (aged 20-102 years) were included in the study. Data collection started in 1998 and was repeated every 3 years with an overall follow-up time of 9 years. For baseline dietary patterns, a continuous dietary pattern score was derived from Reduced Rank Regression (RRR). Omega-3 fatty acids (EPA+DHA), vitamin B6 and folate were used as response variables. The continuous depression score (ranging from 0-60 points) from the Centre for Epidemiologic Studies Depression (CES-D) scale was used for assessing depressive symptoms. For the cross-sectional analyses, linear multiple regression was used. Longitudinal analyses were performed with baseline dietary patterns and repeated measures of continuous CES-D scores using linear mixed models.

Results: The dietary pattern derived by RRR was rich in vegetables, fruit, olive oil, grains, fish and moderate in red and processed meat and was labelled as a healthy diet. After adjusting for potential confounders, including age, marital status and other health variables, an inverse association was observed between a healthy dietary pattern

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and depressive symptoms cross-sectionally (B= -1.02, 95% CI -1.49; -0.54). When looking at the relationship between a healthy dietary pattern at baseline and depressive symptoms during follow-up, a similar association was found after full adjustment for confounders (B= -0.88, 95% CI -1.27; -0.50).

Conclusions: A diet containing high amounts of vegetables, fruit, olive oil, grains, fish and moderate intakes of red and processed meat is consistently associated with lower CES-D scores over a time period of 9 years in the Tuscan population.

Keywords: (maximum 5): diet, dietary pattern, depression, depressive symptoms, Reduced Rank Regression

149/153. A systematic review of the effectiveness of peer support to reduce cardiovascular risk.

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Introduction: Cardiovascular disease (CVD) is a major cause of morbidity and mortality worldwide and there is a need to identify strategies for both primary and secondary CVD prevention. Peer support is an important, flexible and low-cost method of improving health outcomes in different population groups. In this regard, mobilising peer support may be an effective public health approach to reduce CVD risk.

Objectives: This review examined the effect of peer support on CVD risk in adults.

Method / Design: Medline, EMBASE and CINAHL were searched for articles up to August 2013 and supplemented by a manual search of reference lists for eligible studies. Studies examining the effect of peer support on primary and secondary CVD events or CVD risk factors, in adults > 18 years, were eligible for review. Data was extracted by two independent reviewers and synthesised in a narrative review.

Results: A total of 65 randomised controlled trials and comparator cohort studies met the inclusion criteria. There was substantial heterogeneity in the design, setting and outcomes measured. None of the included studies examined CVD events as an outcome measure. Peer support showed statistically significant improvements in BMI/weight (23 out of 38 studies: 61%), glycaemic control (10 out of 23 studies: 43%), blood cholesterol levels (9 out of 18 studies: 50%) and blood pressure measurement (8 out of 19 studies: 42%). No consistent pattern of effect was found for specific peer support approaches (group, peer mentor, web/online, telephone/text) and CVD outcome measurements examined in individual studies.

Conclusions: Despite some evidence supporting a beneficial effect of peer support for established CVD risk factors, studies are too heterogeneous to draw firm conclusions. There is a need for further well-designed intervention trials to evaluate the effect and sustainability of peer support for CVD risk in different population groups.

Keywords: (maximum 5): Peer, support, cardiovascular disease

149/155. Energy-Malnutrition of institutionalized geriatric patients – Are the common menus adequate?

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Introduction: Energy malnutrition is obvious in multi-morbid institutionalized geriatric patients and results in a wasting of both fat and lean mass and a changed body composition. It is assumed that poor oral food consumption and therefore low energy intake are responsible for the development of energy malnutrition.

Objectives: To evaluate whether the oral energy intake through the regular food provision of multi-morbid geriatric patients is adequate for sustaining their body composition.

Method / Design: A nine month observational study. At the beginning (month 1) and at the end (month 9) three-days weighing records for assessing energy intake and bioelectrical impedance analysis (BIA) for assessing body composition were carried out. Three-days-weighing records were done by a trained staff, which weighed the plates with the meals before and at the end of the senior's food intake. The body composition was measured with Bodystat 1500®MDD in a multi-frequency (5/50kHz) technique on the right side of the body in supine position at the beginning (week 1) and at the end (week 36) of the observation-time. The statistical evaluation was done using the non-parametric Wilcoxon-Rang-Test. P-value <0.05 was considered statistically significant. 81 multi-morbid institutionalized geriatric patients with a mean (±SD) age of 84 (±9.5) years and a mean (±SD) BMI of 26.2 (±4.8) gave their consent to take part. 82% (n=68) were female and 18% (n=15) were male. No participant was fed enteral or parenteral or got nutritional supplements.

Results: Mean energy-intake was significantly below 24kcal/kgBW ($p<0.001$) and declines ($p<0.018$) during observation time. Fat-mass decreased ($p<0.002$) and total-body-water increased ($p<0.001$) significantly. Energy-intake correlates significantly with fat-mass ($p<0.003$) and total-body-water ($p<0.001$).

Conclusions: Energy intake through oral food intake was insufficient for sustaining body-composition of multi-morbid geriatric patients. Efforts should be made in adapting regular non therapeutic food provision to poor oral food-intake for avoiding energy malnutrition.

Keywords: (maximum 5): multi-morbid-geriatric-patients, energy-malnutrition, body-composition, food-intake

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149/156. Peer support to encourage dietary change toward a Mediterranean diet: the TEAM-MED study protocol.

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Introduction: Greater adherence to a Mediterranean Diet (MD), using an intensive dietetic strategy to achieve dietary change, significantly reduces cardiovascular disease (CVD) risk. Peer support potentially offers an alternative, low cost approach to encourage dietary behaviour change.

Objectives: This study aims to develop a tailored peer support intervention and examine its feasibility to encourage MD adoption in Northern European adults at high CVD risk.

Method / Design: The Trial to Encourage Adoption and Maintenance of a Mediterranean diet (TEAM-MED) is a pilot randomised controlled trial developed using the Medical Research Council framework for design and evaluation of complex interventions. The peer support intervention was informed by literature review and qualitative research with the target population.

Results: The developed peer support intervention is a group-based programme comprising 11 non-didactic and interactive sessions delivered by two trained peer supporters. The underpinning theoretical framework is based on the social support model and behaviour change techniques, including social support, dietary goal setting, self-monitoring and problem-solving, are incorporated within the intervention. A total of 75 overweight adults who do not follow a MD (Mediterranean Diet Score (MDS) ≤ 3) and at ≥ 20% CVD risk will be randomly assigned to receive either: a minimal intervention (written MD educational material), an intensive intervention (personal dietetic advice, quarterly group support and key MD foods) or the developed peer support intervention, for a 12 month period. The primary endpoint is change in MDS from baseline to 6 months.

Conclusions: TEAM-MED will complete in 2016 and will evaluate feasibility of a peer support intervention, compared with both an intensive and minimal intervention, to encourage dietary change toward a MD. The study will also explore the extent to which social-cognitive factors, in addition to factors relating to social support and social cohesion, mediate dietary behaviour change towards a MD.

Keywords: (maximum 5): Peer, support, Mediterranean diet

149/158. Impact of iron intake through the non-therapeutic meals provision on anemia prevalence of institutionalized frail elderly

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Introduction: A high prevalence of iron-deficiency anemia and poor oral intake are frequent in geriatric long-term-institutions. It is assumed that the iron density of the non-therapeutic meals provision should be adapted to the poor oral intake of the frail elderly for rebalancing iron intake and dietary requirements to avoid iron deficiency anemia.

Objectives: To evaluate, whether a one-year optimization of the daily meals provision with iron-rich food items have an impact on hemoglobin concentration and prevalence of iron-deficiency anemia of institutionalized frail elderly.

Method / Design: An open applied intervention study in the daily non-therapeutic meals provision. The participants could choose between the regular food-provision and a menu containing iron rich food items like liver, black pudding or oat-fiber. At the beginning (month 1) in the middle (month 6) and at the end (month 12) of the intervention time routine blood-parameter were driven from the routine medical reports of the institution. At the same time oral food intake was assessed with two-days weighing records. The statistical evaluation was done using the non-parametric Friedman-Test. P-value <0.05 was considered statistically significant. The study was approved by the local ethics committee (EK-13-043-0513). 99 frail elderly (86% female and 14% male) with a mean (±SD) age of 84.8 (±7.9) and a mean (±) weight of 67.4 (±16.0) kg participate. No participant was fed enteral or parenteral or got nutritional supplements.

Results: During intervention-time oral iron intake increased significantly (p<0.001). At the end of intervention time patients with anemia showed significant higher hemoglobin concentrations (p<0.05) and anemia prevalence decreased from 29% to 16%.

Conclusions: Iron-dense foods in the non-therapeutic food-provision contributed to a reduction of anemia frequency of institutionalized frail elderly.

Keywords: (maximum 5): anemia, iron-dense foods, institutionalized-frail-elderly, oral intake

149/159. Coherent Diet: Role of different dietary macronutrient distribution patterns and positive reinforcement on weight loss and body composition

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Introduction: According to the WHO, obesity is one of the more important risk factors for chronic diseases and premature death. In Europe over 50 % people are obese or overweight, prevalence rates doubled in the past 30 years. In adults prevalence is higher in women, particularly older than 40 years, and among those in low socioeconomic and educational environments. 1 in 3 11-year-old is obese or overweight. 80% will be obese adults.

Obesity treatment is a long term process, based in acquiring healthier lifestyle, therefore positive reinforcement will improve adherence to diet.

Low glycemic index diets and moderated in proteins, have demonstrated favourable effects as rapid weight loss, better glucose and insulin levels and triglycerides and blood pressure reduction.

Coherent Diet is moderated in proteins (fish, vegetables, low fat dairy products, lean meat and nuts), moderated in fat, low content of refined carbohydrates, high in dietary fibre, low GI carbohydrates and antioxidants (vegetables, fruits and fresh vegetables).

Objectives: Validating Coherent Diet with a sample of 165 subjects in terms of weight loss, fat percentage, BMI and contours (waist, hip and chest) reduction

Method / Design: Random selection of 165 overweight patients who followed our education program. At the beginning, after 15 days, 1 month and two months, we examined: gender, age, weight, height, waist, hip and chest contours, BMI and fat %.

Results: We confirmed a significant weight reduction (6,68 Kg), 2,73% fat, BMI (2,15), waist (6,6 cm) and hip (6,2 cm) (P=0,000), according to "t" test. Weight significantly deceased more in male (8,3 Kg) than in female (6,52 Kg), (P=0,000) according to Anova test.

Conclusions: We confirmed a significant weight, corporal fat, IMC and contours loss, for what the Coherent Diet is a valid strategy to treat the obesity and overweight.

Keywords: (maximum 5): Obesity, prevalence, food habits, slimming diet, positive reinforcement

149/160. Validation of a web platform and smartphone apps for the nutritional education of overweight subjects

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Introduction: Obesity is considered to be a major public health problem in all developed countries and economies in transition. In Europe, over 50 % of people are obese or overweight, prevalence rates doubled in the past 30 years. According to the WHO, it is the leading cause of preventable death, next to smoking and consumes 10% of Health Budget.

Obesity treatment is a long term process, involving weight loss and acquiring healthier lifestyle. Therefore a validated online educational program relying on Internet, ICT and social media improves motivation and adherence.

The key is changing behaviour thanks to customized diets supported by social media (Facebook, Twitter, Whatsapp) chat or videoconference to maintain motivation. Spanish platform has been running for two years. Each week the patient receives a pdf with Nutrition contents, their menus, tips to make shopping better, exercising and coaching.

Objectives: Testing an online educational program based on a validated diet method, positive reinforcement with online Dietitians, coaching techniques and social learning through smartphone applications.

Method / Design: Random selection of 65 overweight patients who followed our online educational program. At the beginning, after 15 days, 1 month and two months, we examined: gender, age, weight, height, waist, hip and chest contours, BMI and fat %.

Results: We confirmed a significant reduction of weight (7,2 Kg), 2,72% fat percentage and 1,99 BMI (P=0,000), according to test "t" for related samples and non-parametric Wilcoxon test for chest (P=0,000). The weight significantly decreased more in male (9,5 Kg) than in female (6,5 Kg) (P=0,000) according to the Anova test.

Conclusions: We have stated that our online nutritional education program favours weight loss and improves the corporal composition of overweight subjects

Keywords: (maximum 5): Obesity, coherent diet, online education program, food habits, positive reinforcement, motivation

149/163. Associations of milk and dairy consumption during pregnancy with infant birth weight

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Introduction: Maternal nutrition is recognized as one of the determinants of fetal growth. Milk and milk products contribute essential nutrients and bioactive substances. However, milk is not just a simple nutrient, but has been recognized to function as an endocrine signaling system promoting anabolism and postnatal growth. Increa-

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sed birth weight is a risk factor for the development of diseases of civilization such as obesity, diabetes and cancer.

Objectives: The purpose of this study was to examining the relationship between maternal consumption of milk and milk products during pregnancy with infant birth weight.

Method / Design: Cohort study composed of 1042 healthy pregnant women. A food frequency questionnaire administered at the 35th-36th gestational week was used to measure dairy consumption during pregnancy. Dairy consumption was categorized into total, low-fat, whole-fat, and subgroups: milk, yogurt, cheeses, fermented dairy, concentrated full fat, and processed dairy. Logistic regression models estimated associations between infant birth weight and dairy intakes with adjusted for prepregnancy maternal BMI.

Results: The results delineating the assessment of the consumption of milk and/or dairy products indicate that the level of intake was not in accordance with the recommended model. The consumption of dairy products, was particularly low (375g/day) . The adjusted odds ratios between extreme quartiles of infant birth weight were 0.67 (95% CI 0.48-0.99, P for trend = 0.04) and 0.60 (95% CI 0.40-0.88, P for trend = 0.05), respectively. No relationships were observed between the infant birth weight and intake of all dairy products during pregnancy.

Conclusions: For infant birth weight reported no associations with milk and/or dairy products consumption during pregnancy.

Future studies are needed to better study the effect of dietary milk consumption's difference during pregnancy.

Keywords: (maximum 5): birth weight, pregnancy, milk products, nutrition

149/164. Child care practice, immunization and nutritional status of under-two children

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Introduction: Malnutrition remains high in Nigeria despite several nutrition-specific and nutrition-sensitive interventions. The synergy between immunity and nutrition is recognized, however, the relationship between immunisation and nutritional status remains unknown in Nigeria. This knowledge is vital to reduce malnutrition following co-existence of low vaccination coverage and high malnutrition burden.

Objectives: To assess the relationship between child care practice, immunisation and nutritional status of children aged 9-23 months in Sabo community, Ibadan, Nigeria.

Method / Design: This descriptive cross-sectional study involved 211 mother-child dyads. Information on socio-demographic characteristics and Child Care Practice (CCP) of mothers, immunisation status and anthropometric characteristics of children aged 9-23 months was collected using a semi-structured questionnaire. Using a 30-point scale, CCP was characterized as poor (<20) and good (≥20). Immunisation status was assessed on a 12-point scale categorized as complete (12), incomplete (>0<12) and none (0). Weight and length were assessed using digital weighing scale and length board respectively, and analysed using WHO-Anthro software. Data were analysed using descriptive statistics and Chi square test at p=0.05.

Results: Age of mother was 27.9±6.6years and 98.6% were married. Age of child was 14.7±4.5months and 56.9% were males. Seventy percent had poor CCP; about 40.0% exclusive breastfed child within the first three days of life and 32.7% started complementary feeding before 6months. Only 23.0% had complete immunization; 59.0% had incomplete immunization and 18.0% had none. Wasting, stunting and underweight were 16.1%, 42.1% and 22.3% respectively with severe cases accounting for 7.1%, 21.3% and 9.0% respectively. Child gender is significantly associated with wasting (p=0.04), underweight (p=0.03) and stunting (0.02). Immunization status had significant relationship with stunting (p=0.02) and CCP had significant relationship with wasting (p=0.02).

Conclusions: Poor child care practices and low immunization coverage contribute to malnutrition.

Keywords: (maximum 5): vaccination, child malnutrition, stunting, wasting, underweight.

149/165. Comparison of nutritional status and vulnerability of older people in rural and urban areas of Ibadan, Nigeria

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Introduction: Adequate nutrition is essential for healthy ageing and reduction of morbidity among the aged. There is a dearth of information on rural/urban differential in nutrition situation of older Nigerians. Knowledge of this differential is essential to design programmes that promote healthy ageing and quality of life.

Objectives: This study was aimed at assessing rural/urban differences in nutritional status and vulnerability of older people in Ibadan.

Method / Design: This comparative cross-sectional survey involved 168 respondents from two urban local government areas (LGAs) and 178 respondents from two rural LGAs of Ibadan. A three-stage sampling technique was used to select LGAs, wards/communities and respondents aged 65 years and above. A semi-structured questionnaire was used to collect information on socio-demographic characteristics, nutritional vulnerability and anthropometric characteristics of the respondnets. Nutritional vulnerability was evaluated using HelpAge-International checklist, categorised as non-vulnerable (0-5), moderately (6-14) and highly (15-38) vulnerable. Weight and armspan were assessed to calculate Body Mass Index (BMI) categorised as underweight (<16.5 Kg/m2), normal-weight (16.5-22.9 Kg/m2) and overweight (≥23.0 Kg/m2). Data were analysed using descriptive

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statistics, Chi-square test and logistic regression at 5% level of significance.

Results: Respondents' age were 68.9±4.7 years (urban) and 69.7±4.4 years (rural). Men constituted 58.9% and 60.1% in urban and rural areas respectively. Married respondents were 79.8% in urban and 75.8% in rural. In urban, 5.4% were moderately vulnerable whereas in rural area, 29.2% and 21.3% were moderately and highly vulnerable respectively. Underweight was higher in rural (24.2%) than urban (16.7%) while overweight was higher in urban (8.3%) than rural (7.3%) areas. The likelihood of undernutrition reduced in urban than rural when respondent was married (OR: 0.6 versus 3.5) among other results.

Conclusions: Ununder nutrition and nutritional vulnerability were higher in rural than urban areas. Nutritional intervention programmes should target the elderly in rural areas.

Keywords: (maximum 5): Undernutrition, Body Mass Index, underweight, Elderly

149/169. The urban – rural differences in the prevalence of overweight among children in Poland.

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Introduction: Overweight adversely affects not only health and development of children and adolescents but also health in adulthood, increasing the risk of chronic non-communicable diseases and disabilities. The frequency of nutritional disorders among children and adolescents increases in many countries around the world and Europe, including Poland.

Objectives: The urban – rural differences in the prevalence of overweight among children in Poland may indicate the direction of national and local activities aiming to reduce inequalities resulting from nutritional well-being.

Method / Design: The study conducted in 2010 covered the total of 1255 pupils at the age of 9 (627 girls and 628 boys) from the area of five voivodeships of Poland: representing north, south, west, east and central regions of the country. Based on the height and weight measurements of children, the body mass index was calculated. The nutritional status was assessed according to the criteria of Cole et al.

Results: The analysis of data shows that overweight and obesity are most common among boys studying in schools located in urban areas, in larger cities with over 100 thousand inhabitants, and among girls studying in schools located in rural areas. On the other hand, underweight is most common among girls from areas of large cities and boys from rural areas.

Conclusions: The degree of overweight and obesity among children in rural and urban areas of Poland seem to be varied but there is need of further monitoring. The analysis of regional differences in the prevalence of obesity, overweight and underweight among children and adolescents may indicate the direction of national and local activities aiming to reduce the inequalities resulting from nutritional well-being.

Keywords: (maximum 5): children, obesity, overweight, body mass index, rural and urban areas

149/170. Daidzein and genistein fail to improve lipid profiles, C-reactive protein and uric acid in Chinese women with impaired glucose regulation

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Introduction: The risk of CVD increases significantly in diabetes patients. Evidence suggests that soy protein and soy isoflavones have significantly association with reduction of lipids related to CVD risk, but few studies have focused on women with impaired glucose regulation (IGR).

Objectives: This study aimed to evaluate the effect of isolated daidzein and genistein on lipid profiles, inflammatory markers (high sensitive C- reactive protein and uric acid) in Chinese women with IGR.

Method / Design: This randomized, double-blind, and placebo-controlled trial was conducted in 165 Chinese women aged 30-70 years with IGR. Participants were randomly assigned to one of three groups with a daily dose of 10 g of soy protein plus (i) nothing, (ii) 50 mg of daidzein, or (iii) 50 mg of genistein for 24 weeks. Fasting serum total cholesterol (TC), high-density lipoprotein (HDL-C), low-density lipoprotein (LDL-C), lipoprotein a(LP(a)), high sensitive C-reactive protein(hs CRP) and uric acid were assessed at baseline and at 12 and 24 weeks post intervention. One-hundred and fifty-eight and 151 subjects completed the measures at weeks 12 and 24, respectively.

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Results: There were no significant differences in the changes (%) of TC, HDL-C, LDL-C, LP(a), hs CRP and uric acid between the three treatment groups at weeks 12 or 24 (all p> 0.05).

Conclusions: Neither isolated daidzein nor genistein have a significant effect on lipid profiles, C-reactive protein and uric acid in Chinese women with impaired glucose regulation over a six month supplementation period.

Keywords: (maximum 5): Daidzein ,Genistein , Lipid profiles, C-reactive protein, Uric acid

149/171. Role of p38MAPK in palmitate-induced inflammation in C2C12 muscle cells

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Introduction: The saturated fatty acid palmitate (PAL) is now recognized as an inducer of inflammation in many types of cells, including adipocytes and muscle cells, whereas n-3 polyunsaturated fatty acids (n-3PUFA) have anti-inflammatory properties. Meanwhile, PAL induces muscle insulin resistance (IR) and n-3PUFA are suggested to reverse it.

Objectives: The aim of the study was to investigate the n-3PUFA effects on palmitate-induced inflammation and the potential link between inflammation, p38 mitogen-activated protein kinase (p38MAPK) activation and IR in C2C12 myotubes.

Method / Design: After 16 hours incubation with 500µM PAL without or with 10µM of SB203580, a specific inhibitor of p38MAPK, and 50µM of alpha linolenic acid (ALA), eicosapentaenoic acid (EPA) or docosahexaenoic acid (DHA), myotubes were harvested and submitted to mRNA quantification or immunoblotting.

Results: Interleukine-6, tumor necrosis factor alpha and cyclooxygenase-2 mRNA levels were significantly increased by PAL treatment and reversed by EPA and DHA supplementations. Inhibition of p38MAPK significantly prevented the effect of PAL on these regulations although this did not prevent PAL-induced IR.

Conclusions: Our results suggested that p38MAPK activation by PAL is crucial to induce inflammation in C212 muscle cells, but is not involved in PAL-induced IR. Among n-3PUFA, only EPA and DHA reduced p38MAPK activation and improved IR. Additional studies are currently performed to explore the involvement of nuclear factor kappa B signalling in these effects.

Keywords: (maximum 5): Muscle cells, n-3PUFA, inflammation, p38MAPK

149/183. Socioeconomic differences in cardiometabolic risk markers are mediated by diet and fatness in Danish children

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Introduction: Socioeconomic inequalities in cardiometabolic risk markers have been observed from childhood, but the roles of body fatness, diet and physical activity are uncertain.

Objectives: To explore whether socioeconomic differences existed in cardiometabolic risk markers in 8- to 11-year-old Danish children and whether body fatness, diet, physical activity and sedentary time mediated these differences.

Method / Design: Cardiometabolic risk markers, including fasting blood cholesterols, triglycerides, glucose, homeostasis model assessment of insulin resistance (HOMA-IR), blood pressure and heart rate were measured cross-sectionally in 715 Danish children. Potential mediators examined were fat mass index, measured by DEXA; intake of fruit, vegetables, dietary fibre and added sugar; whole-blood n-3 long chain polyunsaturated fatty acids (LCPUFA) as a biomarker of fish intake; and moderate-to-vigorous physical activity and sedentary time, by accelerometry.

Results: Children of parents with ≤10 years, compared to ≥17 years, of education had higher triglyceride concentrations [β (95%CI)] [0.12 (0.04;0.21) mmol/L)] and HOMA-IR [0.36 (0.10;0.62)], whereas children of parents with 12-13 years of mainly practical education compared to ≥17 years of education had higher total cholesterol concentrations [0.14 (0.02;0.27) mmol/L] and LDL cholesterol [0.14 (0.03;0.25) mmol/L] (all P<0.05). Fat mass index explained 21-46%, 25% and 64% of the differences in the cholesterol variables, triglycerides and HOMA-IR, respectively. Fat mass index and n-3 LCPUFA combined explained 38-42% of the differences in triglycerides, whereas fat mass index, n-3 LCPUFA and dietary fibre intake explained 89% of the difference in HOMA-IR.

Conclusions: Socioeconomic differences existed in several cardiometabolic risk markers among the children and were apparently mediated by body fatness and the intake of fish and dietary fibre, independent of body fatness. These mediators may be important targets in public health initiatives aimed at reducing cardiometabolic inequalities from childhood.

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Keywords: (maximum 5): n-3 PUFA; insulin; mediation; children; social inequality

149/194. The role of a high phosphorus diet on metabolism of calcium, magnesium and iron

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Introduction: Dietary intake of phosphorus increased in the last decades but there is a lack of information about the consequence of high phosphorus diets on metabolism of calcium, magnesium and iron.

Objectives: The aim of the present placebo-controlled, double-blind human intervention study was to examine the influence of a high phosphorus intake on metabolism of calcium, magnesium and iron in healthy subjects.

Method / Design: The study terminated 62 healthy subjects. In the first two weeks all subjects consumed a placebo product and afterwards for 8 weeks the test product according to the intervention group: P1/Ca0 (1 g phosphorus), P1/Ca0.5 (1 g phosphorus, 0.5 g calcium), P1/Ca1 (1 g phosphorus, 1 g calcium). At the beginning, after placebo, 4 and 8 weeks subjects kept a weighed diet diary, collected urine for 24 h and a fasting blood sampling took place. After placebo and 8 weeks subjects collected a stool sample.

Results: Plasma calcium concentration increased after 8 weeks of P1/Ca0.5 and P1/Ca1 supplementation compared to baseline. Plasma transferrin concentration increased significantly after 8 weeks of P1/Ca0.5 intervention compared to placebo. After all interventions renal phosphorus excretion increased significantly after 8 weeks compared to placebo and baseline. Renal calcium and magnesium excretion decreased significantly after 8 weeks of intervention with P1000/Ca0 compared to placebo. Faecal phosphorus concentration increased significantly after 8 weeks of all interventions compared to placebo. Calcium concentration in faeces increased after 8 weeks of P1/Ca0.5 and P1/Ca1 compared to placebo.

Conclusions: High phosphorus intake did not influence fasting phosphate plasma concentrations. The high phosphorus intake without calcium supplementation seems to have a negative impact on calcium and magnesium balance as well as on iron metabolism. Nevertheless, it can be stated that a well-balanced phosphorus to calcium ratio is an important prerequisite for a normal metabolism of calcium, magnesium and iron.

Keywords: (maximum 5): phosphorus, calcium, magnesium, iron,

149/201. Seafood consumption predicts the maternal docosahexaenoic acid status 3-, 6- and 12 months postpartum

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Introduction: Introduction: Essential fatty acid status as well as docosahexaenoic acid (DHA, 22:6n-3) declines during pregnancy and lactation. As a result, the DHA status may not be optimal for child development and may increase the risk for maternal postpartum depression.

Objectives: Objective: The objective of this study was to assess changes in the maternal fatty acid status from pregnancy to 12 months postpartum, and to study the impact of seafood consumption on the individual fatty acid status.

Method / Design: Methods and Design: Blood samples and seafood consumption habits (gestation week 28, and three-, six- and 12 months postpartum) were collected in a longitudinal observational study of pregnant and postpartum women (n=118). Multilevel linear mixed modeling was used to assess both changes over time in the fatty acid status of red blood cells (RBC), and in the seafood consumption.

Results: Results: Six fatty acids varied the most (>80%) across the four time points analyzed, including the derivative of the essential α-linoleic acid (ALA, 18:3n-3), DHA; the essential linoleic acid (LA, 18:2 n-6); and the LA derivative, arachidonic acid (AA, 20:4n-6). Over all, a large variation in individuals' DHA- and AA status was observed; however, over the 15-month study period only small individual differences in the respective fatty acid profiles were detected. The median intake of seafood was lower than recommended. Regardless, the total weekly frequency of seafood and eicosapentaenoic acid (EPA, 20:5n-3)/DHA-supplement intake predicted the maternal level of DHA (μg/g RBC).

Conclusions: Conclusion: The period of depletion of the maternal DHA status during pregnancy and lactation, seem to turn to repletion from about six months postpartum towards one year after childbirth, irrespective of RBC concentration of DHA during pregnancy. Seafood and EPA/DHA-supplement intake predicted the DHA levels over time.

Keywords: (maximum 5): Keywords: Pregnancy, longitudinal, fatty acids, DHA, seafood

149/202. Rapeseed or fish oil protects muscle mass during energy restriction in the rat.

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Introduction: In obese subjects, the loss of fat mass during energy restriction is often accompanied by a loss of muscle mass. In parallel, n-3 polyunsaturated fatty acids (PUFA) modulate protein homeostasis via effects on insulin sensitivity.

Objectives: The hypothesis that n-3 PUFA could contribute to maintain muscle mass during energy restriction aiming to weight loss was tested in the rat, and underlying mechanisms were investigated.

Method / Design: 48 male rats were fed with a high-fat induction diet (4 weeks) and then energy restricted (8 weeks). Dietary lipids contained oleic sunflower oil (71% 18:1 n-9, ad libitum ADLIB and restricted OLE control groups), rapeseed oil (10% 18:3 n-3, RAPE group) or fish oil (10% long-chain n-3 PUFA, FISH group). After insulin injection, body composition, expression of genes involved in proteolysis, and insulin signalling were assessed in Gastrocnemius muscle.

Results: All energy-restricted rats lost weight (-20%) and fat mass (-50%), but only the OLE rats showed a significant muscle loss (-5%). Proteolysis: only the ubiquitin/proteasome system was affected, with MAFbx and MurF1 mRNA levels being significantly decreased in FISH rats (-30% and -20%, respectively), intermediary in RAPE rats and unchanged in OLE rats. Insulin signalling: AKT and IRS1 phosphorylation levels were significantly increased (+ 70%) in FISH group, together with an increased expression of the insulin receptor mRNA (+ 50%). RAPE rats showed the same overall activation pattern as the FISH ones, albeit to a lesser extent. No change was observed in OLE rats.

Conclusions: Dietary n-3 PUFAs prevent the loss of muscle mass associated with energy restriction, probably by and improving the insulin-signalling pathway activation. The vegetable 18: 3 n-3, supplied by rapeseed oil, has the same overall efficiency as its long-chain derivatives (20: 5 n-3 and 22: 6 n-3) from fish oil.

Keywords: (maximum 5): Rapeseed oil: protein homeostasis: muscle

149/206. Improved bone health by intake of tailor-made Atlantic salmon with vitamin D and K

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Introduction: Due to a considerable change of feed formulation for farmed Atlantic salmon towards less marine ingredients, the contribution of vitamin D from salmon fillet in the human diet has been reduced. This is the first study investigating the effects of intake of vitamin D enriched tailor-made Atlantic salmon on biomarkers of bone health.

Objectives: To investigate how intake of tailor-made salmon affected serum vitamin D status (S-25(OH)D), omega-3 index (relative amount of EPA+DHA in RBC), and bone biomarkers.

Method / Design: The 122 healthy postmenopausal women (55 years) included in this 12 weeks intervention study were randomized into four groups: three salmon groups (150 grams/two times/week) and one tablet group (two Calcigran Forte/day). The salmon had three different vitamin D3/K1 combinations: high D3 + high K1 (HD/HK), low D3 + high K1 (LD/HK), or high D3 + low K1 (HD/LK).

Results: S-25(OH)D increased by 11.1 in the tablet group, by 11.2 in the HD/HK group, and by 11.7 nmol/L in the HD/LK group. The LD/HK group had unchanged s-25(OH)D status (p-trend=0.001). The omega-3 index decreased by 1.8% in the tablet group, which was significant compared to the other groups where the omega-3 index were unchanged (p-trend<0.001). All groups, except from the LD/HK group, had decreased values of the bone resorption biomarker urinary N-telopeptides (NTx). The bone formation biomarkers s-osteocalcin and s-undercarboxylated osteocalcin (GLU) decreased in the HD/HK and LD/HK groups. S-carboxylated osteocalcin (GLA) decreased in the tablet and HD/LK groups, and the HD/HK group had decreased GLU-GLA ratio.

Conclusions: Increased intake of tailor-made salmon containing high levels of vitamin D3 (0.38 mg/kg/fillet), and supplements with the same weekly contribution had a positive influence on bone biomarkers, and emphasizes the importance of increased upper limit for vitamin D in feed for salmonids.

Keywords: (maximum 5): Atlantic salmon, bone health, vitamin D, Vitamin K, bone biomarkers.

149/209. The anabolic properties of wheat protein hydrolysate compared to casein and whey

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Introduction: Aging is characterized by the loss of skeletal muscle mass and function. This is, at least partly, attributed to a blunted muscle protein synthetic response to protein ingestion. The muscle protein synthetic response to protein ingestion is dependent on the source, type, amount, and timing of protein consumed. It has been suggested that plant-derived proteins are less potent in stimulating postprandial muscle protein synthesis rates compared with animal-derived proteins. However, there are few data to support this contention.

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Objectives: To assess postprandial plasma amino acid profiles and whole-body protein synthesis following the ingestion of 35 g wheat protein hydrolysate compared with casein and whey in healthy, older males.

Method / Design: Thirty-six healthy older males (age: 73±1 y, BMI 25.1±0.4 kg/m2) received a primed continuous infusion of L-[ring-13C6]-phenylalanine and L-[ring-3,5-2H2]-tyrosine and ingested 35 g wheat protein hydrolysate (WHEAT; Meripro, Tereos Syral; n=12), whey (WHEY; Nutri Whey 800F, DMV; n=12), or micellar casein (CASEIN; Refit MCI 80, Domo; n=12). Plasma and muscle samples were collected at regular intervals. Repeated measures ANOVA was used to identify differences between groups over time.

Results: Plasma leucine concentrations increased following protein ingestion (P<0.01), to a similar extent following WHEAT and CASEIN (P=0.86) and to a greater extent following WHEY (P<0.01). In agreement, peak leucine concentrations averaged 351±11, 316±24, and 580±18 μM for WHEAT, CASEIN, and WHEY, respectively (WHEAT vs CASEIN P=0.40; WHEY vs WHEAT and CASEIN P<0.01). Whole-body protein synthesis increased following protein ingestion in all groups (P<0.01), with no significant differences between groups (P=0.13). Postprandial muscle protein synthesis rates will be assessed by determining the incorporation of L-[ring-13C6]-phenylalanine into myofibrillar protein.

Conclusions: Ingestion of wheat protein hydrolysate increases plasma amino acid availability and stimulates whole-body protein synthesis rates as effectively as casein in healthy, older males.

Keywords: (maximum 5): muscle protein synthesis
aging
wheat protein
whey
casein

149/212. Consumers' preferences regarding drinking milk in a selected region of Poland

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Introduction: As concerns reports on adverse effects of milk consumption by adults, obtaining information on consumption of drinking milk plays a part in planning and intensification of nutritional education aimed at popularization of a well-balanced nutritional method.

Objectives: The aim of this paper was to determine the preferences and inclinations of consumers related to consumption of drinking milk, including flavoured milk.

Method / Design: The assessment, based on the results of a questionnaire, was related to declared consumption, its frequency, reasons for the lack of consumption, choice of pack, fat content, type of meal, level of knowledge on the nutritional value of milk and its products and specify the factors on which consumers depend when buying milk.

Results: The majority of respondents declared the consumption of milk, mostly young persons, with a frequency of 1-3 times a week and followed by every day, usually for breakfast. They preferred milk with fat content of 1.5-2%, cardboard packs and plastic bottles, UHT and pasteurized milk, and, to a lesser degree, micro-filtered milk. Most of the respondents were conscious of the favourable effects of regular consumption of milk, and as they stated, the most important factor was the calcium content in milk, and among the advantages resulting from the consumption of milk, the possibility to prevent skeletal system diseases – osteoporosis. The most important factors observed as concerns the choice of drinking milk primarily included respondents' expectations towards the health effects of milk.

Conclusions: As concerns formation of proper nutrition habits, among others through the inclusion of milk products into the daily diet, it becomes an important factor to determine respondents' knowledge on the advantages resulting from milk consumption and consciousness related to choice factors concerning nutrition and health.

Keywords: (maximum 5): drinking milk, consumers' preferences, Poland

149/214. Cholesterol and breast cancer risk: a systematic review and meta-analysis of prospective studies

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Introduction: Studies that investigated the relationship between blood cholesterol and breast cancer risk showed contrasted results that need to be put into perspective.

Objectives: Our objective was to conduct the first systematic review and meta-analysis of prospective studies on total cholesterol (T-C), high density lipoprotein cholesterol (HDL-C), and low density lipoprotein cholesterol (LDL-C) and breast cancer risk.

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Method / Design: Relevant studies were identified in PubMed (up to January 2014). Inclusion criteria were original peer-reviewed publications with a prospective design. Random effects models were used to estimate summary hazard ratios (HRs) and 95% confidence intervals. Distinction was made between studies that did or did not exclude cancer cases diagnosed during the first years of follow-up, thereby eliminating potential preclinical bias.

Results: Overall, summary associations with breast cancer risk were HR=0.97(0.94-1.00) (dose-response per 1mmol/L increment, 13 studies) for T-C and HR=0.86(0.69-1.09) (dose-response per 1mmol/L increment, 6 studies) for HDL-C, with high heterogeneity (I2=67% and 47%, respectively). When focusing on studies that eliminated preclinical bias, T-C (dose-response HR=0.94(0.89-0.99), 7 studies, I2=78% / highest versus lowest HR=0.82(0.66, 1.02) , 9 studies, I2=81%) and HDL-C (dose-response HR=0.81(0.65-1.02), 5 studies, I2=30% / highest versus lowest HR=0.82(0.69-0.98), 5 studies, I2=0%) were inversely associated with breast cancer risk. There was no association between LDL-C and breast cancer risk (4 studies).

Conclusions: These meta-analyses support the evidence of a modest but statistically significant inverse association between T-C, and more specifically HDL-C and breast cancer risk, consistent with mechanistic plausibility from experimental studies. Further large prospective studies that adequately control for preclinical bias are needed. If confirmed, these results suggest that controlling cholesterol level and its fractions may contribute to breast cancer prevention.

Keywords: (maximum 5): Cholesterol, HDL cholesterol, Breast cancer, Prospective studies, Meta-analysis

149/215. Multiple sclerosis: socio - economic factors and food habits in Tehran, Iran

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Introduction: Multiple sclerosis (MS) is a chronic autoimmune inflammatory disease of the human central nervous system (CNS) in which environmental and genetic factors are suggested to play an aetiological role. In Iran, a sharp increase of the prevalence of MS was shown during the past 12 years. In the capital city of Tehran (22 districts; ca. 8.0 million inhabitants in 2006), the annual incidence (AI) of MS 2001 - 2011 was shown to be much higher the northern (AI: 5.62 - 11.24 per 100,000) vs. the southern (AI: 3.42 - 6.01 per 100,000) districts (Saei et al. 2014).

Objectives: To correlate the distribution of MS incidence in Tehran with select environmental factors.

Method / Design: Geographical and socio - economic data of the population, subdivided by 10 census districts of Tehran, were taken from Seger 1978 and compared with the MS incidence by means of the U test. As indicator of westernization of food habits, American (n = 10) vs. Asian (including Iranian; n = 48) style restaurants, taken from an independent Internet source, were compared by z - score. The level of significance was p = 0.05.

Results: The incidence of MS was associated with the following variables: northern vs. southern location (p = 0.009); percentage of people having a university qualification (p = 0.009); percentage of people at age 20 who visited a college (p = 0.009); inverse percentage of inhabitants by living room (p = 0.0163); and inverse percentage of workers in the manufacturing industry (p = 0.0122). Restaurants of American vs. Asian style were located more in the northern vs. southern districts of Tehran (z = 2.080; p = 0.038).

Conclusions: Indicators of a higher level of socio - economic advance which included markers of westernized food consumption, were associated with the MS incidence in Tehran, Iran.

Keywords: (maximum 5): multiple sclerosis; epidemiology; socio-economic status; food.

149/216. Prospective association between dietary folate intake and skin cancer risk: results from the SU.VI.MAX cohort

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Introduction: The role of folate in skin carcinogenesis is unclear, with experimental data suggesting potentially protective but also deleterious effects.

Objectives: Our main objective was to investigate the prospective association between dietary folate intake and the risk of skin cancer (overall), non-melanoma skin cancer (NMSC), and basal cell carcinoma (BCC). As an exploratory analysis, we also investigated the prospective association between erythrocyte folate concentration and skin cancer risk.

Method / Design: This study included 5880 participants to the SU.VI.MAX cohort who completed at least six 24h dietary records during the first 2y of follow-up. The associations between sex-specific tertiles of dietary and erythrocyte folate and skin cancer risk were assessed by multivariate Cox proportional hazards models.

Results: After a median follow-up of 12.6y, 144 incident skin cancers were diagnosed. Dietary folate intake was associated with increased risk of overall skin cancer (HRT3vs.T1=1.79(1.07-2.99), Ptrend=0.03), NMSC (HRT3vs.T1=1.85(1.06-3.23), Ptrend=0.03) and BCC (HRT3vs.T1=1.78(0.98-3.24), Ptrend=0.05). This association was observed in women (corresponding Ptrend=0.007, 0.009, and 0.009), but not in men (Ptrend=0.8, P=0.8 and P=0.9 respectively). Erythrocyte folate concentration was directly associated with increased risk of overall skin cancer (HRT3vs.T1=2.46(0.94-6.45), Ptrend=0.03), NMSC (HRT3vs.T1=3.33(1.08-10.28), Ptrend=0.01) and BCC (HRT3vs.T1=6.46(1.41-29.57), Ptrend=0.004).

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Conclusions: This prospective study suggests an increased risk of overall skin cancer, NMSC and BCC associated with dietary folate intake and erythrocyte folate concentration. While several mechanistic hypothesis and two previous large prospective studies on BCC support these results, epidemiological literature is limited and future research is needed to better elucidate the role of folate in the etiology of skin cancers.

Keywords: (maximum 5): folate intake, erythrocyte folate, skin cancer, non-melanoma skin cancer, basal cell carcinoma, prospective study

149/218. Prospective association between cancer risk and an individual dietary index based on the British Food Standard Agency nutrient profiling system

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Introduction: The Food Standard Agency nutrient profiling system (FSA-NPS) constitutes the basis for the Five-Color Nutrition Label (5-CNL) suggested in France to be put on the front-of-pack of food products. At the individual level, a dietary index (FSA-NPS DI) has been derived and validated and corresponds to a weighted mean of all FSA-NPS scores of foods usually consumed by the individual, reflecting the nutritional quality of his/her diet.

Objectives: Our aim was to investigate the association between the FSA-NPS DI and cancer risk in a large cohort.

Method / Design: This prospective study included 6435 participants to the SU.VI.MAX cohort (1994-2007) who completed at least 6 24h dietary records during the first 2y of follow-up. FSA-NPS DI was computed for each subject (higher values representing lower nutritional quality of the diet). After a median follow-up of 12.6y, 453 incident cancers were diagnosed. Associations were characterized by multivariate Cox proportional hazards models.

Results: The FSA-NPS DI was directly associated with overall cancer risk (HRfor a 1-point increment=1.08(1.01-1.15), Ptrend=0.02; HRQ5vs.Q1=1.34(1.00-1.81), Ptrend=0.03). This association tended to be more specifically observed in subjects with moderate energy intake (below the population median, HRfor a 1-point increment=1.10(1.01-1.20), Ptrend=0.03). No association was observed in subjects with higher energy intake (Ptrend=0.3).

Conclusions: For the first time, this study investigated the prospective association between the FSA-NPS individual score and cancer risk. Results suggest that unhealthy food choices may be associated with a 34% increase in overall cancer risk, supporting the public health relevance of developing front-of-pack nutrition labels based on this score.

Keywords: (maximum 5): Cancer risk, FSA-NPS, Nutrient Profiling System, Nutrition policy, Prospective study

149/220. Intake of wholegrain bread and incidence of colorectal cancer among Norwegian women

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Introduction: Globally colorectal cancer (CRC) is the second most common cancer type in women, and the CRC incidence among Norwegian women is one of the highest in the world. There has been growing interest in the possible disease preventable effects of whole grain consumption. A meta-analysis and a systematic review indicate that there may be an association between wholegrain consumption and risk of CRC. The general consumption of wholegrain bread is high in Norway and the intake variation is broad.

Objectives: Our objective was to investigate the association between wholegrain bread consumption and CRC incidence among Norwegian women.

Method / Design: The Norwegian Women and Cancer study (NOWAC) is a nationwide prospective cohort study. After exclusions, 72 296 women who answered a food frequency questionnaire in the period 2002-2005 were included in the present analyses. The CRC tumors were classified as CRC, colon and rectum; respectively 555, 402 and 153 cases. Dates of diagnosis, emigration and death were obtained from national registries.The association between wholegrain bread consumption and CRC was investigated in multivariable Cox proportional-hazards regression models using age as timescale and adjusting for common CRC risk factors.

Results: The participants were divided into 4 groups according to wholegrain bread consumption (non-consumers, n=7 282; 1-7 slices per week, n=16 049; 2-3 slices per day, n=31 463; 4 or more slices per day, n=17 502). We found no clear association between wholegrain bread consumption and CRC, but a significant higher risk for colon cancer was found when comparing the second highest with the third highest intake group (HR: 1.30; 95% confidence interval: 1.02-1.67).

Conclusions: Our results do not support previous findings of protective effects of whole grain intake on incidence of CRC.

Keywords: (maximum 5): Wholegrain bread, incidence, colorectal cancer, women, Norway.

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149/221. Maternal fatty acid intake during pregnancy and children's BMI, waist circumference and risk of overweight at 7 years of age

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Introduction: Poly-unsaturated fatty acids of the n-3 and n-6 families are involved in maturation of adipose tissue. However, whether maternal dietary intake of these fatty acids during pregnancy is associated with overweight in the child remains unclear.

Objectives: The aim of this study was to examine the relationship between maternal intake of n-3 and n-6 fatty acids during pregnancy and child BMI, waist circumference and risk of overweight at 7 years.

Method / Design: A prospective cohort study of 30,185 mother-child pairs from the Danish National Birth Cohort (1996-2002). Maternal dietary intake was assessed by a validated food frequency questionnaire in gestational week 25. At 7 years, children were followed up by a questionnaire which included maternal report on the child's weight, height and waist circumference.

Results: Maternal dietary intake of the most long-chained n-3 fatty acids eicosapentaenoic and docosahexaenoic acids (EPA + DHA) during pregnancy were significantly associated with lower BMI z-score, smaller waist circumference and lower risk of overweight in girls (odds ratio (95% confidence interval)) for highest versus lowest quintile of intake: 0.76 (0.64; 0.91). Similar, relations were seen for intake of the most long-chained n-6 fatty acid arachidonic acid (AA) and outcomes in girls. Although directionality was the same as for girls we observed non-significant association between maternal fatty acid intake and anthropometric measures in boys at 7 years.

Conclusions: Our results suggest that maternal intake of both EPA+DHA and AA during pregnancy may reduce the risk of overweight at 7 years of age in girls.

Keywords: (maximum 5): Pregnancy, maternal diet, Polyunsaturated fatty acids, offspring overweight,

149/226. The prediction of a diet quality index on cardiovascular disease and coronary heart disease mortality

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Introduction: The role of single foods and nutrients as predictors of major chronic diseases has been under extensive research. However, the research on the role of the diet as a whole, reflecting healthy vs. unhealthy diet and measured with dietary scores, has been conducted in lesser extent.

Objectives: To investigate the prediction of a diet quality index on mortality from cardiovascular disease (CVD) and coronary heart disease (CHD).

Method / Design: A total of 5 825 individuals, aged 30-75, from the Finnish Mobile Clinic Survey (1966–72) were included in this prospective cohort study. Data collection included health examinations, a questionnaire and a 1-year dietary history interview. A modified Alternate Healthy Eating Index (mAHEI) was formed to assess diet quality. The statistical analyses were based on Cox's model. During a 29-year follow-up, 894 CVD and 574 CHD deaths were identified.

Results: The relative risk (RR) of CVD death between the highest and lowest quintiles of mAHEI was 0.73 (95% confidence interval (95% CI) 0.58-0.91) (p for trend 0.02), after adjustment for age, gender, marital status, community density, geographical area, smoking, body mass index, leisure-time physical activity, and energy intake. The corresponding RR for CHD death was 0.67 (95% CI 0.50-0.90) (p for trend 0.01). Further adjustments for blood pressure and serum total cholesterol concentration did not change the results.

Conclusions: Higher scores from mAHEI, reflecting a better adherence to a healthy diet, predicted lower risks of CVD and CHD deaths.

Keywords: (maximum 5): cardiovascular disease death: coronary heart disease death: diet quality: cohort studies: relative risk:

149/229. Assessment of Nutritional Status of the Elderly in Eket Local Government Area, Akwa Ibom State, Nigeria.

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Introduction: Malnutrition continues to be global problem affecting the elderly as it leads to increased hospital admissions, morbidity and high rates of mortality. Good nutrition is important in the health and wellbeing of the elderly as it affects the ageing process.

Objectives: The specific objectives were to: (i) assess the nutritional status of the elderly using anthropometry; (ii) determine the dietary patterns of the elderly using weighed food intake; (iii) determine the relationship between demographic and socio economic variables and malnutrition.

Method / Design: Two hundred elderly persons were purposively selected from six communities for the survey. A validated questionnaire was used to gather information on weighed food intake,

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anthropometry, socio-economic and demographic variables of the elderly. A bathroom scale and a height meter were used for weight and height measurements respectively. SPSS version 20 was used to analyze descriptive statistics, chi-square and cross tabulations.

Results: The result showed that 6.6% of the elderly were underweight, 10% were obese and 21% were overweight. The weighed food intake showed that energy intake was adequate for both males and females. Micronutrients;Thiamin (78.6%), riboflavin (72.8%), and vitamin A (79.1%) were inadequate for men,while calcium (78.2%), iron (31.6%), vitamin A (81.4%), thiamin (77.5%), riboflavin (68.3%), and niacin (76.7%), were inadequate for women. Hypertension was the most common disease among the elderly (46.9%). There was a significant association P<0.05 between sex, obesity and underweight in the elderly. There was a significant association P<0.05 between occupation, education, monthly income, living condition, frequency of feeding, skipping meals, food choices, health problems, difficulty in chewing and the nutritional status of the elderly.

Conclusions: Socioeconomic status and food choices played an important role in the nutritional status of the elderly.

Keywords: (maximum 5): Nutritional Status, Elderly, Assessment, Akwa Ibom, Nigeria

149/233. Nutritional status of under-five and household health service levels , West Sumatera, Indonesia in 2014

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Introduction: Nutritional status is body condition as affected food consumption and utilization nutrients, as measured by antropometric index, that is weight for age, weight for height and height for age. Household Health Service consists 4 levels, namely : Pratama, Madya, Purnama and Mandiri. The lowest levels is Pratama and the highest levels is Mandiri.

Objectives: The purpose study was to know description of nutritional status of children under-five and Household Health Service levels in area Public Health Center Ibuh. Then, this study was in order to see the relation between household health service and nutritional status.

Method / Design: This was a cross sectional study and there were 1509 sample. The study conducted in November 2014 in area community Public Health Center Ibuh district West payakumbuh. The data was collected through interview method and quitionnare with measure children of height and weight directly.

Results: Based on antropometric measurement with indicator weight for age, there were 101 (6.7%) underweight, 1392 (92.2%) normal, 16 (1.1%) overweight. For indicator weight for height, there were be found 104 (6.9%) wasted, 1308 (86.7%) with normal status, 97 (6.4%) obese. While based on indicator height for age, there were be found 309 children (20.4%) stunted, 1182 (78,3%) had normal height and 18 children (1,2%) were tall. There was no significant relation between Household Health Service Levels with Nutritional Status of Under-Five.

Conclusions: There was found malnutrition children based on each indicators. Then, there were malnutrition children every levels of Household Health Service.

Keywords: (maximum 5): Nutritional Status, Under-Five, Household Health Service levels

149/236. Carnosine and anserine in skeletal muscles and heart are dependent on vitamin B6 status

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Introduction: There is limited information about the roles of vitamin B6 (B6) in the skeletal muscles and heart.

Objectives: To examine the effect of dietary supplemental B6, playing an important role in amino acid metabolisms, on the contents of the amino acids and related metabolites in the muscles and heart.

Method / Design: Rats were fed a diet containing 1, 7, or 35 mg pyridoxine HCl/kg for 6 weeks. The concentrations of pyridoxal 5- -phosphate (PLP) in skeletal muscles and heart were measured by HPLC. The contents of carnosine, anserine, and β-alanine in these tissues were quantified using ultra-performance liquid chromatography coupled with tandem mass spectrometry (UPLC-MS/MS). Serum carnosine was determined by ELISA.

Results: Food intake and growth were unaffected by dietary treatment (P>0.05). PLP concentrations in the gastrocnemius and soleus muscles and heart were significantly higher in the 7 and 35 mg pyridoxine HCl/kg groups than in the 1 mg pyridoxine HCl/kg group. In both muscles and heart, the carnosine and anserine concentrations were profoundly higher in the 7 and 35 mg pyridoxine HCl/kg groups than the 1 mg pyridoxine HCl/kg group. In both muscles, the concentration of β-alanine, a precursor of dipeptides, was also markedly higher in the 7 and 35 mg pyridoxine HCl/kg groups. Moreover, higher intake of B6 significantly increased serum carnosine concentration. In humans, 20% lower muscle carnosine content was found in soleus muscle of women of the lower PLP tertile, but this was not observed in gastrocnemius muscle or in men.

Conclusions: Adequate dietary B6 is essential for maintaining carnosine and anserine, which are anti-oxidant as well as ergogenic

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and anti-heart disease factors, in the skeletal muscles and heart of rats. This finding could only be partly confirmed in human volunteers.

Keywords: (maximum 5): Vitamin B6, carnosine, anserine, skeletal muscles, heart

149/238. Anthropometric assessment of commercial restaurants of employees within the Bahia- Brazil

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Introduction: The restaurant business is characterized by the production and distribution of food to the community. Therefore the nutritionist has a very important role in contributing to the health of individuals and the community through the science of nutrition, with priority attention to the employees of those places and not only their customers.

Objectives: The objective was to perform anthropometric assessment in staff of 3 commercial restaurants in Santo Antônio de Jesus - Bahia-Brazil.

Method / Design: This study was approved by the Ethics Committee on Research in Human Beings under the number 129/2010. We analyzed three commercial restaurants (A, B and C) and 6 employees in each location. Evaluation was performed anthropometric (height, waist circumference (WC) and determining body mass index (BMI)).

Results: It was observed that 72.2% of all employees of the 3 restaurants did not exercise regularly. The restaurant B had a higher number of employees practitioners of physical activity, while the restaurant A presented higher percentage of sedentary. It was observed that these 27.8% were overweight, 27.8% are obese grade I and 44.4% in normal weight according to BMI. In comparison of the 3 restaurants also been found that the restaurant C has high percentage of normal weight (66.6%) according to BMI, the restaurant A had the lowest rate of Obesity Grade I and the second largest of normal weight. The restaurant B in turn, had a higher level of overweight and restaurants B and C had the same percentage of Obesity Grade I. In the assessment of WC, it was found that 13 employees analyzed showed increased risk of cardiovascular problems 72.2% (WC exceeding 80 cm to 94 cm for women and men), while 27.8% had no risk.

Conclusions: The staff of the analyzed commercial restaurants need nutritional education and nutritional counseling for your health is preserved.

Keywords: (maximum 5): Nutritionist; Workers; Health.

149/240. Dietary guidance given to patients with diabetes in Burkina Faso and Mali: content and impact of professional profile

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Introduction: Dietetic and therapeutic education are the basis for the management of type 2 diabetes they can delay taking medication and also when the patient is receiving treatment to delay the onset of complications. Yet in West Africa most physicians have not received specific training in the nutritional management of diabetes.

Objectives: To assess the recommendations provided by health professionals to persons with diabetes regarding diet, physical activity and weight control, and to examine the relationship between advice given and characteristics of the health professionals.

Method / Design: The cross-sectional study was conducted over three months in 2012 in Ouagadougou and Bamako. Interviews with closed and open-ended questions were conducted with health professionals. Dietary recommendations pertaining to specific food items, meal and snack patterns, cooking methods and meals away from home were rated. Types of recommendations for physical activity and for body weight were rated in a similar fashion.

Results: Although 24% had no specific training in diabetes management, all respondents declared providing some dietetic advice to patients. In general, recommendations focused on foods to avoid, to restrict or to consume ad libitum, and diet sheets were given to patients. Most interviewed practitioners recognized that they did not have enough time or training to provide adequate dietetic guidance. Only 44% gave specific advice to patients on insulin and 20% talked about cooking methods. Overall, advice given to patients was considered 'acceptable' in 65% of respondents for diet, in 70% for control of body weight, and in 95% for physical activity. Dietary and physical activity guidance scores were significantly higher in professionals with specific training, and in MDs compared with other health professionals

Conclusions: The study highlights the need to improve dietary counseling of patients with diabetes, particularly as regards developing specific dietary plans with individual patients for better compliance.

Keywords: (maximum 5): Dietary guidance, diabetes ,Burkina Faso, Mali.

149/242. Mediterranean diet in the United Kingdom: Association with cardiovascular diseases and cost

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Introduction: Epidemiological evidence indicates health benefits of the Mediterranean diet (MD), but optimal measures of adherence and affordability of the diet remain unknown in non-Mediterranean countries.

Objectives: To examine associations of different Mediterranean diet scores (MDS) with incident cardiovascular diseases (CVD) and with diet cost in two different UK populations.

Method / Design: Adults in the EPIC-Norfolk cohort were followed-up over 1993-2013 (n=23902; 269935 person-years). Using food-frequency questionnaires, we calculated four different MDS representing adherence to the MD: MDS based on medians (mMDS) or tertiles (tMDS) of nine dietary components; MDS based on absolute cut-points proposed in recent literature (LitMDS) or cut-points derived from the Mediterranean diet pyramid (PyrMDS). Using cumulative-average approach for repeated measures of diet, multivariable-adjusted Cox regression was used to assess prospective associations between each MDS and incident CVD. Applying LitMDS and PyrMDS to the contemporary UK Fenland cohort (Baseline 2005-2014, n=11754), daily individual diet costs adjusted for age, sex and energy intake were compared by degree of MD adherence.

Results: Incident CVD occurred in 7960 participants. High adherence to MD was significantly associated with lower incidence of CVD when assessed with LitMDS and PyrMDS, but not mMDS or tMDS. Hazard ratios (95% confidence intervals) of high adherence (top third) to low adherence (bottom third) were 0.92 (0.87-0.97; p-trend =0.003) for LitMDS; 0.91 (0.86-0.97; p-trend=0.003) for PyrMDS; 0.98 (0.92-1.04; p-trend=0.44) for mMDS; and 0.95 (0.90-1.00; p-trend=0.07) for tMDS, respectively. In the Fenland cohort, adjusted total diet cost was on average higher for individuals with high MD adherence compared to low adherence (LitMDS: £4.43 vs £4.12; PyrMDS: £4.38 vs £4.13) (p-trend<0.001). Dietary composition also varied by different degree of MD adherence and diet cost.

Conclusions: Greater adherence to the MD was associated with lower incidence of CVD and higher diet cost.

Keywords: (maximum 5): Dietary pattern; Mediterranean diet; Cardiovascular diseases; Diet cost

149/244. Malnutrition In Institutionalized Old People - Study On The Potential Socio-Medical Factors Involved. Preliminary Results

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Introduction: Ageing represents a progressive and generalized, physiological and functional impairment of the body. Some important factors possibly leading to malnutrition are low dietary intakes or unbalanced diets not adapted to individual needs. In Romania there is insufficient data to show the exact frequency of malnutrition among elderly. Moreover, there is no system helping elderly maintain an adequate nutritional status based on their age and needs.

Objectives: The current research forms part of a PhD thesis-plan and focuses on the study of nutritional and public health aspects among institutionalized elderly. The study aims to determine their current nutritional status characteristics. The objectives focus on identifying possible specific socio-medical factors involved in the occurrence of progressive malnutrition and premature ageing.

Method / Design: In 2014 we conducted an observational-descriptive-retrospective study on 110 cases(=100%). These represented the total number of institutionalized elderly in the Cluj-Napoca(RO) Care and Assistance Centre. The chronically-ill unit's records constituted the data source. The data gathered on original forms was processed statistically and mathematically.

Results: People aged 60 and over predominated the studied group (76.01%). The determinations indicate major nutritional imbalances relating to the nutritional status of the institutionalized elderly. Only 23.33% of all women have normal weight, while 76.67% suffer from malnutrition (obesity, overweight or underweight). These conditions can lead to nutritional diseases or other diseases influencing their health and life quality. Before their institutionalization most elderly faced multiple socio-medical malnutrition aggravating factors. They are single, divorced or unmarried (68.43% men; 85.25% women) with low income (98.00%), chronic diseases(24.25%), homeless(68.18%), requiring assistance in specialized units.

Conclusions: The study revealed the need for designing and implementing an interdisciplinary, inter-sectorial, socio-marketing program to reduce the impact of possible malnutrition generating factors. It is also necessary to develop preventive policies and strategies for malnutrition starting with childhood, adolescence or adulthood.

Keywords: (maximum 5): Elderly: Malnutrition: Socio-Medical Factors: Chronic Diseases:

149/245. Which patients surgically treated for urolithiasis need nutritional care?

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Brazil.

Introduction: Few studies in the literature have investigated the nutritional status of Brazilians with urologic diseases. The present study is justified by the interest associated with investigating the impact of nutritional status on patients with urologic diseases.

Objectives: To investigate the nutritional status of patients with urologic diseases and identify the risk factors associated with the type of kidney stones.

Method / Design: This cross-sectional study assessed the nutritional status and energy and nutrient intakes of 175 adults hospitalized for kidney stones. They were grouped as follows: patients submitted to percutaneous nephrolithotripsy (NP), patients submitted to endoscopic ureterolithotripsy (EU) and patients without kidney stones. All study variables were assessed as possible risk factors of urologic diseases. Multinomial logistic regression analysis and proportional odds model identified the factors associated with kidney stones. The significance level was set at 5%.

Results: Younger (p=0.0001), female (p<0.0001), EU (p=0.0061) patients without nutritional risk according to the Nutritional Risk Screening (NRS) and triceps skinfold thickness in the normal range (p=0.015) had the most kidney stones. The patients without kidney stones were older (p<0.0001) and hospitalized the longest (p=0.0038). Males had kidney stones less frequently than females (p<0.0001). Kidney stones in the EU group were associated with being female (p<0.0001; OR: 3.699; CI: 2.001; 6.838), having mid-upper arm muscle circumference between the 10th and 90th percentiles (p=0.0477; OR: 3.164; CI: 1.012; 9.895), not being at nutritional risk according to the NRS (p=0.0308; OR: 3.265; CI: 1.116; 9.557), and being younger (p=0.0008; OR: 0.966; CI: 2.001; 6.838).

Conclusions: Patients submitted to PN seem to require nutritional assessment and follow-up, while patients with kidneys stones smaller than one centimeter across do not seem to require a routine nutritional approach.

Keywords: (maximum 5): urologic disease, kidney stone, nutritional care, energy intake, sodium intake.

149/246. Nutritional risk and its association with nutritional status indicators in hospitalized older patients

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Introduction: Older patients are often malnourished during hospitalization. Hence, the use of instruments that assess nutritional status and risk is indispensable.

Objectives: To diagnose nutritional status using the Nutritional Risk Screening (NRS) and associate the diagnosis with the total lymphocyte count of hospitalized older patients.

Method / Design: A cross-sectional study was conducted with 131 hospitalized older patients to analyze nutritional status using anthropometric indicators, lymphocyte count, and the NRS. The chi-square test and the Fisher`s exact test when necessary verified the associations and compared the proportions. The Mann-Whitney test compared continuous or ordinal data. Finally, Spearman's linear coefficient correlation assessed the correlation between lymphocyte count and anthropometric indicators. The significance level was set at 5%.

Results: The mean age of the sample was 68.7±6.9 years; 66% were females and 34% were males. According to NRS, 41.2% of the patients were at nutritional risk and roughly 36% of the patients had mild or moderate depletion of total lymphocytes. The patients at different nutritional risks according to the NRS had significantly different lymphocyte counts. Older individuals not at nutritional risk according to the NRS had higher lymphocyte counts. Lymphocyte count correlated significantly but with low intensity with arm circumference and triceps skinfold thickness. Additionally, NRS was significantly correlated with calf circumference and body mass index (p<0.0001).

Conclusions: Routine nutritional status assessment should be part of the therapeutic process during the hospitalization of older patients.

Keywords: (maximum 5): hospitalized older patients, NRS, lymphocyte count, nutritional status.

149/247. Prevalence and economic burden of obesity in Hungary

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Introduction: The previous wide-range evaluation about nutritional status of the population in Hungary was completed in 1988, while obesity related health care expenditures were never estimated.

Objectives: (1)collect and present updated prevalence data
(2)estimating the economic burden of overweight/obesity for the health budget and for the financial contribution of patients.

Method / Design: (1): Anthropometric, educational and morbidity data of persons above 18y were registered in community and primary care settings, representatively in all geographical regions of Hungary.
(2): National Health Insurance Fund expenses related to inpatient (hospital), outpatient services and sick-leave finances related to obesity, diabetes and hypertension were analyzed.

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Results: (1): Data (BMI, waist circumference, educational level) of 40,331 individuals (16,544 men, 23,787 women) were analyzed. Overall prevalence for overweight was 40.4% among men, 31.3% among women, for obesity 32.0% and 31.5%, respectively.

Amongmen, the prevalence of overweight-obesity was: under 35y=32.5%-16.2%, between 35-60y=40.6%-34.7%, over 60y=44.3%-36.7%. Amongwomen 17.8%-13.8%, 29.7%-29.0%, and 36.9%-39.0%. Data were presented by age-decades as well.

The highest odds ratio for overweight was at middle educational level, the lowest for obesity at the highest educational level.

The highest proportion of obese people lived in villages and in Budapest.

Registered metabolic morbidities were strongly correlated with BMIs and both were inversely related to the level of urbanization.

(2): According to the estimation, 207.000 Million HUF (cca.680 Million EUR) was spent for treatments, which means a 11.6% of the total Hungarian Health Budget and a 0.73% of the GDP. Considering other morbidities at least 1% of the GDP.

Conclusions: Over previous decades, there has been a shift in the distribution of population toward being overweight and moreover obese, mainly in younger generation. Obesity is an important contributor of the increased health care expenditures.

Keywords: (maximum 5): obesity, prevalence, economy, Hungary

149/248. Chronic diseases in vulnerable populations

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Introduction: Overweight and localized fat in the abdominal region seems to be the link between chronic diseases such as diabetes, hypertension and dyslipidemia. In developed countries, the distribution of these diseases is uniform between economic classes, but in Brazil is associated with low education and income. Populations in social and economic vulnerability may also be in health vulnerability process, but there are no studies addressing chronic diseases in these populations.

Objectives: Analyze the prevalence of diabetes, dyslipidemia, hypertension, overweight and abdominal obesity in a population of vulnerable (waste pickers).

Method / Design: Cross-sectional descriptive study with a quantitative approach with 273 waste pickers with income of US $ 300 / month inserted in 15 cooperatives of 7 cities in southern Brazil. It was analyzed the fasting glucose, lipid profile (total cholesterol, fractions and triglycerides), body mass, height, waist circumference and percentage of body fat by bioimpedance. The hypertension, dyslipidemia, diabetes, overweight, general and abdominal obesity been identified as national and international standards (SBC 2010, SBC 2007, SBD, 2007; WHO, 1995; MS, 2004).

Results: The sample was composed of adults (92.3%), women (72.5%), non-white (58.6%), with excess body fat (83.4%), abdominal obesity (57.5%), overweight (51.3%), reduced HDL cholesterol fraction (51%), high total cholesterol (28.5%), abnormal blood pressure (25%) and elevated fasting glucose (17.5%) and high triglyceride (16.5%).

Conclusions: The prevalence of abdominal obesity, dyslipidemia and abdominal obesity in this vulnerable population are higher when compared to the Brazilian population in general. It is worth emphasizing that in this population there are many factors associated risks, and public policies of income, health and education should be expanded to reach all Brazilians in order to improve the health profile.

Keywords: (maximum 5): prevalence, chronic diseases, vulnerability.

149/250. SCreening malnourished children at high risk of death: study in Moroccan malnourished children

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Introduction: The intra-hospital death rate in severe acute malnutrition (SAM) in low income country, particular in Africa, remains very high than the WHO defines as acceptable (<5%).

Objectives: The aim of this study was the assessment of the diagnostic performance of simple biochemical markers in screening malnourished children at high risk of death.

Method / Design: ninety-three children with SAM were admitted to the paediatric ward of University Hospital Hassan II Fez, Morocco. Frome those children, who receive nutritional rehabilitation according to the WHO management protocols, 10 were excluded from the study, thirteen died and seventy survived. The biochemical and anthropometric data from 70 children with SAM, who survived, were compared with those who died (13 children). The area under the curve (AUC) was calculated to estimate the diagnostic accuracy of each marker.

Results: The highest area under the curve (AUC) was found for Acid Alpha Glycoprotein (AUC: 0.73, P<0.008), in contrast to C-reactive protein (AUC: 0.590, P=0.631), Haemoglobin (AUC: 0.602, P=0.277), Haematocrit (AUC: 0.602, P=0.201), Glycaemia (AUC: 0.602, P=0.292), and Total protein (AUC: 0.551, P=0.606). The Haemoglobin, Haematocrit, Glycaemia, and Total protein were all deemed diagnostically not accurate. The AAG yielded the best diagnostic performance at cut-off > 1.936g/l.

Conclusions: Our results suggest that discriminatory power of risk of death can be made by AAG at cut-off > 1.936 g/l. The AAG can

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help clinicians to improve triage and to rationalize manpower resources toward the high-risk groups more accurately.

Keywords: (maximum 5): Acid Alpha Glycoprotein, performance, death, malnutrition.

149/252. Assessment of outcome of Moroccan undernourished children receiving nutrition rehabilitation by using the who guidelines

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Introduction: Protein-energy malnutrition is a major cause of mortality among young children in Africa hospital.

Objectives: The objective was to assess the outcome of children with protein-energy malnutrition after treatment by World Health Organization guidelines.

Method / Design: Eighty-three children with protein-energy malnutrition (PEM) and aged from 6-60 months were admitted to the paediatric service in University Hospital Hassan II, Fez, Morocco, from 1 January 2002 to 30 July and 30 July 2005. The main outcomes measures were the recovery rate, relapse post-discharge and rate death during treatment. All children received nutrition rehabilitation by using the World Health Organization protocol. during 21days. Dietary treatment was based on using a formula-fed (Guigoz 2) containing 498kcal/100g of energy, 9.9g/100g of protein and 23.5g/100g of fat. At initial phase we begin with energy density of 75Kcal/kg/day and 1.2g/kg/day of protein without stopping both breast-feeding and oral micronutrient supplement. At rehabilitation phase the energy dens 100-150Kcal/kg/day and 3g/kg/day of protein were used.

Results: fatality rate was 13(15.66%) split between the NM with (6.02%) and OM with a rate of 9.63% early death and late death. The recovery rate was (84.33%) and the relapse rate post-discharge was lower (4.81%). Overall rate recovery was divided among 38(45.78%) in the nonedematous group and 32(38.55%) in the oedematous. The overall weight gain was 7.16±0.62 and 58.57% gained over 5g/kg/day. 70.73% of oedamtous malnutrition gained over.

Conclusions: Despite the case fatality rate above target levels <5% of WHO, the use WHO guidelines provided an acceptable level of care indicated by high recovery rate (84.33%), lower relapse post-discharge 4(4.81%) and over half of children (58.57%) had weight gain >5g/kg/day. The high early death rate 10(76%) may call us to makes a screening of malnourished children at high risk at admission and reviewing the therapeutic treatment protocol proposed by WHO.

Keywords: (maximum 5): outcome, WHO guidelines, hospital, nutrition rehabilitation

149/254. Fruits and Dairy Dietary pattern and Colorectal Cancer risk: a prospective cohort study in Korea

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Introduction: In Korea, cancer has been the leading cause of death since 1983, and the overall incidence rate has increased by 3.3% per year from 1999 to 2010.

Objectives: The purpose of this study was to identify major dietary patterns among Korean population and to investigate the association between these patterns and cancer risk using data from the Cancer Screening Examination Cohort of the National Cancer Center of Korea.

Method / Design: Among 26,815 individuals who participated in cancer screening examinations from 2004 to 2008, 8,024 subjects who completed a self-administered questionnaire concerning demographics and lifestyles, and a 3-day food record were selected. Analysis was conducted using Cox proportional hazards regression, controlling for important demographic and lifestyle confounders.

Results: During a mean follow-up of 8.1 years, 411 cancers were documented. By factor analysis using twenty-three food groups, four distinct dietary patterns (Vegetables and fish, White rice and kimchi, Fruits and dairy, alcohol and meats) were derived, which explained 29.0% of the total variation. The 'white rice and kimchi' pattern was associated with a decreased risk of overall cancer for the subjects younger than to 50 years of age {HR 1.0 (referent), 0.85 (95% CI, 0.57-1.26), and 0.61 (95% CI, 0.37-0.98), P for trend 0.1206 from the lowest to the highest}. Subjects in the highest tertile of the 'fruits and dairy' pattern showed a decreased likelihood of colorectal cancer risk compared with those in the lowest tertile {HR 1.0 (referent), 0.27 (95% CI, 0.11-0.68), and 0.62 (95% CI, 0.29-1.31), P for trend 0.0192 from the lowest to the highest}.

Conclusions: Our study showed that the 'fruits and dairy' dietary pattern was associated with the decreased risk of colorectal cancer in Koreans, implying that eating more fruit and dairy foods may have a beneficial effect on the etiology of cancer among Koreans.

Keywords: (maximum 5): Cohort Study, Dietary patterns, Colorectal Cancer

149/256. Effects of germinated brown rice and synbiotics on colon carcinogenesis in rats

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Introduction: Colorectal cancer (CRC) is closely associated with diet and inflammation. Emerging data suggest that dietary component such as probiotics, prebiotics, or their combination (synbiotics) may prevent CRC.

Objectives: This study investigated the preventive effect of combination of germinated brown rice (GBR), Lactobacillus acidophilus and Bifidobacterium lactis on colon carcinogenesis.

Method / Design: Male F344 rats were divided into five groups. All rats except control group (C group) were fed modified AIN-93G-based diets containing 10% GBR (G group), 0.5 g/kg of L. acidophilus (GA group), 0.5 g/kg of B. lactis (GB group), and both 0.25 g/kg L. acidophilus and B. lactis (GAB group), respectively. One week after the beginning of experimental diet, all rats received 1, 2 -dimethylhydrazine (40 mg/kg body weight) intraperitoneally and 2% dextran sulfate sodium in drinking water to induce colon carcinogenesis. All rats were sacrificed after 10 weeks of feeding. Serum and colons were collected for analysis.

Results: The results showed that GA and GAB groups significantly decreased the number of aberrant crypt foci (ACF) producing sialomucins (SIM) in the middle colon. GB and GAB groups significantly decreased SIM-ACF in the distal colon. G, GA, GB and GAB groups significantly reduced NFκB and COX-2 expression in the middle colon compared with C group. However, in the distal colon only GAB group reduced NFκB and both GB and GAB groups reduced COX-2 expression. G, GA, GB and GAB groups significantly reduced serum TNF-α levels.

Conclusions: These findings suggest that GBR combined with L. acidophilus or B. lactis prevents colon carcinogenesis in different regions of colon. Synbiotics may suppress preneoplastic lesions of early colon carcinogenesis. Synbiotics are more effective than GBR alone in preventing colon cancer.

Keywords: (maximum 5): Germinated brown rice, Lactobacillus acidophilus, Bifidobacterium lactis, Colon cancer, Prevention

149/258. The relationship between folate intake and risk of colorectal cancer

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Introduction: Folate, included in fruit and green leafy vegetable, plays an important role in nucleotide synthesis and DNA replication. Recent studies demonstrated that adequate consumption of folate may reduce the risk of colorectal cancer.

Objectives: In this study, we aimed to investigate the relationship between folate intake and colorectal cancer risk in a case-control study.

Method / Design: A case-control study was conducted with 922 colorectal cancer patients and 2766 controls recruited from the Center for Colorectal Cancer, National Cancer Center in Korea. Information on dietary intake was collected using a food frequency questionnaire (FFQ) with 103 items. Folate intake level was classified by sex-specific quintile of control group. Nutrient intake was adjusted for calories by the residual method to the total energy adjusted intake. Binary and polytomous logistic regression models were used to estimate odds ratios and their 95% confidence intervals.

Results: High folate intake was strongly associated with a reduced risk of colorectal cancer in women (OR, 0.14; 95% CI 0.07-0.27 for highest vs. lowest quintile) and similar inverse association was observed for men (OR, 0.45; 95% CI 0.31-0.64). In subsite analysis, adjusted ORs (95% confidence interval (CI)) comparing the highest vs the lowest quintile of folate intake were: 0.44 (0.24-0.80) for distal colon cancer, and 0.42 (0.26-0.80) for rectal cancer in men. An inverse association was also found in women for proximal colon cancer (0.10 (0.02-0.45)), distal colon cancer (0.22 (0.01-0.44)) and rectal cancer (0.11 (0.04-0.31)).

Conclusions: We found a statistically significant association between higher dietary folate intake and reduced risk of colorectal cancer and the association was observed for all subsite of colorectum in both men and women.

Keywords: (maximum 5): folate intake, folic acid, colorectal cancer

149/259. Circulating carotenoids and breast cancer risk among Chinese women

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Introduction: Some epidemiological studies revealed the anticancer effect of dietary and circulating carotenoids. However, protective role of individual specific carotenoid was not consistent.

Objectives: The purpose of the present study was to examine whether serum carotenoids, including α-carotene, β-carotene, β-cryptoxanthin, lycopene and lutein/zeaxanthin were inversely associated with the risk of breast cancer among Chinese women.

Method / Design: Five hundred and twenty-one breast cancer cases and equal frequently-matched controls by age (5-year interval) and residence were selected from three teaching hospitals in Guangzhou, China. Concentrations of α-carotene, β-carotene, β-cryptoxanthin,

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lycopene and lutein/zeaxanthin were measured by high pressure liquid chromatography methods. Unconditional logistic regression model was used to estimate odds ratios (ORs) and 95% confidence intervals (CIs).

Results: A significant inverse association was observed between serum α-carotene, β-carotene, lycopene, lutein/zeaxanthin and the risk of breast cancer. The adjusted ORs for the highest quartile of serum concentration compared with the lowest quartile were 0.44 (95% CI: 0.30-0.65, Ptrend <0.01) for α-carotene, 0.27 (95% CI: 0.18-0.40, Ptrend <0.01) for β-carotene, 0.41 (95% CI 0.28-0.61, Ptrend <0.01) for lycopene, 0.26 (95% CI 0.17-0.38, Ptrend <0.01) for lutein/zeaxanthin, respectively. However, no significant association was found between serum β-cryptoxanthin and breast cancer risk, with the adjusted OR of 0.71 (95%CI: 0.48-1.03, Ptrend = 0.07). The inverse associations between serum α-carotene, β-carotene, and lutein/zeaxanthin and breast cancer risk were found both in pre and postmenopausal women. Analysis stratified by estrogen receptors (ER) or progesterone receptor (PR) status showed that α-carotene, β-carotene, lycopene and lutein/zeaxanthin were observed to be inversely associated with breast cancer among ER positive and PR positive women.

Conclusions: The present study suggested that serum α-carotene, β-carotene, lycopene, lutein/zeaxanthin, but not β-cryptoxanthin were inversely associated with breast cancer risk in Chinese women.

Keywords: (maximum 5): serum carotenoids, breast cancer, case-control study, Chinese women

149/262. Traditional Japanese dietary pattern is associated with birth rate of low-birth-weight infants in Japan

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Introduction: Birth rate of low-birth-weight infants in Japan is about 10%.

Objectives: This study was conducted to clarify the association between the physical status and lifestyle habits, including breakfast intake, of mothers, and the prevalence of low-birth-weight infants.

Method / Design: Mothers and infants who underwent 3-month health check-ups at health and welfare centers in Osaka city, Japan, between June and November 2014 were examined. The questionnaires were composed of items regarding the physical status of the infant at birth and at the 3-month health check-up, and the physical status and lifestyle habits of the mother before and after pregnancy. The questionnaires also included items on whether the mothers' breakfast intake included grain, meat and fish, and vegetable dishes, which are traditional Japanese dietary pattern.

Results: Questionnaires were distributed to 723 individuals. Valid responses were obtained from 527 individuals. Regarding the physical status of low-birth-weight infants at birth, 8.9% had a birth weight of less than 2,500g. Dietary restrictions for the purpose of weight loss before pregnancy had a similar risk of 1.74 (95% CI: 1.10–3.51). The birth weight and height of infants born to mothers who consumed a combination of grain, meat and fish, and vegetable dishes for breakfast were 3,058.6g and 49.1cm, respectively, whereas those of infants born to mothers who did not were 2,977.3g and 48.6cm, respectively, indicating a significant difference. The relative risk for mothers who did not consume a combination of grain, meat and fish, and vegetable dishes for breakfast of giving birth to a low-birth-weight infant of was 4.71 (95% CI: 1.20–18.56).

Conclusions: To reduce the prevalence of low-birth-weight infants in Japan, it is important for mothers to avoid unreasonable dietary restrictions for the purpose of weight loss, and to consume a balanced breakfast.

Keywords: (maximum 5): Low-Birth-Weight Infants, breakfast intake, traditional Japanese dietary pattern

149/265. Lean Seafood Intake Reduces Cardiovascular Risk Factors In Healthy Subjects

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Introduction: Observational studies strongly indicate an association between fish consumption and reduced risk of cardiovascular disease, but data from randomized controlled trials are inconclusive.

Objectives: We hypothesized that lean seafood intake would reduce cardiovascular risk factors in healthy subjects, as compared to intake of non-seafood protein sources.

Method / Design: Two balanced diets, rich in fiber, vegetables and unsaturated fatty acids that varied in the main protein sources; 60% of total dietary proteins from lean-seafood or non-seafood sources, were given to 20 healthy subjects for 4 weeks in a randomized controlled trial with crossover design. Fasting and postprandial blood samples were collected before and after, respectively, consumption of test meals with cod or lean beef on day 1 and 28 of each intervention.

Results: Relative to the non-seafood intervention, the lean seafood intervention reduced fasting (relative change by diets 0.31 mmol/L, P = 0.002) and postprandial (P = 0.0004) serum triacylglycerol (TAG). The lower serum TAG level was mainly due to less fasting (relative change by diets 13 nmol/L, P = 0.003) and postprandial (P=0.0007) medium-sized very low-density lipoprotein (VLDL) particles. The

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lean seafood intervention prevented the elevated ratio of total- to high-density lipoprotein (HDL) cholesterol in the fasted (P = 0.002) and postprandial (P=0.0004) state that was observed after the non-seafood intervention. Fasting (P=0.02) and postprandial (P=0.01) HDL particle size was larger after the lean seafood than after the non-seafood intervention.

Conclusions: Dietary protein source determines fasting and postprandial lipids in healthy subjects in a manner that may have impact on long-term development of cardiovascular disease.

Keywords: (maximum 5): Nutrition, Risk factors, Cardiovascular disease, Diet, Lipoproteins

149/270. Infant and young child feeding practices in urban Indonesia

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Introduction: In 2010, a guideline to assess infant and young child feeding (IYCF) practice in household level was published by WHO to help a better understanding on current child nutrition problems. This guideline was previously used for countries scale survey only. In Indonesia, the decentralization policy making has created a need to provide local context data in related topics.

Objectives: To assess the IYCF pratices of children age 0-23 months in an urban area of Indonesia

Method / Design: A cross-sectional survey was conducted in Bekasi Municipality, the most populated urban district in Indonesia. Data on IYCF practice (including eight core and 5 optional IYCF indicators) were collected from 636 children age 0 to 23 months .

Results: Within one hour of birth there were 74,5% children who got early initiation of breastfeeding. Exclusive breastfeding at first six month were 31.4%. Children that continued to breastfed at one year were 72.% and appears to be declined for 10% at 2 years. About half of children were bottle fed. Children aged 6-8 months that had timely initiation of food are 81.6%. While almost all children had met the recommendation of meal frequencies but only half of children that met the recommended food diversity. Children that had met the minimum acceptable diet were 48.9%. Consumption of iron rich foods were 62.7%.

Conclusions: Overall, even in urban area of Indonesia there is still a need for intervention to improve exclusive breastfeeding, food diversity, and minimum acceptable diet of children age 0-23 months. Some factors that could disturb the appropriate practice were also need to be assessed in further study.

Keywords: (maximum 5): Infant and young child feeding, urban, Indonesia

149/277. Evaluation of risk factors for and effects of gestational diabetes mellitus on mothers and newborn in Austria

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Introduction: Gestational diabetes mellitus (GDM) is one of the most frequent complications during pregnancy and the number of women affected is increasing. The reason for this trend is a rise in risk factors, such as overweight and obesity. Undetected, GDM can lead to severe perinatal complications and long-term adverse effects for both mother and child.

Objectives: The purpose of this study was to evaluate potential risk factors for developing GDM on the one hand and effects of GDM for both mother and child on the other hand.

Method / Design: A total of 173 pregnant women participated in this study. Mean age was 30.5 years. Women were at least in the 24th week of gestation (average: 32.2 gestational week) and underwent an oral glucose tolerance test. The survey was carried out at gynecologic practices, hospitals, workshops on nutrition during pregnancy and lactation, in cooperation with a midwifery association. The questionnaire identified socio-demographic and medical parameters, pregnancy complications and outcomes as well as physical activity frequency. Statistical analysis were performed using SPSS 21.0.

Results: We found diagnosed GDM in 27.7% of the investigated women. Gestational diabetes is associated with ethnic origin, presence of GDM and/or other complications in previous pregnancies, with excessive pre-pregnancy BMI, lower educational level and smoking before pregnancy. Pregnant women with GDM were less physically active than the healthy ones. Women with GDM develop more often urinary tract infections, and suffer more frequent from stillbirth, preterm delivery and cesarean section. Children of GDM mothers were often too large for their gestational age.

Conclusions: These results indicate that overweight/obesity, socioeconomic disadvantage, bad nutritional habits and DM within the family contribute for women's risk for developing GDM. To prevent late-term effects for mother and child GDM screening and therapy at an early stage of pregnancy are recommended.

Keywords: (maximum 5): pregnancy, gestational diabetes, complications, newborn

149/278. Red and processed meat consumption and the risk of renal cell carcinoma in women - Results of the European Prospective Investigation into Cancer and Nutrition (EPIC)

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Introduction: Renal cell cancer (RCC) incidence varies worldwide but the contribution of diet to the development of this disease remains unclear. In EPIC, we observed a positive association between red and processed meat intake in women, but not in men, and similar, though not statistically significant, observations were made in the US Pooling Project (Lee JE et al. JCNI 2008).

Objectives: We evaluated this association in women to elucidate the association between red meat intake and RCC by menopausal status.

Method / Design: We included 335,014 female participants, recruited between 1992 and 2000. Meat and fish consumption was assessed at baseline using country-specific dietary assessment instruments; to account for measurement error, 24-hour recalls were applied in an 8% subsample for calibration purposes. Cox proportional hazards regression was used to calculate multivariable-adjusted hazard ratios (HR) and 95% confidence intervals (CI).

Results: Until December 2008, 303 RCC cases have been identified. Women with a high consumption of red meat (HR=1.36, 95% CI 1.14-1.62; calibrated, per 50 g/day) and processed meat (HR=1.78, 95% CI 1.05-3.03; calibrated, per 50 g/day) had a higher risk of RCC. There was no statistically significant interaction by menopausal status for red meat intake with increased risks of RCC among pre-, peri- and postmenopausal women (p-interaction 0.98). However, the relationship between processed meat and RCC incidence was restricted to pre- (HR=4.15, 95% CI 1.23-14.1; calibrated, per 50 g/d) and perimenopausal women (HR=1.76, 95% CI 0.96-3.24), whereas no association existed in postmenopausal women (HR=0.56, 95% CI 0.11-2.93; p-interaction 0.02).

Conclusions: Our results support an association between red and processed meat consumption and risk of RCC in women. Differences in sex hormone metabolism might provide a biological explanation for this observation as some evidence supports a higher susceptibility of women with high estradiol concentrations as compared to men

Keywords: (maximum 5): cohort study, renal cell cancer, meat consumption

149/286. Effects of scFOS on modulation of immune response in elderly people

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Introduction: Short-chain fructooligosaccharides (scFOS) have been shown to modulate the immune response after immune challenge in animal models and more recently in infants

Objectives: The aim of the present study was to evaluate if scFOS could modulate response to an immune challenge in elderly people who are known to have a depressed immune function in comparison to younger adults.

Method / Design: Healthy human subjects aged 71.1±0.7 years were randomly allocated to scFOS from sucrose (at 4 and 8 g/day) or a placebo for 6 weeks. After 3 weeks subjects were vaccinated with the 2010/2011 seasonal influenza vaccine. Blood, saliva and faecal samples were collected at the start of the study and 3 and 6 weeks later. Immune parameters were measured using blood and saliva samples and the composition of the faecal microbiota was determined.

Results: The response to the influenza vaccination was not significantly influenced by the scFOS supplementation. This can be partly explained by a very high variability in titres of each of the 3 strains contained in the vaccine at baseline. However the scFOS supplementation tended to improve seroconversion (multiplication by 4 of initial titres) for the Brisbane strain that overall induced the lowest response after vaccination. A similar response (improvement of 1 out of 3 strains of the vaccine) to influenza vaccine was already observed with probiotic supplementation. Two bacterial groups were found to have changed in faeces upon scFOS intake: Bifidobacterium spp. were increased at both intake levels and Anaerostipes hadrus was increased at the higher intake level only.

Conclusions: While these results confirm that scFOS can modulate the composition of faecal microbiota in healthy elderly subjects, no significant change of the non-specific immune parameters was observed. The potential improvement of response to a specific strain of influenza (Brisbane) would require further investigation

Keywords: (maximum 5): immune response, elderly, bifidobacteria, fructooligosaccharides

149/287. Association between snacks and beverages 'non-restraint' consumption, physical activity and body composition of adolescents

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Introduction: A higher consumption of snacks and beverages high in sugars may increase energy value of daily diet, cause metabolic disorders and be conductive to overweight. The relation between consumption of these foods and body composition in physical active adolescents is not well known.

Objectives: The aim of the study was to analyze the association between 'non-restraint' consumption of snacks and beverages, physical activity and body composition of Polish adolescents.

Method / Design: The study involved 195 adolescents (93 boys, 102 girls) aged 13-15, including 95 students from regular junior high school and 100 students from sporting junior high school. The weight and height were measured and BMI (kg/m2) was calculated. The body

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composition (fat mass, in kg and %; fat free mass, in kg) was determined by a bioimpedance method (AKERN BIA-101 analyzer). The total physical activity (in MET-minutes/week) was determined by the International Physical Activity Questionnaire (IPAQ). Using a Cluster Analysis two clusters were identified previously: 'restraint' (68% of the sample) and 'non-restraint' (32%). 'Non-restraint' students consumed 2-3 times more salty and sweet snacks, fruit juices and sweetened beverages than 'restraint'.

Results: The 'non-restraint' cluster when compared to 'restraint' was characterized by moderate higher physical activity (1066.0 vs. 947.0 MET-minutes/week; p=0.03) as well as higher fat free mass (53.6 vs. 47.7 kg; p=0.0001) and lower fat mass (10.0 vs. 12.3 kg; p=0.02; 15.8 vs. 19.9%; p=0.0008). The significance of differences disappeared when analysis was made separately in girls and boys, except fat free mass in boys, but tendencies were the same.

Conclusions: It has been shown that higher consumption of unhealthy snacks, fruit juices and sweetened beverages does not rise body fattening in adolescents when associated with higher physical activity.

Keywords: (maximum 5): adolescents, body composition, IPAQ, snacks, sweetened beverages

149/291. Influence of knowledge and preferences on children's fruit and vegetable consumption in Bavaria

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Introduction: The daily consumption of fruit and vegetable (FV) among children in Germany is significantly below international recommendations. Because nutrition patterns during childhood are crucial for nutrition patterns in adulthood, determinants of FV consumption need to be identified (Demor-Luce, 2004). Based on the "Social cognitive theory of Bandura", (1986 and 1997) personal factors influence children's FV consumption. Furthermore, socio-demographics play an important role.

Objectives: The aim of this study is to investigate the relationship between children's FV consumption and the personal factors regarding FV such as knowledge (FV types), preferences (both in general and for FV types), gender and parents' education and income.

Method / Design: A cross-sectional study was conducted with 673 children (aged 8-10) and their parents. Children's personal factors and parents' socio-demographics were collected using questionnaires at sixteen primary schools in spring 2014. Parents' questionnaires to be filled out at home were handed out to their children at primary schools.

Results: Results (return rate: 66.24 %) indicate that 29 % of the children consume no FV, 28 % consume 1 serving a day. Only 1 % of the children reached the recommendation of five servings per day. A multivariate regression (stepwise) shows that knowledge of fruit types (ß = 0.208, $p < 0.001$), preferences for vegetable species (ß = 0.214, $p < 0.01$), general fruit preferences (don't like) (ß = -0.126, $p < 0.05$), general vegetable preferences (like) (ß = 0.125, $p < 0.05$), gender (female) (ß = 0.137, $p < 0.05$) and parents' high level of education (ß = 0.155, $p < 0.01$) are significant.

Conclusions: FV intake data show that children consume less than recommended that is why further intervention is needed. In addition, findings show different relationships between FV knowledge and preferences and FV consumption. Furthermore, gender plays a significant role.

Keywords: (maximum 5): FV CONSUMPTION: CHILDREN: PERSONAL FACTORS CORRELATES: SOCIO-DEMOGRAPHIC ASPECT: QUESTIONNAIRE:

149/297. Assessment of Knowledge Level And Consumption Of Functional Food

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Introduction: Functional foods have been reported as the top trend facing the food industry. Increasing consumer nutrition knowledge and frequency of diseases such as diabetes, atherosclerosis, osteoporosis, obesity are the major reason to interest this kind of food.

Objectives: The aim of this study was to assess the level of knowledge and consumption of functional food

Method / Design: Surveys, which were attended by 105 respondents were conducted among clients specialty food stores (eg., "Healthy food store" "Organic food store"). The study used a questionnaire concerning the knowledge of functional food, its composition and effects on the human health, as well as the consumption of this type of food.

Results: The majority of respondents declared knowledge of the definition of functional foods and over 80% of respondents, answered that functional foods - in comparison to traditional foodstuffs - demonstrating additionally a beneficial effect on human health. In the respondents' opinion vitamins (80%), omega 3 fatty acids (79%), minerals (73%) and dietary fiber (73%), probiotics (61%) as well as β- carotene (51%) have healthy properties and can be a functional component of food. More than a half of respondents thought that product containing functional ingredients will have a positive impact on human health.

Over 90% of respondents declared consumption of functional food. For 78% of them the main reason of consumption of this products was health care, while 13% of them bought functional food because of curiosity, and 8% after doctor's advice. Only 2% of respondents consumed functional products because of current "fashion" food. Almost a half of respondents (47%) who consumed functional foods, observed positive effects on their health.

Conclusions: 1. Definition of functional food was well known by respondents.

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2. Almost all respondents consumed functional products. The main reason of interest and consumption of this foodstuffs was health care.

Keywords: (maximum 5): functional food, consumers, specialty store

149/299. Assessment of consumer expectations in relation to functional foods

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Introduction: Today foods are not intended to only satisfy hunger and to provide necessary nutrients for humans but also to prevent nutrition-related diseases and improve physical as well as mental well-being of the consumers. The consumers expected specific properties of food and create a demand for food products associated to health benefits.

Objectives: The aim of this study was to assess consumers' expectations in relation to functional food products

Method / Design: Surveys, which were attended by 105 respondents was conducted among clients specialty food stores (eg., "Healthy food store" "Organic food store").

Results: More than a half of respondents (54%) indicated that the functional products are definitely needed in the market. In respondents opinion, products with reduced sugar content (65%) and reduced-fat and cholesterol (60%) are the most expected. The other sought after group of functional food were products with low energy value, supporting body mass reduction and products for prevention or treatment of osteoporosis. More than a half of the respondents would expect functional products such cereal grain products, pasta and bread. The respondents were also interested in beverages, dairy products, low fat spreads, eggs, dessert. Research showed that 26% of respondents thought that consumption of functional foods may be related to health problems. More than a half of them declared their attention to composition of food they purchased. The majority of respondents claimed that if they had the opportunity to try a new product containing health-promoting ingredient, they would buy it. Over then 50% of respondents justified that they were interested in functional food because of their healthy effects, while 13% of them answered that they buy it because they like novelty.

Conclusions: The study showed that functional products are definitely needed in the market. Products with reduced sugar content and reduced-fat are the most expected.

Keywords: (maximum 5): functional food, consumers

149/303. Systematic review: Low energy sweetener consumption, energy intake and body weight in animals and humans

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Introduction: Low-energy sweeteners (LES) reduce dietary energy density, and might thereby reduce energy intake (EI). Concern however has been raised that LES use increases EI and body weight (BW).

Objectives: Review relevant studies in animals and humans consuming LES with ad libitum access to food.

Method / Design: Systematic review, including meta-analyses.

Results: In a minority of animal studies exposure to LES increased BW, but a large majority found that LES had no effect on BW or decreased it. Prospective human cohort studies reported inconsistent associations between LES use and BW. The largest of these reported a lower risk of obesity associated with consumption of LES-sweetened beverages. Meta-analysis of short-term intervention studies showed total EI was reduced when LES- versus sugar-sweetened foods or beverages were consumed before an ad libitum meal, with no difference when LES were compared with nothing or water. This was consistent with EI data from sustained intervention studies. Meta-analysis of sustained interventions (duration 1-40 months) showed consumption of LES reduced BW compared with sugar, and to a smaller extent compared with water. Notably, LES did not increase EI or BW in any comparison.

Conclusions: A subset of animal studies has generated hypotheses that LES disrupt appetite control and increase BW. These studies, however, do not mimic the use of LES by humans, and differ in outcome from controlled studies in humans. While human prospective cohort data are inconsistent, most evidence from acute and sustained human intervention shows that LES do not increase EI or BW, whether compared with caloric or non-caloric (e.g., water) control conditions. Indeed, the balance of evidence clearly finds that consumption of LES in place of sugar, in children and adults, leads to reduced EI and BW, and under sustained use seemingly also when compared with water.

Keywords: (maximum 5): Low-energy sweeteners; Energy intake; Body weight; Systematic review; Food intake

149/304. Plasma fatty acid patterns reflect dietary habits and metabolic health in Irish adults

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Introduction: Accumulating evidence suggests that circulating fatty acids may relate to the metabolic syndrome (MetS). To describe this relationship, pattern analysis may be superior to conventional methods due to the complex inter-play of diet and metabolism of circulating fatty acids.

Objectives: To investigate the relationship between fatty acid patterns, dietary intake, and biomarkers of metabolic health.

Method / Design: Both principal component analysis (PCA) and k-means cluster analysis (k-means) were used to derive plasma fatty acid patterns from 26 individual fatty acids in 1052 Irish adults using data from the National Adult Nutrition Survey (NANS). General linear model and multiple linear regression were used to assess the associations between plasma fatty acids, dietary intakes and biomarkers of metabolic health.

Results: Three and four plasma fatty acid patterns were identified based on the proportion of individual fatty acid presents using PCA and k-means, respectively. Patterns driven by shorter chain fatty acid (SCFA), very-long-chain saturated fatty acid (VLCSFA) and n-3 polyunsaturated fatty acids (PUFA) were identified by both methods with a linoleic acid (LA) cluster only derived by k-means. In general, the SCFA pattern (including higher 14:0, 15:0. 16:0, 18:0) was associated with adverse biomarkers of metabolic health and higher metabolic risk ($P<0.025$). The n-3 PUFA (20:5n-3, 22:5n-3, 22:6n-3) and VLCSFA (including 20:0, 22:0, 23:0, 24:0) patterns were associated with healthier and more protective phenotypes ($P<0.025$).

Conclusions: A fatty acid pattern driven by VLCSFA was associated with healthier metabolic outcome. In general, fatty acid patterns derived from PCA and k-means were related to demographic, dietary habit and markers of metabolic health, resulting in varying degrees of metabolic risk.

Keywords: (maximum 5): Plasma fatty acid pattern, principal component analysis, k-means cluster analysis, metabolic health.

149/306. Gliadin induced stress/ inflammation in autoimmune diseases

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Introduction: . Coeliac Disease (CD) and Type-1-diabetes (T1D) are two chronic conditions that often occur together in the same individual due to the sharing of susceptibility genes. CD, also referred to as gluten-sensitive enteropathy, is an autoimmune condition that occurs in genetically predisposed people by exposure to gluten. T1D is an autoimmune disease arising as a consequence of a misdirected T cell response to the pancreatic beta cell. In recent years, there has been a growing interest in the innate immune system as a regulator of both disease development. Moreover, enteroviruses, known to activate a strong innate immune response, have been implicated in both CD and T1D disease pathogenesis. Studies have shown beneficial effects of a Gluten Free Diet (GFD) on symptoms associated for patients with both condition.

Objectives: The hypothesis have tested in this study is that gliadin, could activate the same pathways as viruses to trigger the pathways that will lead to innate immune activation both in CD and in T1D.

Method / Design: Intestinal biopsies from CD patients (Gluten Containing Diet, GCD; Gluten Free Diet, GFD), T1D (complicated and not by CD) and controls cultured in vitro were incubated with undigested gliadin peptide P31-43. Total lysates were analyzed by western blot and by PCR

Results: Gliadin peptide P31-43 induced increase of antiviral proteins Mxa and INF-alpha in CD (both GFD, GCD) and T1DM, but not in control intestinal biopsies cultured in vitro.

Conclusions: Our data showed that in intestinal biopsies from GCD, GFD and T1DM the undigested gliadin peptide P31-43 could increase antiviral proteins. This confirmed our hypothesis that gliadin is capable of activating innate immunity as a result of mechanisms typically induced by viral infections in autoimmune diseases.

Keywords: (maximum 5): Gliadin, Inflammation, Celiac Disease,Diabetes, Autoimmune Diseases

149/307. Food habit and cardiovascular disease risk Factors of Sahraoui ethnic group in south of Morocco

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Introduction: Chronic diseases, including obesity, diabetes, hypertension, are believed to have long latency periods.

Objectives: To assess food habit and its related cardiovascular disease risk factors of sahraoui population in south of Morocco.

Method / Design: Data were collected from two samples of regional surveys conducted in 2001 and 2011 and from a sample of older women who had a nomadic lifestyle. The samples was randomly selected among adult healthy women aged 15 years and older, non pregnant.

Results: The traditional diet was based largely on milk products and barley. Currently, several traditional foods are consumed either frequently such as soup, rice, couscous, camel meat or less frequently such as camel milk, dates and dishes from barley flour. The camel products are still appreciated whereas those of cow are not. The intake of sweet drinks is relatively high. Eating fat on meat and adding sugar to some dishes and to traditional drinks are also reported by the majority. In addition, eating from a common plate is still a very important part of this ethnic way of life and in contrast to nomadic lifestyle, urban population is implicated in many sedentary activities. Moreover, cardiovascular risks factors were very prevalent and its have also increased during the last ten years. There was a significant increase of percentage of women who want to lose body weight but the desire to gain weight remains very high even among normal weight women. Obesity was negatively associated with time spent in walking and positively associated with time spent in some sedentary activities.

Conclusions: Changes in food consumption associated with high body mass index and sedentary may increase the risk for several chronic diseases in this population, suggesting apparent needs for immediate attention in terms of prevention and health education.

Keywords: (maximum 5): Food, Sahraoui population, Morocco

149/309. Antenatal iron supplementation and serum non-transferrin bound iron in Kenyan women: a randomized placebo-controlled trial

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Introduction: Supplementation with ferrous iron can lead to increased rates of malaria, possibly through the transient production of non-transferrin bound iron (NTBI). Evidence that iron supplementation can lead to NTBI production is mostly derived from small, mostly non-randomized studies using volunteers with adequate iron status and without infections or inflammation, and using NTBI quantitation methods with inherent limitations. Little is known about factors that influence the magnitude of the serum NTBI response to iron ingestion.

Objectives: We measured the effect of ingestion of a single iron supplement on serum NTBI concentrations in pregnant Kenyan women. We also explored the influence of initial iron status, gravidity, maternal age, Plasmodium infection, HIV infection, α+-thalassemia genotype on the NTBI response.

Method / Design: Rural Kenyan women with singleton pregnancies, gestational age 13~ 23 weeks and hemoglobin concentration ≥90g/L were randomized to supplementation with iron (60mg as ferrous fumarate) versus placebo. Approximately 1.5h after ingesting the first supplement, participants were offered an optional non-standardized lunch meal. Blood was collected at baseline and after 3hours. Serum NTBI concentrations were determined using a novel, flow cytometry-based assay.

Results: 379 women participated. Compliance was 100%. NTBI concentrations after 3 hours were similar between groups (mean for both: 0.18 μmol/L; difference, 95%CI: 0.01μmol/L, –0.03μmol/L to 0.05μmol/L). NTBI was present in 40.9% and 46.1% of women in iron versus placebo groups (difference: 5.3%, –15.0% to 4.7%). We found no evidence of effect modification by any of the baseline factors investigated.

Conclusions: There was no evidence that oral iron supplementation led to NTBI production when the supplement was given with food to women in their second trimester of pregnancy. These results cannot be extrapolated to pregnant women who ingest supplements without food, or to those in their third trimester of pregnancy

Keywords: (maximum 5): Non-transferrin bound iron; malaria; Plasmodium; pregnancy; Kenya

149/310. Intake of sugar-sweetened beverages in adolescents from Troms, Norway

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Introduction: High intake of sugar-sweetened beverages (SSB) leads to dental decay, and has been associated with weight gain and chronic disease.

Objectives: To study the intake of SSB and predictors of SSB intake in adolescents.

Method / Design: A cross-sectional analysis from the Fit Futures study, a cohort of youths in two Northern Norwegian municipalities (93% participation rate). Descriptive statistics and logistic regression analyses were applied.

Results: We included 420 female and 438 male 1st year high-school students aged 15-17 years. 31.8% of the girls and 61.0% of the boys drank at least one glass of SSB per day. 15.0% of the girls and 9.4% of the boys ate five fruits and vegetables a day. The proportion of both male and female students in vocational studies drinking SSB daily was higher than in general and sports studies ($p<0.01$ in chi-square tests). Eating five a day was more common in girls in sports studies, and less common in vocational studies ($p<0.01$). Among boys, no difference was seen according to study program. In girls, eating five a day was not associated with daily drinking of SSB, while in boys there was a negative association ($p=0.04$). In girls, drinking SSB daily was more common in those not physically active an hour daily ($p=0.05$), in boys there was no association. Overweight was not associated with daily drinking of SSB. In multivariable adjusted logistic regression, male gender, skipping breakfast, daily juice consumption, daily snuffing, daily consumption of artificially sweetened beverages, and vocational study program were associated with daily SSB consumption.

Conclusions: Particularly boys are frequent consumers of SSB, despite efforts at reducing consumption in recent years. Healthy choices need to be available for those who skip breakfast.

Keywords: (maximum 5): Adolescents, sugar-sweetened beverages, fruit and vegetables, Norway

149/312. Early life residence, fish consumption and risk of breast cancer

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Introduction: Few studies exist on the effect of diet during different periods of life, on breast cancer risk. Great differences existed in food consumption between residential areas in Iceland in the middle of the 20th century, with very high fish consumption in coastal areas.

Objectives: Our aim was to explore the effect of diet and residence during early life and midlife on breast cancer risk.

Method / Design: We used data from the Reykjavik Study, a population-based Icelandic cohort of 10049 women born between 1907 and 1935, and examined the association of residence in early life, used as a proxy for dietary habits, and risk of breast cancer. To further explore this association, we also used food frequency data at different periods of life, including adolescence, from the AGES-Reykjavik cohort, a subgroup of the Reykjavik Study, established in 2002. Participants provided information on residence (capital area, coastal village or rural area) in early life. By linkage with the Icelandic Cancer Registry, information on breast cancer diagnoses was available throughout 2013. Adjustments were made for a series of potential confounders, including residence for dietary analysis.

Results: During a mean follow-up of 27.3 years, 744 women were diagnosed with breast cancer. We found a significant inverse association for breast cancer diagnosis among women who lived beyond puberty (20 years or more) in coastal villages compared with women residing in the capital area (HR = 0.74, 95% 0.58, 0.94).We also found that women with high fish consumption in midlife had lower risk of breast cancer in older age, compared with women with lower consumption, (OR = 0.60, 95% 0.38, 0,94).

Conclusions: Our results suggest that high fish consumption in early- to midlife is associated with reduced risk of breast cancer.

Keywords: (maximum 5): Breast cancer, fish consumption, midlife diet, adolescent diet, residence.

149/313. Polyphenols and breast cancer survival – results from the European Prospective Investigation into Cancer (EPIC) cohort

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Introduction: The high incidence of breast cancer in combination with a high relative survival, leads to a high prevalence of breast cancer in many Western societies and thereby a large interest in initiatives aimed at optimizing health of breast cancer survivors. Intake of dietary fiber and soy has been related to better survival among these women, but the evidence is limited. Dietary fiber and soy are found in products rich in polyphenols, plant secondary metabolites. These

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compounds may have biological effects that are relevant for breast cancer progression including estrogen and antioxidant activity.

Objectives: Our objective was to investigate the association between pre-diagnostic intakes of total polyphenols and polyphenol classes (flavonoids, lignans, phenolic acids, and stilbenes) in relation to all-cause and breast cancer-specific mortality among women diagnosed with breast cancer.

Method / Design: We used data from the European Prospective Investigation into Cancer and Nutrition (EPIC) cohort. Diet was assessed from food frequency questionnaires, and polyphenol intakes were estimated using the Phenol-Explorer database. We followed 11,784 breast cancer cases from time of diagnosis until death, end of follow-up or last day of contact. During a median of 6 years, 1,483 women died (753 of breast cancer). We related polyphenol intake to all-cause and breast cancer-specific mortality using Cox Proportional Hazard Models with follow-time as underlying time and strata for 5-year age group and country.

Results: Among postmenopausal women, an intake of lignans in the highest quartile was related to a 36% lower risk of dying from breast cancer compared with participants in the lowest intake quartile (adjusted model: HR, quartile 4 vs. quartile 1, 0.64, 95% CI: 0.47;0.87). We found no association for other polyphenol classes, and for premenopausal women no association was found.

Conclusions: Lignans may be related to improved survival among postmenopausal women with breast cancer.

Keywords: (maximum 5): Breast Cancer, Polyphenols, survivorship

149/314. Insulinoresistance, inflammation, lecithin:cholesterol acyltransferase and HDL composition are improved by Mediterranean diet in metabolic syndrome patients

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Affiliation: *(1) Nutitionnist; (2) nutritionnist.*

Introduction: The metabolic syndrome (MS) is a cluster of factors known to increase the risk for the development of diabetes mellitus and cardiovascular disease.

Objectives: The present study aim at investigating the influence of Mediterranean diet (MD) on insulin resistance, inflammatory status, HDL2 and HDL3 composition, lecithin:cholesterol acyltransferase (LCAT) activity in metabolic syndrome (MS) patients.

Method / Design: 84 patients with MS were randomly recruited in the medical centers of Oran. Eighteen healthy participants were selected as a control group. Among these 84 patients, only 36 patients have followed-up the nutritional advices for 3 months. Patients were instructed to follow a Mediterranean-style diet and received some other selected nutritional and physical activity instructions. Anthropometric measurements were performed and a questionnaire was used to assess dietary intake. Blood samples were drawn at baseline and after 3 months of nutritional intervention and in healthy subjects.

Results: At baseline, the MS patients were obese and had altered anthropometric parameters, higher systolic and diastolic blood pressure, plasma lipids, glucose, insulin, HOMA-IR, HbA1C, CRP and fibrinogen compared to controls. Increases in HDL3-TG, PL, apolipoproteins and in HDL2-mass, apos, PL, TG, UC and TC and decreases in HDL3-TC and UC and HDL2-CE and LCAT activity were obtained in MS group. Patients following the Mediterranean-style diet had significantly reduced weight, BMI, waist circumference, waist/hip circumference ratio, decreased systolic and diastolic blood pressure, HOMA-IR, HbA1C, plasma glucose, insulin, , TC, TG, CRP and fibrinogen. In addition, the adherence to the MD increased LCAT activity, HDL3-TC and CE and decreased HDL3-PL and apos and HDL2-TC, TG, PL, apos and mass.

Conclusions: A lifestyle intervention based mainly on nutritional advices improves metabolic and inflammatory abnormalities of metabolic syndrome and ameliorates the HDL2 and HDL3 composition, which contribute to the increased efficacy of reverse cholesterol transport.

Keywords: (maximum 5): Metabolic syndrome, Mediterranean diet, Human, Inflammation, Lecithin:cholesterol acyltransferase

149/315. The effects of nutritional intervention in oncology patients

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Introduction: An impaired nutritional status is associated with reduced quality of life, lower activity level, increased treatment-related adverse reactions, reduced tumor response to treatment and reduced survival. However, malnutrition is common in patients with cancer. Many cancer patients are unable to meet their daily caloric requirements.

Objectives: To investigate the effects of nutritional interventions in oncology patients.

Method / Design: Oncology patients were divided into inpatient group and outpatient group. The nutritional interventions were individualized nutritional counseling by registered dietitians (RD). The outcomes were assessed after 3 months of nutritional interventions.

Results: There were 1365 inpatients and 573 outpatients with cancer recruited in total. 752 men and 613 women (median age, 61.5±14.4 years) in inpatient group, 269 men and 297 women (median age, 59.7±12 years) in outpatient group respectively. Compared with baseline in inpatient group, our data demonstrated energy and protein intake were increased by 13% and 12.7% . Similarly, energy and protein intake were increased by 22.4% and 28.2% compared with baseline in outpatient group. Estimated energy and protein requirements were calculated for all patients. Total daily energy requirement intake less than 75% was considered as inadequate. After nutritional intervention, the percentage of inpatients and outpatients who reached estimated energy requirements were increased from 43.7% to 58.3% and 40.5% to 80.9% respectively . Adequate protein intake (≥75

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% of requirement) were increased from 42.4% to 56.6% in inpatient group and 41.5% to 69.7% in outpatient group.

Conclusions: Nutritional intervention by individualized counseling can improve nutrition intake in oncology patients.

Keywords: (maximum 5): nutritional intervention, cancer, dietary intake, energy, protein

149/317. Iron Homeostasis and gastric cancer risk : the EPIC-Eurgast study

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Introduction: Iron, an essential element for human life but also toxic when in excess has a very well-regulated metabolism . Only a small percent of dietary iron is absorbed, and dietary iron is not necessarily related to body iron status . Although evidence suggests that dietary iron is associated with gastric cancer, results from studies measuring iron biomarkers is rather insufficient to lead to any conclusions.

Objectives: To investigate the relationship between body iron status and gastric cancer risk.

Method / Design: We conducted a nested case-control study in the multi-centric European Prospective Investigation into Cancer and Nutrition (EPIC) study. The study included 456 primary incident gastric adenocarcinoma cases and 900 matched controls that occurred during an average of 11 years of follow-up. We measured pre-diagnostic serum iron, ferritin, transferrin, and C-reactive protein, and further estimated total iron-binding capacity (TIBC) and transferrin saturation (TS). Odds ratios (OR) and 95% confidence intervals (CI) for the risk of gastric cancer by iron metrics were estimated from multivariate conditional logistic regression models

Results: After adjusting for relevant confounders, we observed a statistically significant inverse association between gastric cancer and ferritin and TS indices (ORlog2=0.80, 95% CI=0.72-0.88; and OR10%increment=0.87, 95% CI=0.78-0.97, respectively). No statistical differences were found by gastric cancer localization (cardia and non-cardia) or histological (diffuse or intestinal) type. TIBC increased risk of overall gastric cancer (OR50µg/dl=1.13, 95% CI=1.02-1.2) and also with non-cardia gastric cancer and intestinal type. Additional analysis suggests that time since diagnosis of gastric cancer and pepsinogen levels could modify these findings.

Conclusions: Our results showed a decreased risk of gastric cancer related to body iron status, measured by serum iron and ferritin. Further investigation is needed to clarify the role of iron in gastric carcinogenesis.

Keywords: (maximum 5): cancer. iron. diet. biomarkers. EPIC

149/319. Associations between weight status and combined predictors in adolescents from the ASSO Project.

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Introduction: The Italian ASSO (Adolescents and Surveillance System for the Obesity prevention) Project, financed by the Italian Ministry of Health, developed and tested an innovative web-based system allowing a standardized data collection about life style, body composition and dietary habits during adolescence.

Objectives: The objective of this study was to provide an overview of the associations between weight status and socio-demographic, early life, clinical factors, lifestyles and food habits of the subjects involved in ASSO Project.

Method / Design: Adolescents aged 14-17 were selected in secondary schools from Palermo, Italy. BMI was calculated by directly measuring weight and height of the subjects. Information on factors potentially influencing weight status was collected through the administration of three different questionnaires included in the ASSO-Toolkit: ASSO-PIQ (Personal Information Questionnaire), ASSO-PASAQ (Physical Activity, Smoke and Alcohol Questionnaire) and ASSO-FHQ (Food Habits Questionnaire). The considered variables were dichotomised, and chi-square test investigated those significantly associated with the outcome. These were included in a Multiple Correspondence Analysis (MCA) to identify the variables more closely associated with different groups. Finally, multivariate logistic regressions were conducted and raw and adjusted odds ratio (OR) with 95% confidence intervals (CI) were provided.

Results: Gender, weight status and parents' education, birth weight and type of birth, supplements' use, slimming regime and physical activity status were found to be associated with weight status. Dimension 1 consisted of the following lifestyles factors: being active/sedentary, consume/not consume supplements, going to school walking, by bike/car. Dimension 2 consisted of socio-demographic and early factors: natural/caesarean birth, normal weight/under- or overweight birth, normal weight/overweight or obese parents.

Conclusions: This study identified the socio-demographic variables, early factors and lifestyles correlates of overweight/obesity status in a sample of adolescents from Southern Italy. It contributed to identifying those adolescents that should be prioritized in interventions aiming at reducing overweight/obesity.

Keywords: (maximum 5): Weight status, determinants, adolescents, multiple correspondence analysis

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149/321. Body composition indices-related thresholds to identify single and clustered cardiovascular disease risk factors in adolescents

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Introduction: The association of body composition indices with single and clustered cardiovascular disease (CVD) risk factors in youth is controversial.

Objectives: We hypothesized that: 1) body composition indices are associated with single and clustered CVD risk factors in European adolescents; 2) there are body composition indices-related thresholds associated with a healthier clustered CVD risk

Method / Design: Cross-sectional study (n=1,089, 46.7% boys, 12.5-17.49yr). Single CVD risk factors: systolic blood pressure, maximum oxygen uptake, homeostasis model assessment, C-reactive protein (n=748), total cholesterol/high density lipoprotein cholesterol and triglycerides. A composite cardiovascular risk score was computed. Body composition indices: height, body mass index (BMI), lean mass, sum 4 skinfolds, central/peripheral skinfolds, waist circumference (WC), waist-to-height ratio (WHtR) and waist-to-hip ratio (WHR).

Results: Linear regression models showed that most body composition indices were associated with single CVD risk factors. In addition, the sum 4 skinfolds, WHtR, BMI, WC and lean mass were strong and positively associated with clustered CVD risk. Lean mass was positively associated with clustered CVD risk independently of fat mass in girls. Receiver Operating Characteristic curves for the prediction of a healthier clustered CVD risk showed highly accurate body composition thresholds for the sum of 4 skinfolds, WHtR, BMI and WC in boys (moderately accurate for lean mass) and moderately accurate body composition thresholds for these indices in girls (all AUC > 0.773).

Conclusions: Our results support an association between most of the assessed body composition indices and single and clustered CVD risk factors. Lean mass is positively associated with clustered CVD risk independently of fat mass in girls. This novel finding helps to understand why BMI is a good index of CVD risk but a bad index of adiposity. Moderate to highly accurate body composition indices-related thresholds associated with a healthier clustered CVD risk are provided.

Keywords: (maximum 5): Adolescence, cardiovascular risk, fat mass, lean mass, threshold.

149/322. APOE genotype-dependent response to zinc: effects on body weight, brain oxidative stress and zinc homeodynamics:

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Introduction: APOE4 gene is a major risk factor for several age-dependent, neurodegenerative diseases. ApoE4 protein probably contributes to neurodegeneration by increasing oxidative stress and brain inflammation. Zinc, an essential nutrient for vitality, has previously been shown by our group to reduce atherosclerosis in vivo by lowering oxidative stress-induced damage in arteries. In contrast, the role of zinc in age-dependent neurodegeneration is less clearly defined as both, zinc supplementation and removal via chelation, have indicated potentially neuroprotective effects.

Objectives: This study investigates if and how dietary zinc modulates brain zinc homeodynamics subsequently neurodegeneration based on the APOE status.

Method / Design: We exposed human APOE3 and APOE4 targeted-replacement mice to short- and long-term dietary zinc deficiency (5ppm) and supplementation (500ppm), respectively. Effects of our dietary zinc regime were quantified in: body weight, feed intake, brain zinc content, zinc transporter proteins, and brain oxidative stress and inflammation markers.

Results: In brief, zinc supplementation reduced the known body weight (BW) disparity between APOE3 and APOE4 mice by promoting weight gain in APOE4 mice. Elemental zinc analysis revealed that increasing dietary zinc intake elevated brain zinc concentrations in both genotypes, especially when given at young age. Interestingly, long-term zinc supplementation upregulated the known lower expression of ZnT-3 (synaptic zinc transporter) in APOE4 mice, also lowered oxidative stress and cytokines level to greater extend in the brains of APOE4 mice. Thus, implicating the potential of zinc in correcting the detrimental, APOE-dependent changes in zinc homeodynamics.

Conclusions: Our results illustrate significantly diverging responses of human APOE3 and APOE4 targeted- replacement mice to dietary zinc. Considering the observed beneficial effects of zinc supplementation on BW, oxidative stress and zinc homeodynamics in APOE4 mice, our work provides a promising experimental platform for exploring the extent to which dietary zinc and APOE-influenced neurodegeneration.

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Keywords: (maximum 5): APOE, dietary zinc, inflammation, oxidative stress, neurodegeneration

149/324. Substitutions of red meat, poultry, and fish and risk of myocardial infarction

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Introduction: Red meat has been suggested to be adversely associated with risk of myocardial infarction (MI). Previous studies examining the association between intake of red meat and incident MI have rarely taken replacement foods into consideration. It is important to specify alternative food items, as the association between red meat intake and MI depends on the replacement food.

Objectives: The study aim was to investigate optimal substitutions between and within the food groups of red meat, poultry, and fish for MI prevention.

Method / Design: We followed 55,171 women and men aged 50-64 years in the Diet, Cancer and Health study with no known history of cancer, MI, or cardiac arrest at baseline. Diet was assessed by a validated 192-item food frequency questionnaire at baseline. Multivariate Cox proportional hazard models including age, total energy and other MI risk factors were used to calculate hazard ratios (HR) and 95% confidence intervals (CI) for specified food substitutions of 150 g/week.

Results: During a median follow-up time of 13.6 years, we identified 656 female and 1,694 male cases. Among women, the HR for replacing red meat with poultry was 0.91 (95% CI, 0.82-1.02). The HR for replacing red meat with lean fish was 1.03 (95% CI, 0.91-1.17), whereas the HR for replacing red meat with fatty fish was 0.81 (95% CI, 0.69-0.96). The HR for replacing lean fish with fatty fish was 0.79 (95% CI, 0.63-0.99), and the HR for replacing processed red meat with unprocessed red meat was 1.05 (95% CI, 0.91-1.20). Among men, no associations were found.

Conclusions: This study suggests that replacing red meat or lean fish with fatty fish is associated with a lower risk of MI among women but not among men.

Keywords: (maximum 5): myocardial infarction, red meat, fish, cohort study, substitution

149/327. Individual characteristics associated with fat liking

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Introduction: Various studies have shown that sensory liking influences dietary behaviors and that individual characteristics, such as socio-demographic or psychological factors, are related to dietary intake and weight status. However, little is known about individual profiles associated with fat liking.

Objectives: The aim of the present study was to investigate the associations between liking for fat sensation and socio-demographic, economic, psychological, lifestyle and health characteristics in a large sample of adults.

Method / Design: Individual factors and liking scores were collected using validated questionnaires from 37,181 French adults participating in the NutriNet-Santé study, a large web-based cohort. The associations between individual characteristics and fat liking were assessed by multivariable multinomial logistic regression models.

Results: In both genders, older individuals were less likely to have a high fat liking (ORmen=0.10 [0.08,0.13]; ORwomen=0.10 [0.08,0.12]) and subjects belonging to low-occupational categories were more likely to prefer fat (ORmen=1.36 [1.14,1.63]; ORwomen=1.32 [1.18,1.47]). Current smokers (ORmen=1.46 [1.17,1.81]; ORwomen=1.30 [1.16,1.45]) and heavy drinkers (ORmen=1.73 [1.39,2.15]; ORwomen=1.67 [1.43,1.94]) were also more likely to have a high liking for fat sensation. Regarding psychological characteristics, highly cognitive restrainers were less likely to have a high fat liking (ORmen=0.37 [0.31,0.44]; ORwomen=0.41 [0.37,0.45]) whereas uncontrolled eaters (ORmen=4.15 [3.50,4.92]; ORwomen=4.19 [3.74,4.70]) and emotional eaters (ORwomen=1.37 [1.18,1.58]) were more likely to prefer fat. Finally, obese subjects (ORmen=1.96 [1.54,2.49]; ORwomen=1.97 [1.72,2.27]), pregnant women (ORwomen=1.86 [1.23,2.82]) and

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menopausal women (ORwomen=1.63 [1.22,2.17]) were more likely to have a high fat liking, compared to those with low liking.

Conclusions: Overall fat liking is mostly associated with unhealthy lifestyle characteristics such as smoking, alcohol, dieting, obesity, etc. Further research is needed to study the influence of individual factors and sensory liking on dietary intake and weight status.

Keywords: (maximum 5): Dietary determinant, individual characteristics, fat sensation, sensory liking

149/328. The risk of obesity is associated with fat and sweet liking

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Introduction: Fat, added sugar and sodium are important nutritional factors involved in the risk of obesity, although these components contribute to eating pleasure thanks to their sensory properties. Few cross-sectional studies have shown equivocal results about relationships between liking and weight status. The only one prospective study has shown an increase of weight in individuals who liked sweet taste and no significant relationships for fat liking. However, the tool that assesses liking is unreliable.

Objectives: The aim of the study was to investigate the prospective association between liking for fat, sweet and salt and the onset of obesity in adults.

Method / Design: Liking scores were assessed using a validated questionnaire and self-reported anthropometric data were collected during 4 years in 29,025 French adults participating in the NutriNet-Santé study, a large web-based observational cohort. The influence of fat, sweet and salt liking on the incidence of obesity was assessed by Cox proportional hazards models adjusted for socio-demographic and economic factors, lifestyle, physical activity and energy intake.

Results: In both genders, liking for fat was positively associated with obesity risk (HRmen=1.24[1.05,1.47]; HRwomen=1.20[1.10,1.32]), whereas sweet liking was inversely associated (HRmen=0.82[0.69,0.98]; HRwomen=0.88[0.80,0.98]). In contrast, no significant association with liking for salty taste was found. When liking scores were considered into quartiles, individuals with the highest fat liking had higher risk of obesity (men: HRQ4vs.Q1=2.75[1.40,5.41]; women: HRQ4vs.Q1=2.31[1.56,3.42]) than those with the lowest liking level. Regarding the highest sweet liking, a strong inverse relationship was also found (men: HRQ4vs.Q1=0.41[0.22,0.75]; women: HRQ4vs.Q1=0.65[0.45,0.92]) compared to those with the lowest liking.

Conclusions: This study demonstrates that a heightened fat liking is an important predictor of weight status in adults, whereas a liking for sweet foods is inversely associated with the onset of obesity. These results suggest that sensory liking should be taking into account in obesity prevention.

Keywords: (maximum 5): Dietary determinant, fat, obesity, sensory liking, sweet taste

149/334. Associations of fruit intake in children with their executive functions 'Cognitive flexibility' and 'Inhibition' .

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Introduction: Fruit and vegetables are known to be important for the delivery of vitamins and minerals to the body, and thus, for the normal development and functioning of brain and body metabolism.

Objectives: This study will investigate if children with higher fruit and vegetable intake exhibit higher cognitive inhibition, flexibility and working memory capacities.

Method / Design: Cross-sectional data on a community sample of 245 children aged 7-13 years were analyzed using Spearman correlations. Parents answered the BRIEF-questionnaire, which measures cognitive inhibition, cognitive flexibility and working memory. The higher the scores on the BRIEF, the lower were the cognitive capacities of the children. Parents also reported the weekly consumption frequency of fruit and vegetables.

Results: Weekly fruit consumption was significantly positively related to cognitive inhibition (r=-0.131; p=0.041) and cognitive flexibility (r=-0.187, p=0.003. There was no significant relation between fruit consumption and working memory (r=0.087, p=0.177), and no significant relation between vegetable intake and the three cognitive functions (inhibition: r=0.080, p=0.208; flexibility: r=0.030, p=0.637; working memory: r=0.049, p=0.443).

Conclusions: The three cognitive functions cognitive inhibition, cognitive flexibility and working memory are necessary for an optimal

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adaptation to the challenges in the environment. As the average fruit consumption in children currently does not reach the nutritional guidelines, it might be of extreme importance to enhance fruit consumption in children, to improve their cognitive functioning. However, this study is limited to cross-sectional data, and further longitudinal data are needed to assess the direction of the associations.

Keywords: (maximum 5): Executive functioning, fruit, vegetables, children.

149/335. Socioeconomic status and Lebanese children obesity: a pilot study

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Introduction: Children obesity has become a global public health crisis. It is affecting all socio-economic groups, irrespective of age, sex or ethnicity but its prevalence may vary across socioeconomic strata.

Objectives: This cross-sectional pilot study describes the current association between obesity and socio-economic status (SES) in Lebanese children.

Method / Design: The sample consisted of 359 Lebanese girls and boys, 11 to 18 years of age, randomly selected from public and private schools. The study was conducted in 2013-2014 at elementary and secondary schools in Lebanon. The questionnaire included a series of questions aiming to assess the children's SES. Children's anthropometric measurements were obtained and the BMI was calculated. The Statistical Package for the Social Sciences was used (p-value <0.05).

Results: The majority of adolescents were found to belong to a low socioeconomic background with a percentage of 55.4%, while 10.3% had a high SES and 34.3% a middle SES.

The BMI differed significantly across the three groups. In fact, the BMI of adolescents with high SES was significantly higher than the BMI of adolescents of low and middle SES. However, there was no significant difference between the BMI of adolescents with low and middle SES, but the prevalence of undernourished students was found to be the highest in the low SES group.

Furthermore, children's BMI was correlated to the type of school attended: a high rate of obesity and overweight were observed in students attending private schools and a wider spread of under nutrition was observed in public schools.

Conclusions: This study supported the view that obesity in the developing world would be essentially a disease of the socioeconomic elite. It showed that there are multiple nutritional problems emerging in the Lebanese society ranging from under-nutrition to overweight and obesity all affected by SES.

Keywords: (maximum 5): Children, obesity, socioeconomic status, Lebanon.

149/339. Association between environmental factors and individual factors with obesity in Brazilian adults

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Introduction: Obesity is a serious public health problem and has a great impact on the disease patterns of populations. The characteristics of the environment in which people live play an important role in obesity in many countries.

Objectives: Estimate the association between environmental factors and individual factors with obesity in adults.

Method / Design: This cross-sectional epidemiological study, developed using the Protective and Risk Factors for Chronic Diseases by Telephone Survey database (Vigitel 2008-2010) from Belo Horizonte. Obesity was defined as a BMI ≥ 30 kg/m2. To characterize the built and social environments, we developed a georeferenced database with environmental data. The data analysis included multilevel logistic regression. The area covered by the basic health units was defined as a neighbourhood unit.

Results: A total of 5,273 individuals were evaluated. The increase in the number of establishments that sell healthy food (OR = 0.88, 95% CI: 0.80 to 0.96), number of restaurants (OR = 0.97, 95% CI: 0,96- 0.99), number of places for physical activity (OR = 0.89, 95% CI: 0.84-0.95) and total income (OR = 0.96, 95% CI: 0.94-0,98) is associated with lower odds of obesity, in addition, these associations remained significant after adjustment for age, gender, education and food consumption.

Conclusions: These findings contribute to a better understanding of the complex relationship between environmental and individual determinants of obesity, which can play an important role in the development of effective interventions and expand obesity control programs in large cities.

Keywords: (maximum 5): MULTILEVEL ANALYSIS. PUBLIC HEALTH. OBESITY.

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149/340. Association between the perceived environment and overweight in adults

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Introduction: Overweight is a global problem of epidemic proportions in many countries, including in Brazil. Various characteristics of the perceived environment are associated with the prevalence of overweight and obesity.The Neighborhood Environment Walkability Scale (NEWS) stands out as one of the most commonly used instruments to evaluate the perceived environment in international and national research communities.

Objectives: Determine characteristics of the perceived environment associated with overweight in adults from the city of Montes Claros, Minas Gerais.

Method / Design: A cross-sectional study was conducted using a representative sample of individuals who were 18 years or older. Overweight was defined as BMI ≥ 25 kg/m2 based on the World Health Organization criteria. The Neighborhood Environment Walkability Scale was used to evaluate the perceived environment. Poisson regression was performed to evaluate the relationships between the perceived environment and overweight.

Results: 808 adults participated in the current study. Of these participants, 52.7% were female. The average age was 39.62 years (SD=16.32), and the predominant age group was between 18 and 30 years of age (38.3%). The majority of individuals in the sample analyzed had complete high school or incomplete higher education (44.8%), were brown (70.2%), and had households with incomes 1 to 4 (85.9%). Of the individuals, 50.4% were overweight (19.35% were obese). Individuals between 46 and 60 years of age and who were married were the most likely to be overweight ($p<0.001$). Perceptions of mixed land-use and the immediate neighborhood were associated with overweight in the sample.

Conclusions: The results of this study provide a basis for discussing the relationship between the environment and health outcomes. The present investigation can also serve as a basis for developing public health and urban planning strategies and policies in medium-sized cities that can stimulate the population's adoption of healthy lifestyles.

Keywords: (maximum 5): PERCEPTION, ENVIRONMENT AND PUBLIC HEALTH, OBESITY, OVERWEIGHT.

149/341. Comparative analysis of nutritional status and quality of life of malnourish patients with diverse etiology

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Introduction: The nutritional status of malnourish patients depends both on the main disease and the diet of the patient, which reflects on their quality of life and lifestyle.

Objectives: The aim of our study is to compare the nutritional status and quality of life of different groups of patients with chronic malnutrition.

Method / Design: We examine 3 groups of patients with chronic malnutrition:

1) primary anorexia nervosa (n=19) – AN
2) secondary anorexia with depressive syndrome (n=38) – SA
3) chronic gastrointestinal disease and status after surgery (n=35) – GID

We assess the diet by special questionnaire, 24 hours re-call and specific biochemical analyses. Also we assess the quality of life by dynamometry, MMSE and special questionnaire.

Results: We didn`t find significant difference in the average energy intake of the 3 groups – 1617kkal of AN patients, 1745kkal – SA and 1874kkal of GID. The average intake of protein is insufficient in the 3 groups and the most satisfied result gives the group with GID – 66,7g. We find out the highest intake of added sugar in AN and high intake of fats in the 3 groups – over 35 %. The biochemical analyses show significant diversity in Hemoglobin, Urea, Albumin and proteinuria, but nevertheless they are normal values excluding AN. Dynamometry shows similar handgrip strength in the three groups and MMSE test shows the worst results in SA group.

Conclusions: We find significant differences in the diet of patients with AN, which reflects negatively on the biochemical analyses of this group but not on the quality of life.

Keywords: (maximum 5): comparative analysis, underweight, diet, questionnaire, biochemical analyses

149/343. Greater circulating levels of retinol, alpha-tocopherol and carotenoids associated with higher bone density in adults

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Introduction: Vitamin A and E and carotenoids may positively regulate bone metabolism through their antioxidant properties; however, few studies have examined the relation between these factors in blood and bone health.

Objectives: We examined the association of serum levels of retinol, α-tocopherol and carotenoids of α- and β-carotene, lycopene, β-cryptoxanthin, and zeaxanthin+lutein with bone mineral density (BMD) in Chinese adults.

Method / Design: This community-based cross-sectional study recruited 2101 women and 1053 men (aged 40–75 years) in Guangzhou, China. Serum concentrations of retinol, α-tocopherol and carotenoids were determined by the methods of reverse-phase high-performance liquid chromatography. Dual-energy X-ray absorptiometry was applied to determine BMD at the whole body, lumbar spine, hip sites. Univariate and multivariate analyses of variance were used to examine the associations of retinol, α-tocopherol and carotenoid with BMDs.

Results: After adjusting for potential covariates, we observed a significant, dose-response positive associations of circulating levels of retinol, α-tocopherol, α- and β-carotene, β-cryptoxanthin and lycopene with BMDs was observed women at the majority of the studied skeletal sites and in men at some bone sites. BMDs in women of the top (vs. bottom) quartiles were 1.36%-3.40% (retinol), 2.20%-4.98% (α-tocopherol), 1.33%-3.48% (α-carotene), 1.58%-3.08% (β-carotene), 0.59%-3.88% (lycopene), and 1.25%-3.26% (β-cryptoxanthin). The mean differences of the BMDs between the extreme quartiles tended to be slightly lower in men. Among the above serum factors, α-tocopherol,α- and β-carotene tended to be more sensitive to BMD. No significant associations between serum zeaxanthin+lutein and BMD were detected in either gender.

Conclusions: These results suggest that serum retinol, α-tocopherol and carotenoids have a favorable association with bone health in the study population, particularly in women. This study provides further evidence to recommend antioxidant-rich foods as a useful tool in bone health promotion and osteoporosis prevention.

Keywords: (maximum 5): retinol; α-tocopherol, carotenoids ; bone density; adults

149/347. The prevalence of undernutrition among children aged 0-72months in India and China: NutriPlanet findings

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Introduction: Health authorities and research institutes are exploring methods to best understand the nutritional status of children in their countries, so intervention programs can be implemented or improved.

Objectives: To use NutriPlanet(1,2) methodology to understand the prevalence of undernutrition among children aged 0-72months in India and China.

Method / Design: NutriPlanet(1,2) developed by Danone Nutricia Research, uses multidimensional methodology (review of published literature, annual health reports, dietary surveys and interviews with experts from academia, hospitals, and institutions) to gather insight into the nutritional status of specific populations within a country.

102 publications from India and 43 from China, published from 2005-2012, were analysed and enriched with interviews from 35 Indian and 20 Chinese health experts.

Results: NutriPlanet revealed that prevalence rates of stunting, underweight and wasting were 48%, 43% and 20%, respectively in India, and 9.9%, 3.64% and 2.3%, respectively in China.

Iron deficiency anaemia (IDA; Haemoglobin:<110g/L; 6-72months) was present in 63% (urban) and 72% (rural) of children in India. In China, the prevalence of anaemias (majority being IDA), was 10.3% (urban) and 13.3% (rural).

Vitamin A deficiency was present in 62% (India) and 10% (China) of children 0-60 months.

The national prevalence of Vitamin D deficiency is not documented. Two-thirds of Indian breastfed infants 2.5-3.5months were Vitamin D deficient, while in Chinese cities, vitamin D deficiency varied between 4-6% (0-36months) and 12-17% (37-72months) in Guangzhou and 5.4% (0-12months) and 21.5% (2-5 years) in Tianjin.

Health experts confirmed that nutrient deficiencies were attributed to high infection rates, low maternal stores of nutrients, low income, poor maternal nutritional knowledge, lack of sun exposure and dietary sources.

Conclusions: NutriPlanet identified that undernutrition was more prevalent in India compared to China and the prevalence of vitamin D deficiency was not nationally representative. This information can assist in planning future nutritional studies in children.

Keywords: (maximum 5): India, China, infants, children, undernutrition.

149/349. Evaluation of the Erythrocyte Incorporation of Iron in Chinese Children by Single Stable isotope

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Introduction: Anemia is an common disease for children especially in developing country, and the 2002 China National Nutrition and Health Survey has revealed that iron deficiency rate of children is nearly 30%. Although the importance of adequate iron intake for children has been realized, while there are few data on the iron metabolism in China.

Objectives: To analysis the erythrocyte incorporation rate of iron in chinese children using single stable isotope tracer technique.

Method / Design: Thirty boys(10.6±0.2years old) and twenty-seven girls(10.4±0.2years old) were selected, each subject was given 5mg 57Fe orally for each time and 30mg for totally. After administration the stable isotope ratios in red blood cell(RBC) were detected by multicollector inductively coupled plasma mass(MC-ICP-MS) at 14d, 28d, 60d and 90d, together with the blood volume and body iron mass, were obtained to calculate the erythrocyte incorporation rate of different genders.

Results: The percentage of erythrocyte incorporation of 57Fe were increased from 14d after administrated orally, and achieved peak at 60d(boys: 19.67±0.56%, girls: 21.33±0.59%) and then decreased, and so was the mean ratio of 57Fe/56Fe. The erythrocyte incorporation rate of 57Fe of girls at 14d, 28d, 60d and 90d was 19.49±0.47%, 20.19±0.85%, 21.33±0.59% and 20.52±0.68% respectively, and were significantly higher than those of boys(18.79±0.47%, 19.20±0.62%, 19.67±0.56% and 19.36±0.44%, P<0.05).

Conclusions: After a certain dose of 57Fe administrated orally, it is available to obtain the 57Fe-enrichment of erythrocytes within 90 days. The erythrocyte incorporation rate in children are ideal calculated by this research, and the mean value of erythrocyte incorporation of girls is always higher than that of boys.

Keywords: (maximum 5): Stable isotope tracer technique; Iron; Erythrocyte incorporation rate; children; MC-ICP-MS

149/351. Dinner timing is associated with BMI values in a sample of overweight Chilean adults

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Introduction: Overweight and obesity prevalence has alarmingly increase worldwide. In the particular case of Chile, it is one of the countries with the highest rates of Latin America region. Therefore, new aspects are being investigated as related to the onset and development of obesity in order to design effective tools to prevent and counteract this disease. In this context, meal timing has been very recently proposed to affect body weight, blood pressure or glucose tolerance, among other aspects.

Objectives: To evaluate the potential association between meal timing, specifically dinner, and the presence of overweight in a sample of Chilean adults.

Method / Design: Data were obtained from National Health Survey, carried out by the Chilean Ministry of Health between years 2009-2010, which was an observational and transversal study. 5416 adult subjects were recruited, being the sample representative of both rural and urban areas and male and female gender. Waist circumference, body weight and height were determined following validated protocols and body mass index (BMI) was calculated as the body weight divided by the squared height (kg/m2). The sample was categorized according to dinner time into two groups: before 8 pm or after 8 pm.

Results: Data for this report include 5265 subjects (2141 men, 3124 women; mean age 46±19 years old). When comparing the two groups categorized by dinner time it was observed that those having dinner after 8 pm showed significantly higher BMI values than those having this meal before 8 pm (28.01±5.40 kg/m2 vs. 27.59±5.35 kg/m2; p= 0.009). The same trend was observed for waist circumference (102.19±100.97 cm. in the before-8-pm-group vs. 97.37±69.70 cm. in the after-8-pm-group; p= 0.071).

Conclusions: Eating late is associated with higher BMI values within Chilean adults. The meal timing should be taken into account when designing dietary approaches for body weight management.

Keywords: (maximum 5): BMI, overweight, timing, dinner, adults

149/354. The diet of community-dwelling older adults. Results from the Dutch National Food Consumption Survey-2010-2012

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Introduction: Monitoring the diet of older adults can contribute to adequate food policies and recommendations.

Objectives: To gain insight in the diet and undernutrition of community-dwelling men and women aged 70 years and older in the Netherlands.

Method / Design: A two-stage cluster sample in 15 municipalities was drawn to compile a representative national sample of older adults. Height, weight, and arm and waist circumference were measured. Undernutrition was assessed with the Short Nutritional Assessment Questionnaire 65+. Two non-consecutive dietary record assisted 24-hour dietary recalls were carried out using the EPIC-Soft program during home visits. Usual intake distributions were modelled using SPADE software and compared with Dutch dietary guidelines.

Results: Of the 2,848 invited eligible people, 739 (26%) participated in the study. The study population represented a relatively vital population of older adults. Undernutrition was present in 13% and BMI ≥30 kg/m2 in 19% of the population. About 2% of the men and 20% of the women had an energy intake below 6.3 MJ. Intake of saturated fatty acids >10en% occurred in more than 90% of older adults.

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More than half of the women and 77% of men consumed >6 gram salt daily. About 70% of the population consumed <200 g fruit and <twice fish per week; and about half of the population consumed <150 g vegetables daily. Almost 20% of the men and 26% of the women took vitamin D supplements; >90% of the population had an inadequate vitamin D intake.

Conclusions: One in eight vital community-dwelling Dutch older adults is undernourished. Intake of vitamin D is inadequate, which supports the need for supplementation of vitamin D in this group. Furthermore, the same issues for improvement of the diet apply to vital community-dwelling older adults, as to the rest of the Dutch population.

Keywords: (maximum 5): older adults, diet, vitamin D, undernutrition, The Netherlands

149/372. Potato consumption and risk of colorectal cancer in the Norwegian Women and Cancer (NOWAC) cohort

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Introduction: Potatoes are the fourth most important food crop in the world, and boiled potatoes is a central component of the Norwegian supper. The scientific literature on health effects of potato consumption is scarce and contradictive.

Objectives: The aim of this study was to investigate the association between potato consumption and colorectal cancer risk among women in the NOWAC cohort.

Method / Design: Information on diet, lifestyle and health was collected using a postal questionnaire. Cancer cases (n=912) were identified through the national cancer registry among 79,778 women aged 41-70 years at baseline. Cox proportional hazard regression was used to estimate the association between potato consumption and colorectal cancer risk, stratified by BMI and adjusted for known risk factors.

Results: Median potato consumption was two potatoes per day.

Higher intake of potatoes was associated with a higher risk of colorectal cancer,

HR: 1.23 (95% CI: 1.04-1.45) for the highest intake (≥3 potatoes per day) versus the second highest intake (2 potatoes per day) in the multivariable adjusted model, with a significant trend (p=0.010). For rectal cancer, the association was borderline (HR: 1.35, 95% CI: 1.00-1.82) with a significant trend (p=0.023). For colon, the same tendencies were found, even though the results were non-significant.

When stratified by BMI (<25 and ≥25) significant associations were found only for those with BMI<25 for colorectal cancer (HR: 1.41, 95% CI: 1.13-1.76) (p for trend: 0.012), colon (HR: 1.35, 95% CI: 1.03-1.77) with non-significant trend, and rectum (HR: 1.55, 95% CI: 1.04-2.32) (p for trend: 0.035).

Conclusions: In this study a high potato intake (3 or more potatoes per day) was associated with increased risk of colorectal cancer for women with a BMI<25.

Keywords: (maximum 5): potato consumption, colorectal cancer, epidemiology, Norwegian women.

149/375. Association of thyroid hormone with serum selenium for the pregnant women in China

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Introduction: Selenium is an essential ingredient of three iodothyronine deiodinase isoforms, which are responsible for the production of the active hormone 3,3',5-triiodothyronine (T3) from thyroxine (T4), thus taking part in the metabolism of thyroid hormones. Hence, thyroid hormones can be partly determined by selenium nutritional status.

Objectives: To assess the selenium nutritional status for the pregnant woman in China Nutrition and Health Survey 2010-2012 and to assess the association of thyroid hormone with serum selenium for a better understanding.

Method / Design: A total of 918 pregnant women were recruited using a stratified cluster sampling technique from China Nutrition and Health Survey 2010-2012. The concentrations of serum selenium and thyroid hormones (FT3, FT4, and TSH) were determined by inductively coupled plasma mass spectrometer and chemiluminescence immunoassay kits. We would ascertain selenium deficiency, adequacy and excess using the logistic sigmoid saturation curve of the median derivatives, then we explored the change of thyroid hormone with serum selenium status.

Results: The overt saturation range interval of serum selenium was 51.2-100.1 μg/L in the pregnant women, and the corresponding concentration of FT3, FT4 and TSH were 4.4, 16.3, 1.9 μg/L, while were 4.2, 16.9, 1.9 μg/L in selenium deficiency and 4.6, 16.7, 1.5 μg/L in selenium excess, respectively. Therein, FT3 was positively changed with the selenium status and significant difference was observed (P=0.0374). TSH was negatively along with the selenium status and the concentration of TSH was significantly lower in selenium excess than the counterparts in selenium adequate and in selenium deficiency (P=0.0268).

Conclusions: The optimum range of serum selenium was established for the pregnant women in the current study. Thyroid hormones were conversely changed with serum selenium, namely, FT3 was significantly shifted, while TSH was significantly decreased in selenium excess.

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Keywords: (maximum 5): thyroid hormone, selenium, pregnant woman, sigmoid saturation curve, median derivative

149/379. Effect of wholegrain emmer wheat on serum folate and homocysteine – a pilot human intervention study

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Introduction: Ancient wheat varieties have been suggested to be more nutritious due to a generally higher content of vitamins and minerals. Emmer wheat has been reported to have a high content of folate, which has been linked to reduced homocysteine (Hcy), a risk marker of cardiovascular disease. However, evidence for any beneficial effect of ancient wheat varieties on human health compared to common wheat is lacking.

Objectives: To compare the effects of consumption of emmer wholegrain wheat (EWW) and common wholegrain wheat (CWW) on markers of cardiovascular disease.

Method / Design: In a crossover dietary intervention study, 11 participants (6 women and 5 men) were randomized to the order of consuming EWW or CWW flakes and kernels for 3 weeks while refraining from other wholegrain foods. Fasting blood samples were drawn and anthropometry was assessed before and after each dietary intervention period.

Results: Total serum folate concentrations decreased with CWW (-2.12±2.03 nmol/L) vs. a small increase in the EWW period (0.67±1.27 nmol/L), but there was no significant difference between the groups ($p=0.17$). Similarly, Hcy changes did not differ significantly between groups (-0.21±0.51 and -1.50±1.48 μmol/L in CWW and EWW, respectively; $p>0.5$). Despite the lack of effects, there was an inverse association between changes in total serum folate and Hcy during the emmer period (Spearman's ρ =-0.69; $p=0.02$). No difference in the effect of either diet was observed plasma glucose and insulin, blood lipids or blood pressure.

Conclusions: Although no differences in total serum folate or plasma Hcy between EWW and CWW periods was seen, we found an inverse association between these two parameters. This was the first study to investigate potential health benefits of emmer consumption, and appeared to be underpowered to find significant differences. Further investigations in larger studies of longer duration are warranted.

Keywords: (maximum 5): Homocysteine, folate, emmer wheat, wholegrain, cardiovascular disease

149/382. The structure of wheat bread influences the postprandial metabolic response in healthy men

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Introduction: Postprandial high glucose and insulin responses after starchy food consumption, which are associated with an increased risk of developing several metabolic diseases, could possibly be improved by altering food structure.

Objectives: To investigate the influence of a compact food structure on postprandial glucose kinetics and metabolic response.

Method / Design: In a randomized, crossover study with ten healthy male volunteers bread with a compact structure (flat bread) was compared to bread with a porous structure (control bread) and pasta, with a very compact structure. The wheat products had a similar composition and only differed in structure due to different processing conditions. The rate of appearance of exogenous glucose, endogenous glucose production, and glucose clearance rate was calculated using a stable isotope technology. Furthermore, postprandial plasma concentrations of glucose, insulin, several gut hormones and bile acids were analyzed.

Results: The structure of flat bread was considerably more compact compared to control bread, as confirmed by microscopy, XRT analysis (porosity) and density measurements. Consumption of flat bread resulted in a more moderate postprandial response compared to control bread, and was similar to pasta based on glucose, insulin, and the glucose-dependent insulinotropic polypeptide response, although the rate of appearance of exogenous glucose was lower only in the first postprandial phase. Interestingly, the glucose clearance rate after flat bread was higher than expected based on the insulin response, indicating increased insulin sensitivity or insulin-independent glucose disposal.

Conclusions: These results demonstrate that the structure of wheat bread can influence the postprandial metabolic response, with a more compact structure being more beneficial for health. Bread-making technology should be further explored in order to create healthier products.

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Keywords: (maximum 5): wheat bread, starch digestion, glucose kinetics, gastrointestinal hormones, stable isotopes

149/385. A prospective study of vegetable and fruit intake during pregnancy and the risk of gestational diabetes mellitus

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Introduction: Gestational diabetes mellitus (GDM) has become a serious public health problem with an increasing trend in China. The effect of vegetable and fruit on GDM risk is controversial. Few studies have been conducted among Chinese population.

Objectives: This study aimed to prospectively examine association between the consumption of vegetable and fruit and GDM risk

Method / Design: The prospective cohort study included 1117 women who were in the first trimester of pregnancy and were enrolled in the cohort between April 2013 and April 2014. The 3-day 24- hour dietary recall was used to investigate the dietary intake of women in early pregnancy and in the second trimester of pregnancy. The diagnosis of GDM was based on glucose tolerance test performed between 24 and 28 gestation weeks. Multivariate logistic regression was used to estimate the odds ratios (ORs) and 95% confidence interval (95%CI) after adjusting for potential confounders.

Results: The average intake was 189.15g and 294.08g for total vegetables and 275.15g and 412.27g for total fruit in two stages of pregnancy, respectively. In the second trimester, total vegetables and dark green leafy vegetables were found to be inversely associated with GDM risk. The adjusted ORs of the highest versus the lowest quartile were 0.50 (95% CI=0.28-0.90) for total vegetable and 0.36 (95% CI=0.20- 0.65) for dark green leafy vegetables. However, total fruit intake were found to be positively associated with GDM risk, with an OR (95% CI) of 2.85 (0.93-7.71) comparing the highest with the lowest quartile. Using the merged data of the first and second trimester, we found that dark green leafy vegetable intake was inversely associated with GDM risk, whereas total fruit intake was positively associated with GDM risk.

Conclusions: This study indicated that greater intake of dark green leafy vegetables and fewer intakes of total fruit were associated with decreased risk of GDM among Chinese women.

Keywords: (maximum 5): vegetable, fruit, gestational diabetes mellitus, prospective study, China

149/390. Diet composition of overweight pregnant women is related to serum zonulin concentration, a marker for intestinal permeability

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Introduction: Alterations in intestinal permeability may associate with adverse metabolic conditions including diabetes and obesity. Preliminary in vitro and human data indicate that dietary intakes of nutrients may influence intestinal barrier function. Whether pregnancy is associated with alterations in intestinal permeability and the extent to which diet composition contributes are poorly understood.

Objectives: To explore the impact of diet composition on intestinal permeability in overweight pregnant women.

Method / Design: Fasting serum samples for analysis of zonulin, a marker for intestinal permeability, were obtained from overweight women (prepregnancy BMI median 30.3, IQR 27.1-33.1kg/m2, n=95) in early pregnancy (median 13, IQR 11-15 weeks of gestation). Zonulin was measured using ELISA (Immunodiagnostik AG, Bensheim, Germany). Women were categorized to low and high intestinal permeability groups based on zonulin median. Three-day-food diaries were recorded within a week prior to serum sample collection. Dietary intakes of nutrients were calculated using computerized software (Aivodiet 2.0.2.3,Turku, Finland).

Results: Cut off value (median) for lower and higher zonulin concentration, ie. low and high intestinal permeability group, was 46.4ng/ml (IQR 38.7-53.2ng/ml). Dietary intakes of polyunsaturated fatty acids (mean ±SD 13.1±4.8 vs. 11.2±4.0g, p=0.04, independent samples t-test), n-3 polyunsaturated fatty acids (3.7±1.1 vs. 3.2±1.1g, p=0.02), n-6 polyunsaturated fatty acids (10.2±3.9 vs, 8.7±3.4g, p=0.05), protein (87.1±18.6 vs 78.8±21.5g, p=0.04) and fibre (21.4±6.5 vs 18.4±5.8g, p=0.01) were higher in women with low compared to those with high intestinal permeability. No differences between the groups were detected in intakes of energy, carbohydrates, total fat or saturated or monounsaturated fatty acids.

Conclusions: Diet composition may contribute to intestinal permeability during pregnancy with potential beneficial effects induced particularly by higher intakes of n-3 PUFA, protein and fibre. Dietary modification may offer novel means to contribute to metabolic health of both mother and foetus through impacting intestinal barrier function.

Keywords: (maximum 5): Intestinal permeability, diet, pregnancy, zonulin

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149/391. Relationship between iron deficiency and bone resorption in women at childbearing age

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Introduction: Iron is essential in oxygen transport and participates in many enzymatic systems in the body, with important roles in collagen synthesis and vitamin D metabolism. Whether iron deficiency affects bone metabolism has not been fully addressed.

Objectives: To determine if there is a relationship between iron status and bone remodelling in women at childbearing age

Method / Design: Cross-sectional observational study. Two hundred and twenty women aged 18-35 years, menstruating, non-pregnant, non-breast-feeding and non-smoker were recruited. Lifestyle factors including diet, physical activity, smoking, and use of hormonal contraceptives were controlled. Iron status parameters (hemoglobin, mean corpuscular volume, serum transferrin and serum ferritin), parathormone and biochemical bone markers of formation (N-terminal propeptide of type 1 procollagen, P1NP) and resorption (N-telopeptide cross- link of type 1 collagen, NTx) were analyzed. Statistical analysis was carried out by Pearson's correlation controlled for BMI and age.

Results: Negative associations between serum ferritin and NTx (R2=-0.237, p<0.001, n=220); and between transferrin, principal iron transporter to tissues, and P1NP (R2=-0.254, p<0.001, n=193) were obtained. Parathormone was not associated with any of the iron parameters.

Conclusions: A lower iron status is related with altered bone remodelling with an increase in bone resorption and a decrease in bone formation in young women. The underlying mechanisms and consequences of this finding should be further explored.

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Keywords: (maximum 5): Iron deficiency; anemia; bone remodelling; bone health.

149/405. Evaluation of the level of nutrition knowledge of the military aircraft personnel.

Author(s): Bartosz Bertrandt; Aleksandra Bębnowicz; Paweł Kler; Adam Nowosad.

Affiliation: *Nutritionist. Military Research & Development Center for Food Services. Warsaw. Poland.*

Introduction: Introduction: Healthy eating has a great impact on the proper growth and functioning of human organism. Dietary behaviours are one of many different factors which have an influence on maintaining good health. It is especially important for professional soldiers. The level of nutrition knowledge is closely related to dietary choices, therefore it is necessary to conduct such a research.

Objectives: Objectives: Evaluation of the level of nutrition knowledge of the flight crew and ground crew of Poland's 3rd Airlift Wing at Powidz Air Base.

Method / Design: Method: The study was conducted in March 2015 on a group of 60 persons, 53 male and 7 female respondents. The author's questionnaire consisting of 24 questions was used to evaluate the level of nutrition knowledge.

Results: Results: The level of nutrition knowledge in the examined group was varied. Some of the questions were difficult for respondents. 30% of them were not able to mark which group of the products should be on the base of the food pyramid and which should be on the top. Other questions which caused problems, were related to the sources of saturated and unsaturated fatty acids. It is worrying, that the main sources of proper nutrition are the Internet (67%) and television (60%).

Conclusions: Conclusions: The results of the research indicate that in the examined group the knowledge about food and dietary behaviours needs to be systematised. Many of the elementary questions are unknown for the respondents. To expand the nutrition knowledge of military aircraft personnel, it is necessary to perform a series of training sessions about creating healthy eating habits and importance of diet.

Keywords: (maximum 5): Key words: nutrition knowledge, military aircraft personnel

149/410. A healthy start into life is possible: Results of the German Pilot Project „9+12 Jointly Healthy in Pregnancy and Baby's First Year"

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Introduction: According to the concept of metabolic programming, a balanced diet and physical activity are relevant determinants to prevent obesity. However, those lifestyle factors currently play only a subordinate role in preventive medical check-ups.

Objectives: Within the German pilot project „9+12" physicians and midwifes use the period of pregnancy and a child's first year of life to entrench a healthy lifestyle in families (n=1.005) using systematic and comprehensive consultations on the topics of diet and exercise.

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We examine whether this approach is eligible to improve health behavior of mother and child to reduce the risk of childhood overweight/obesity.

Method / Design: Therefore we compare a subsample of participants of the pilot region with a nationwide control group.

Results: Our evaluation results show that health behavior including dietary behavior and physical activity can be sustainably counteracted using systematic and comprehensive consultations on the topics of diet and exercise. With regard to dietary behavior, both test and control group, show a high awareness for a healthy diet, but the test group pays more attention to meal structures. Nevertheless, after the period of breastfeeding, non-favorable dietary behavior increases in both groups. Children in the test region tend to be more of breastfed. Additionally, participants follow more often the recommendations for infant nutrition of the network "Healthy Start – Young Family Network".

Conclusions: Medical consultations are important instruments to promote women's and children's health behavior and to prevent obesity. Nevertheless, there is a need to improve mother's dietary behavior after breast-feeding. In future, an extension of consultations on the topics nutrition and physical activity seems to be useful for the first three years of childhood. Finally, as a sustainable strategy to prevent obesity the topics nutrition and physical activity should be also legally consolidated within the German health system.

Keywords: (maximum 5): metabolic programming
pregnancy
early childhood
prevention
obesity

149/411. Intuitive eating is inversely associated with body weight in the general population-based NutriNet-Santé Study

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Introduction: Intuitive eating is an adaptive dietary behavior that emphasizes eating in response to physiological hunger and satiety cues, along with low preoccupation with food in general. It has been proposed as an alternative strategy to weight-loss programs, promoting a healthier food-mind-body connection but its relation with body weight in the general population remains largely under-studied.

Objectives: We aimed at studying the relationship between intuitive eating and weight status in a large sample of adult general population.

Method / Design: A total of 11,774 men and 40,389 women aged ≥ 18 years participating in the NutriNet-Santé cohort were included in this cross-sectional analysis. Self-reported weight and height were collected as well as intuitive eating levels using the validated French version of the Intuitive Eating Scale-2 (IES-2). The association between intuitive eating, its three subscales (Eating for Physical Rather than Emotional Reasons, Reliance on Hunger and Satiety Cues and Unconditional Permission to Eat) and weight status was assessed using multinomial logistic regression models adjusted for sociodemographic and lifestyle factors.

Results: A higher IES score was strongly associated with lower odds of overweight (excluding obesity) and obesity in both men and women. The strongest associations were observed in women [quartile 4 vs. 1 for both overweight (OR (95% CI): 0.19 (0.17, 0.20)) and obesity (OR: 0.09 (0.08, 0.10))]. Associations in men were as follows: for overweight (quartile 4 vs. 1: OR: 0.43 (0.38, 0.48)) and obesity (OR: 0.14 (0.11, 0.18)). All IES subscales were inversely associated with weight status.

Conclusions: IE is inversely associated with overweight and obesity which supports the importance of eating in response to hunger and satiety signals. Although no causality can be inferred from the reported associations, these data suggest that IE might be relevant for obesity prevention and treatment.

Keywords: (maximum 5): intuitive eating, obesity, hunger, satiety, cross-sectional study

149/413. Does lunch have short-term effects on children's executive cognitive functioning?

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Introduction: Studies in adults indicate impairments of cognitive functioning after having lunch. In childhood short-term effects of lunch on executive functions (EF) have not been examined yet.

Objectives: The randomized crossover study Cognition Intervention Study Dortmund PLUS (CogniDo PLUS) was designed to evaluate short time effects of lunch on EF in children in the early afternoon.

Method / Design: Subjects were students of the 5th and 6th grade of a comprehensive school in Gelsenkirchen (Germany). On study day 1 group 1 skipped lunch at the lunch break and received lunch ad libitum 1 week later on study day 2. Group 2 was treated vice versa. The EF parameters switching, updating and inhibition were tested

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at the beginning of the afternoon lessons using a computerized test battery. Lunch effects were estimated using two sample t-test or Wilcoxon rank-sum test. Of 215 initially recruited children 21 dropped out because of illness or absence on one of the two individual test days.

Results: In the total sample no short time effects of lunch on parameters of EF were found indicating no general post-lunch dip in children. After excluding implausible data parameters of switching and inhibition did not differ between the lunch and skipping lunch condition. However, lower ratios of false alarms in the updating function were observed after having lunch than after skipping lunch (8.2% (lunch) vs. 9.4% (skipping lunch), $p<0.01$).

Conclusions: In contrast to findings in adults our results indicate that children's EF is not impaired by lunch under true-life conditions. For updating the current study even indicates beneficial effects of lunch intake. Considering results from a previous study school lunch does not seem to have negative effects, but partially even a positive influence on cognitive performance in the early afternoon.

Keywords: (maximum 5): Lunch, Post-lunch dip, Cognition, Executive functions, Children

149/419. Effect of onion peel extract on reactive oxygen species production and anti-oxidative defense in obese woman

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Introduction: Quercetin, found abundantly in onion peel, has been known to have anti-cholesterol, antithrombotic and insulin-sensitizing properties.

Objectives: The study was designed to elucidate the effect of quercetin-rich onion peel extract (OPE) on reactive oxygen species production and anti-oxidative defense in obese woman.

Method / Design: This study was randomized, double-blind, placebo controlled study. Thirty-seven healthy obese participants were randomly assigned that eighteen subjects received red soft capsuled OPE (100mg/d, 50mg bid), while the other nineteen subjects received same capsuled placebo for 12 weeks. Reactive oxygen species (ROS) production and superoxide dismutase (SOD) activity in plasma were determined by using ROS and SOD assay kits, respectively.

Results: Baseline characteristics of anthropometric indicators and blood metabolic profiles were not significantly different between the two groups. Compared with baseline values, OPE consumption significantly reduced waist and hip circumference. Plasma ROS and urine malondialdehyde levels were decreased in both placebo and OPE groups compared with baseline values. Although OPE consumption group showed lower plasma ROS level than placebo group, there was no statistically significant differences between the two groups. Plasma SOD activity was also decreased in the two groups compared with baseline values. However, plasma SOD activity in OPE group was significantly higher than in placebo group after 12 weeks of consumption.

Conclusions: The results indicate that OPE consumption may exert antioxidative effect by preventing the decrease of SOD activity in obese women.

Keywords: (maximum 5): Onion peel extract, Quercetin, Reactive oxygen species, superoxide dismutase

149/421. Endometrial cancer morbidity and changes in the diet in Poland in the years 1970-2012

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Introduction: Endometrial cancer morbidity in Polish females is relatively high. Its standardised incidence rate in 2012 amounted to 15.1/100 thousand resulting from growing trend during the period of 1970-2012.

Diet was probably among the factors that played a significant role in endometrial cancer pathogenesis.

Objectives: The objective of the study was to investigate the relationship between selected dietary factors and endometrial cancer morbidity in Poland in 1970-2012.

Method / Design: Standardised endometrial cancer incidence rates were derived from the National Cancer Registry administered by the Institute of Oncology. The information source on the dietary pattern was the database established by the National Food and Nutrition Institute including data derived from the national food balance sheets showing food quantities available for consumption per capita/year. The Spearman rank correlation coefficient (r) was used as a measure of the relationship between examined variables.

Results: Positive correlation was found for endometrial cancer incidence rates in 1970-2012 and the consumption of edible fats ($r=0.84$) and meat ($r=0.58$). Edible fats consumption significantly increased during that period from 20.8 to 32.3 kg/person/year, whilst meat consumption from 53.0 to 71.0 kg/person/year, also the share of processed meat increased. Positive correlation ($r=0.47$) was noted also with respect to alcohol consumption which was 5.9 in 1970 and 9.7 l/person/year in 2012.

There was no beneficial effect of increasing consumption of coffee over studied period on the incidence of endometrial cancer.

Conclusions: Improper dietary habits including high consumption of fat, meat, especially processed, and alcohol has probably contributed to the increase of endometrial cancer morbidity rates between 1970 and 2012. Other factors such as high overweight and obesity prevalence and low physical activity could also adversely affect these rates.

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Keywords: (maximum 5): ENDOMETRIAL CANCER, DIET, TRENDS

149/422. Mind-body practice is inversely associated with body weight in the general population-based NutriNet-Santé Study

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Introduction: In industrialized countries characterized by a high prevalence of obesity and chronic stress, mind-body practices such as yoga or meditation may facilitate body weight control. However, virtually no data are available to ascertain whether mind-body practices are associated with weight status.

Objectives: We aimed to examine the relationship between mind-body practices and weight status in a large sample of the adult general population.

Method / Design: A total of 14,400 men and 49,228 women aged ≥18 y participating in the NutriNet-Santé study were included in this cross-sectional analysis. We collected data on mind-body practices as well as self-reported weight and height. The association between mind-body practices and weight status was assessed using multiple linear and multinomial logistic regression models adjusted for socio-demographic, lifestyle and dietary factors.

Results: Compared with never users, regular users of mind-body techniques were the least likely to be overweight (excluding obesity) (OR (95%CI): 0.74 (0.69 to 0.79) adjusted for socio-demographic and lifestyle factors) or obese (OR (95%CI): 0.56 (0.50 to 0.62)), followed by occasional and former users. In addition, compared with never users, mind-body users had a lower BMI, particularly in regular users (β (95% CI): -0.88 (-0.99 to -0.76)), followed by occasional and former users.

Conclusions: Our data provide novel information about an inverse relationship between mind-body practices and weight status. If causal links were demonstrated in further studies, such practice could be fostered in obesity prevention and treatment.

Keywords: (maximum 5): mind-body therapies, obesity, relaxation, cross-sectional study

149/429. Dietary intervention and key fatty acid ratios in serum and Omega-3 index in Erythrocyte in Hyperlipidemic subjects

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Introduction: Trials among healthy individuals strongly support the conclusion that replacing saturated fat with polyunsaturated fat (largely omega-6 fatty acid) lowers total cholesterol (TC) and LDL-cholesterol and leads to a reduction of the TC/HDL-cholesterol ratio. Population studies have reported that percentages of docosaheksaenoic acid (DHA) levels of ≥4.5% of total fatty acids in serum phospholipid decreased risk for coronary heart disease by 34%.

Objectives: To investigate the effects of dietary intervention on key fatty acid ratios in serum phospholipids and omega-3 index in erythrocyte phospholipids in hyperlipidemic subjects.

Method / Design: The data were collected from 41 individuals (13 men, 28 postmenopausal women). Nutritional habits in treatment subject have been evaluated by semi-quantified food frequency questionnaire. Participants were followed Step I dietary treatment for 12 weeks. Participants maintain their initial dietary energy intake throughout the study period.

Results: Strong positive correlation between the total of omega-3 fatty acid in serum phospholipids and omega-3 index in erythrocyte phospholipids was found. Marked decrease ($p<0.001$) in four fatty acid ratios in serum phospholipids, omega-6/omega-3, arachidonic acid (AA) / eicosapentaenoic acid (EPA), AA/DHA and AA/(EPA+DHA) were also found in participants after therapeutic diet. TC/HDL, LDL/HDL and TG/HDL-cholesterol ratios negatively correlated with total omega-3 levels in serum phospholipids and omega-3 index in erythrocytes.

Conclusions: The changes in dietary habits resulted in decreased serum key fatty acid ratios which may lead to a lower risk for cardiovascular disease in moderate hyperlipidemia. This study was supported by the Grant No. III 41030 from the Ministry of Education, Science and Technological Development, Republic of Serbia.

Keywords: (maximum 5): fatty acid ratio, omega 3-index, phospholipid, Step 1 diet, hyperlipidemia

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149/437. Age at adiposity rebound: determinants and association with nutritional status and the metabolic syndrome at adulthood

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Introduction: Early-life growth characteristics, and in particular age at adiposity rebound (AR), have been shown to impact nutritional status later in life but studies investigating the association with long term health are still scarce.

Objectives: Our aims were to identify determinants of age at AR and its relationship with nutritional status and metabolic risk factors at adulthood.

Method / Design: A total of 1,465 subjects aged 20-60 participated in this retrospective cohort study. Height, weight, waist circumference, blood glucose and lipids and blood pressure were measured at adulthood. Childhood weight, height, gestational age, birth weight and early nutrition were collected retrospectively from health booklets and age at AR was assessed. Participants self-reported parental silhouette. Associations were assessed using multiple linear and logistic regressions.

Results: Parental silhouette was an important determinant of age at AR. Age at AR was strongly associated with BMI and waist circumference at adulthood in both men and women ($P < 0.0001$). In addition, women with an AR occuring earlier had higher triglyceride ($P = 0.001$), LDL-cholesterol ($P = 0.001$) and systolic ($P = 0.02$) and diastolic blood pressure ($P = 0.04$) at adulthood. Individuals were less likely to develop a metabolic syndrome in men (OR (95%CI): 0.82 (0.70-0.95)) and women (OR (95%CI): 0.84 (0.73-0.96)),

Conclusions: This long term study showed that age at AR was associated with nutritional status and metabolic syndrome at adulthood. These results highlight the importance to monitor child growth in order to help in the identification of children at risk of developing adverse metabolic profile in adulthood. AR determinants were identified that can be used in overweight surveillance.

Keywords: (maximum 5): Developmental growth; Obesity; Metabolic syndrome; Retrospective cohort study, Adiposity rebound

149/446. The association between components of the healthy eating index and excessive weight during pregnancy

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Introduction: Maternal diet can lead to inadequate gestational weight gain, negatively affecting the health of mothers and children. However, few studies have investigated the relation between the Healthy Eating Index and excessive weight during pregnancy.

Objectives: To evaluate the association between components of the Healthy Eating Index for Brazilian Pregnancy (HEIP-B) and excessive weight during pregnancy.

Method / Design: A cross-sectional study was conducted among 785 adult women, at the second trimester of pregnancy, in Ribeirão Preto, São Paulo state, Brazil. Excessive weight (overweight and obesity) during the pregnancy was defined according to Atalah criteria. Dietary intake was evaluated by two 24-hour dietary recalls and a food frequency questionnaire, and the Multiple Source Method was applied to estimate the usual intake of nutrients and foods. The relation between the components of the HEIP-B (vegetables; fruit; beans; white/red meat ratio; fiber; trans fat acids; polyunsaturated/ saturated fatty acids ratio; folate; calcium and iron) and excessive weight during pregnancy, were investigated using logistic regression models, adjusted by age, schooling, physical activity, smoking status, gestational week at the time of the interview, and energy intake.

Results: Among the 785 pregnant women evaluated, 448 (57%) had excessive weight. Pregnant women classified in the second [OR 0.64 (95% CI 0.44, 0.94), $p < 0.05$] and third tertiles of beans intake [OR 0.67 (95% CI 0.46, 0.99), $p < 0.05$] had a lower chance of excessive weight, when compared with women classified into the lowest intake. The highest intake of fiber was inversely associated with excessive weight [OR 0.60 (95% CI 0.40, 0.88), $p < 0.05$]. No associations between other HEIP-B components and excessive weight during pregnancy were found.

Conclusions: Our findings suggest an inverse association between beans and fiber intake during mid-pregnancy and excessive weight.

Funding: CAPES,FAPESP,CNPq (472221/2010-8).

Keywords: (maximum 5): diet quality, pregnancy, excessive weight.

149/456. Costs of healthy lunches in nurseries in Germany – a model calculation

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Introduction: The number of children eating their lunches in nurseries in Germany increased alone since 2010 by 16.9% to 1.9 million. Due to this development, nursery catering has a key role in promoting child nutrition. In order to obtain a realistic basis for the model calculations, a nationwide survey was conducted. It showed that the average price paid for a lunch in nurseries is €2.40 and is with a range of €5.25 heterogeneous. Moreover the results indicated that the lunches often do not fulfil the specific standard of the German Nutrition Society(DGE).

Objectives: As studies of the USA indicate, that higher reimbursements have an impact on the quality of food served, the present study tries to estimate the costs of a high quality healthy lunch meal.

Method / Design: In the model calculation the incurred cost for a lunch like cost of food purchased or the delivery price for ready-made meals; personnel costs; operating costs and investment costs were taken into account for catering systems like cook and serve, cook and chill, frozen meals and hot hold meals. Price surveys were carried out in winter 2013/14.

Results: The calculated price of a lunch that meets the DGE-Standard is for children (4 to 6 years) depending on the number of issued lunches and catering system between €2.53 and €5.58. The comparison shows that prices identified in survey clearly differ from calculated prices. There are several factors which give reasons: One is that specialists in home economics were calculated while in most nurseries semiskilled workers are responsible for the meals. Other reasons are that lunches offered differ in quality which might cause lower food expenditures or that subsidies spent by countries or communities may differ.

Conclusions: The findings indicate that improving the quality of meals in nurseries may require higher spending or subsidies.

Keywords: (maximum 5): cost of healthy lunches, nurseries

149/458. Salt intake in childhood and its relationship to blood pressure in adolescence

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Introduction: High sodium intake is linked to raised blood pressure in adults but there is little known about the antecedents of this relationship

Objectives: To examine dietary sources and tracking of sodium intake in childhood and its relationship with blood pressure in adolescence

Method / Design: Data were collected from children participating in the Avon Longitudinal Study of Parents and Children (UK), using dietary records at 5 time-points from 1992 to 2000 when children were aged 4-months to 7-years. Individuals were categorised into quartiles of sodium intake. Blood pressure was measured at 7 and 15 years. Adjusted general linear models assessed whether sodium intake quartiles were independently related to blood pressure

Results: Non-discretionary sodium intakes increased, from 180mg at 4-months to 2314mg at 7-years. Most children consumed in excess of UK recommendations. Bread, breakfast cereals and savoury snacks contributed the highest proportion of sodium. Children in the highest sodium intake quartile at one age were twice as likely to be in the highest quartile at the next age (OR for remaining in the top quartile between 5 and 7 years; 2.70 (95% CI 1.54-4.75) in boys, 4.49 (2.01-10.05) in girls). Systolic blood pressure at 7 years was 1.4 mmHg higher (p=0.001) and at 15 years 2.0 mmHg higher (p=0.001) in children in the highest compared to the lowest sodium intake quartile at 7 years. Accounting for recent reductions in sodium in manufactured foods would lower intake levels by approximately 15% but the majority of children would still have excessive intakes

Conclusions: Sodium intakes were higher than recommended. The contribution to sodium intake from nutrient-poor foods increased with age. We found evidence of tracking of sodium intake and an association between higher blood pressure at ages 7 and 15-years and being in the highest quartile of sodium intake in childhood

Keywords: (maximum 5): ALSPAC, salt intake, children, adolescents, blood pressure

149/461. The ones with lowest fruit and vegetable intake benefitted of the intervention only moderately

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Introduction: Infrequent fruit and vegetable (FV) intake is especially common among children with low parental educational level (PEL) and among boys.

Objectives: Our aim was to examine whether a school-based intervention was efficient in increasing children's FV intake especially among those whose FV intake is the lowest and which factors could explain the the group differences in the associations.

Method / Design: In Finland 11-year-old (at baseline) children participated in the PRO GREENS intervention in winter 2009. In control schools were 424 and in intervention schools 386 children (response rate 77%). Children filled in validated food frequency

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questionnaire assessing FV intake (times/day) and a validated questionnaire about factors influencing FV intake (availability of FV, liking for FV, preferences, self-efficacy to eat FV, attitudes towards FV and knowledge of the recommendations) both at baseline May 2009 and follow-up May 2010. Parental educational level (low, middle, high) was reported by the parents. Associations were examined with linear regression and mediation analyses.

Results: The intervention increased fruit intake among girls but not among boys. Intervention increased also children's knowledge of the recommendations. Since knowledge had no impact on boys' fruit intake, the increase in knowledge mediated only intervention's effect on girls' fruit intake. Intervention increased children's fruit intake similarly in all PEL groups.

Intervention increased vegetable intake only in the middle PEL group but no intervention effect was noted among children with low or high PEL. Knowledge, the only factor which mediated the intervention's effect on children's vegetable intake, could not explain PEL differences in the effectivity of the intervention.

Conclusions: Increase in knowledge was not a sufficient prerequisite to increase FV intake among boys or the lowest PEL group. More in depth analyses are needed to find out which factors to target in interventions to reach an effect in the target groups.

Keywords: (maximum 5): Fruit and vegetable intake: intervention: children: education: gender

149/466. Effect of recombinant human Lactoferrin from transgenic cow's milk on salmonella typhimurium infection in mice

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Introduction: Lactoferrin is a multifunctional protein with antibacterial and immunomodulatory activities. As to obtaining lactoferrin from human milk is difficult and unfeasible, it would be of great interest to utilize a safe recombinant human lactoferrin (rhLF).

Objectives: To explore the effect of rhLF from milk of transgenic cows in Salmonella enterica serovar typhimurium (ST) infection in mice.

Method / Design: Balb/c mice were used to identificate the LD50 of ST50333. Two hours before the infection with 0.3 mL of 2×105 CFU/ml ST, 12 mice received rhLF with 0.3 mL of 20 mg/mL and 12 buffer (PBS) by gavage. After infection, the mice received rhLF (6 mg/day) or buffer by the same route for 7 days, respectively. Bacterial enumeration in blood, liver and spleen and histopathological analysis of the liver, spleen, kidney and intestine were conducted.

Results: Compared to the control group, the mortality and body weight of mice were similar to the rhLF group. rhLF decreased the bacterial load of liver and spleen in mice, and attenuated infectious inflammation with less histopathologic abnormalities in the liver, spleen and kidney of mice.

Conclusions: rhLF had antibacterial activity of alleviating the infection caused by ST bacteria, which indicated that rhLF could be used as a valuable supplement in special products.

Keywords: (maximum 5): Recombinant human lactoferrin, Salmonella enterica serovar Typhimurium, Infection, Mice

149/467. Prevalence of anemia and its risk factors in pregnant women attending at antenatal clinic in Rapti Zonal Hospital Tulsipur, Dang

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Introduction: Iron deficiency anemia is one of the most common nutritional problems in Nepal given its impact on psychological and physical development, behavior and work performance. The prevalence of anemia was higher among pregnant women than non-pregnant women.The prevalence of anemia among pregnant women in Nepal is 47 percent.

Objectives: The overall objective of this study is to assess the prevalence of anemia and different factor associated with anemia in pregnant women,proportion of anemic pregnant women.socio-economic factors associated, their dietary pattern

Method / Design: descriptive and cross sectional study

The registered pregnant women who were visiting at ANC at zonal hospital were the study population.

The pregnant women above three month were included in this study; they were taken for interview on the basis of purposive sampling method. And Rapti Zonal hospital of Dang district was selected purposively.

Sample size was calculated by formula, n=Z2.p.q/L2

= (1.96)2*48*52/ (10)2

= 100

Results: The study shows that only few (22.9%) were normal or non anemic whereas more than 80.0% of pregnant women were anemic. Out of which 56.1% and 21.1% were mild and moderate anemic respectively,common in 16-20 age group, Dalit ethnic group, housewife, non-formal education level, extended family type and from low economic status,prevalence was high who had three pregnancies before current pregnancy followed by who had two pregnancies before this. study also shows that majority of the respondents (80.8%) whose birth interval was less than 24 months.

Conclusions: anemia is highly prevalent among pregnant women due to lack of knowledge and awareness about the consequences of anemia as most of pregnant women did not perceive its severity. The reason of the irregular or discontinuation iron tablets found from study was mostly undesired, less supply, no supply and unequal distribution of tablets.

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Keywords: (maximum 5): Anemia,pregnancy,Nepal

149/472. Association between yogurt consumption and depression in the SUN cohort: A cross-sectional and prospective assessment

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Introduction: Little is known about the role of yogurt consumption on the development of depression.

Objectives: The aim of this study was to assess the association between yogurt consumption (total, whole-fat and low-fat) and the prevalence and incidence of depression in the SUN (Seguimiento Universidad de Navarra) Project.

Method / Design: Both cross-sectional and prospective analyses were conducted. A total of 18,840 participants were included in the cross-sectional analysis, while 14,213 (initially free of depression) were evaluated in the prospective assessment (8-years follow-up). Yogurt consumption at baseline was assessed using a validated semi-quantitative 136-item food-frequency questionnaire. Participants were classified in 3 categories of yogurt consumption: 0-2 (low), >2-<7 (moderate), and >7 (high) servings/week. Subjects were considered to have depression if they reported a clinical diagnosis of depression by a physician.

Results: At baseline, 2,128 cases of depression were identified. In the multiple-adjusted model, a high consumption of whole-fat yogurt showed a significant inverse association with depression [odds ratio (OR)=0.84 (95% CI: 0.73-0.97); p-trend=0.029]. However, high consumption of low-fat yogurt was positively related with depression [OR=1.27 (95% CI: 1.11-1.46); p-trend=0.002], while no association between total yogurt consumption and depression was observed at baseline. During an 8-year-follow-up period, 413 incident cases of depression were identified. A moderate consumption of low-fat yogurt was associated with a higher risk of depression [hazard ratio (HR)=1.33 (95% CI: 1.07-1.70); p-trend=0.424]. Nevertheless, no association was found for whole-fat or total yogurt consumption and the incidence of depression.

Conclusions: Low-fat yogurt consumption seems to increase depression risk in this Mediterranean cohort. Although whole-fat yogurt consumption was related with lower depression prevalence at baseline, this association could not be confirmed in the prospective analysis.

Keywords: (maximum 5): Depression, Yogurt, Low-fat, Cohort studies.

149/475. Health relevance of the modification of low-grade inflammation in ageing: Could nutrition play a role?

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Introduction: Ageing of the global population has become a public health concern with an important socio-economic dimension. Ageing is characterized by an increase in the concentration of circulating inflammatory markers, a phenomenon that has been dubbed "inflammaging". The inflammatory response is beneficial as an acute, transient response to harmful conditions, facilitating the repair, turnover and adaptation of many tissues. However, chronic and low grade features of inflammaging might be detrimental for many tissues and organ or system functions.

Objectives: To clarify if a modification in inflammaging could have a beneficial effect and to explore whether (nutritional) strategies in reducing inflammation support or impair host defence.

Method / Design: We provide a comprehensive definition of low-grade inflammation (LGI) and determine the potential drivers and effects of the "inflamed" phenotype observed in the elderly. We discuss the role of microbiota and immune system cross-talk and the so-called gut-brain axis. Then, we focus on major elderly health complications associated to LGI namely mental health and wellbeing, mobility, infection and cancers. Finally, we discuss the possibility of manipulating LGI in the elderly by nutritional interventions. We provide an overview of the clinical evidence that exists in elderly for omega-3 fatty acid, probiotic or prebiotic interventions.

Results: Although there is some evidence to support a role for these interventions in controlling LGI in the elderly, there is a lack of robust evidence linking prevention or management of LGI and improvement of health and well-being in the elderly.

Conclusions: We conclude that this is a topic that requires more attention.

Keywords: (maximum 5): low-grade inflammation; inflammaging; nutritional interventions; gut-brain-immune system crosstalk

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149/476. Associations between vitamin E status and metabolic syndrome in a healthy population

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Introduction: Metabolic syndrome is associated with abnormal glucose and lipid metabolism, insulin resistance, increased oxidative stress and pro-inflammatory activity that raise the risk of type 2 diabetes and cardiovascular diseases. Vitamin E is believed to have anti-inflammatory and antioxidant effects, which have been shown to reduce oxidative stress in humans. Whilst the impact of vitamin E status on reducing the risk of chronic diseases has been intensively investigated, the results remain inconclusive.

Objectives: This study aimed to investigate whether vitamin E intakes and plasma α- and γ-tocopherol concentrations were associated with metabolic syndrome in a healthy population.

Method / Design: Dietary intake data was obtained from the Irish National Adult Nutrition Survey (NANS). Fasting plasma α- and γ-tocopherol concentrations were measured by HPLC. The definition of metabolic syndrome followed the criteria set by the National Heart, Lung, and Blood Institute (NHLBI) in the Adult Treatment Panel III (ATP III). Participants (n=848) were divided into groups based on their metabolic syndrome status, and associations between vitamin E status and metabolic syndrome status were explored by multiple linear regression.

Results: Metabolic syndrome seemed to be not influenced by vitamin E intakes; however, participants with the metabolic syndrome had significantly higher plasma α- and γ-tocopherol concentrations. With additional adjustment for circulating plasma cholesterol levels, plasma α- and γ-tocopherol concentrations were still significantly higher in participants with the metabolic syndrome compared to those without the syndrome.

Conclusions: In summary, plasma α- and γ-tocopherol concentrations were observed to be positively associated the metabolic syndrome. This study was conducted in heathy individuals and therefore the impact of vitamin E intake and plasma α- and γ-tocopherol status in participants at high risk of metabolic syndrome remains to be further explored.

Keywords: (maximum 5): Vitamin E, Metabolic syndrome, α-Tocopherol, Antioxidant, Oxidative stress

149/478. Modulation of energy metabolism and cerebral blood-flow by multivitamins/minerals and coenzyme Q10 during cognitive tasks

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Introduction: Adequate levels of vitamins and minerals are essential for the optimal performance of physiological processes that have both direct and indirect effects on brain function. Micronutrient supplementation has previously been shown to modulate a number of parameters relevant to brain function across animals and humans, including vasodilatory and/or metabolic parameters.

Objectives: The aim of this trial was to assess the effects of acute and chronic supplementation with two multivitamin/mineral preparations on whole-body energy metabolism and cerebral blood flow (CBF) during performance of cognitive tasks of differing levels of difficulty; cognitive performance as measured by multiple computer tasks; subjective mood and energy evaluations and nutritional status as measured by the serum/plasma concentrations of various analytes.

Method / Design: One hundred and six healthy, female participants aged 25-49 years took part in this randomised, placebo-controlled 3-arm parallel groups design with energy metabolism, cerebral haemodynamics and cognitive performance being measured pre-treatment, following a single dose and after eight weeks supplementation with one of two multivitamin/mineral supplements or matched placebo. The first active treatment contained 4.5 mg CoQ10 with vitamins and minerals up to one times the Recommended Daily Allowances (RDAs) and the second active treatment contained vitamins and minerals up to 3 RDAs.

Results: Significant modulation of all metabolic and CBF parameters related to cognitive task demands was demonstrated irrespective of treatment. Supplementation with single doses of the lower dose (also containing coenzyme Q10) led to dose-dependent increases in fat oxidation and increased CBF during task performance. Chronic supplementation over 8 weeks led to a dose-related increase in total energy expenditure during the task period.

Conclusions: These results show that the brain activity associated with differing cognitive demands engenders measurable differences in CBF and energy metabolism and that these parameters can be modulated by micronutrient supplementation in healthy adults.

Keywords: (maximum 5): cognitive, metabolism, cerebral blood-flow, multivitamins/minerals, coenzyme Q10

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149/483. A prospective study of plasma 25-hydroxyvitamin D and parathyroid hormone concentrations and prostate cancer risk

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Introduction: Mechanistic hypotheses suggest that vitamin D may be involved in prostate carcinogenesis through various effects on differentiation, apoptosis, and cell proliferation. Plasma parathyroid hormone (PTH) concentration, closely related to vitamin D metabolism may also play a role in prostate carcinogenesis. However, epidemiological evidence is lacking for PTH and inconsistent for vitamin D (25-hydroxyvitamin D (25OHD) concentration and selected single nucleotide polymorphisms (SNPs)).

Objectives: Our objectives were to prospectively investigate the association between 25OHD, selected vitamin-D related gene polymorphisms, PTH concentration and prostate cancer risk.

Method / Design: 184 cases diagnosed within the SU.VI.MAX cohort were included in a nested case-control study and matched to 368 controls (13 years of follow-up). Baseline total plasma 25OHD was assessed with Roche Cobas® electrochemoluminescent assay and plasma PTH was measured through Roche Cobas® electrochemoluminescent immunometric assay. SNPs of selected vitamin D-related genes (VDR BsmI, FokI and Cdx2, CYP24A1 rs4809958, GC rs4588 and rs7041, RXR rs7861779 and rs12004589, CaSR rs1801725 and rs4678174) were determined with TaqMan assay. Conditional logistic regression models were computed.

Results: Higher 25OHD concentration was associated with decreased risk of prostate cancer in normal-weight men (ORper 1ng/ml increment=0.91 (0.84, 0.98), P-trend=0.02), but not in overweight men (P=0.1). Higher PTH concentration was associated with decreased prostate cancer risk (ORper 1ng/L=0.96 (0.94, 0.99), P-trend=0.006; ORQ4 vs Q1=0.44 (0.24, 0.79), P-trend=0.01). The studied SNPs were not associated with prostate cancer risk.

Conclusions: In this prospective study, prostate cancer risk was inversely associated with 25OHD concentration in normal-weight men, and with PTH concentration. These associations, supported by biological plausibility, deserve further exploration.

Keywords: (maximum 5): 25-hydroxyvitamin D; parathyroid hormone; prostate cancer risk; single nucleotide polymorphisms; nested case-control study

149/484. Effects of individualized nutritional counseling on body composition in overweight and obese adults.

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Introduction: Overweight and obesity is a major health problem among Romanian adult population. Obesity is a serious public health problem, as it significantly increases the risk of chronic diseases such as cardiovascular disease, type-2 diabetes, hypertension, and certain cancers.

Objectives: The current paper evaluated an intervention based on individualized counseling and nutrition education in patients overweight and obese (BMI = > 25 kg / m2). The main objective was the reduction of BMI, body fat mass, visceral fat mass and the promotion of healthy lifestyle habits through the individual sessions of nutritional education.

Method / Design: A total of 55 overweight or obese patients that met the criteria received up to 8 face-to-face individual sessions of nutritional education delivered by a dietitian over a 10 month period. Antropometric measurements (including body weight, height, body mass index) and body composition (total fat mass, total body water, visceral fat mass, fat free mass) were measured in every intervention session. Body composition was determined by bioelectrical impedance analysis using a body composition analyzer (Tanita BC418-MA).

Results: Our study post-intervention measurements showed significant decrease in body weight, BMI, total body fat mass and a slight decrease in total body water content. Furthermore, the patients who were engaged in physical exercise during the intervention showed a greater reduction in total body fat mass than those who didn't.

Conclusions: Gradual changes in lifestyle and in eating habits through individualized nutritional counseling is an important tool who can foster weight loss most of the total body fat mass and can be an effective strategy for the management of overweight and obesity intervention and prevention.

Keywords: (maximum 5): overweight, obesity, individualized nutritional counseling , body composition, weight loss

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149/486. Body composition and associations with cardio-vascular risk in community dwelling old Icelanders.

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Introduction: Body mass index (BMI) does not predict cardiovascular morbidity or mortality in old populations which is known as the obesity paradox in elderly. This could be explained by the fact that body composition changes during ageing and BMI might not necessarily be a good marker of body fatness in old adults. Other measures of body fatness might be better associated with cardiovascular risk.

Objectives: The aim of the present analysis was to investigate the associations between various measures of body fatness and cardiovascular risk factors in community dwelling old adults.

Method / Design: In this cross-sectional analysis, the participants' (N = 237,65-92 years) body fatness was estimated using BMI, waist circumference, fat mass and cardiovascular risk factors were assessed. Statistical analysis was seperately done for men and women and corrected for various confounders.

Results: BMI correlated highly with DXA measurements across age tertiles and in both genders. The strength of associations between cardio-vascular risk and body fatness was very similar for all measures of body fatness. However, the strength was sometimes differing between genders. None of the fat measures were associated with total cholesterol or LDL, but all of them significantly related to HDL in women (not in men) and to triglycerides (man and women). Most fat measures were related to markers of glucose metablism with associations about three times stronger in men than in women. The same was true for blood pressure, however, the associations were about two times stronger in women than in men.

Conclusions: Our results indicate that BMI is still highly correlated with body fatness measured by DXA in old adults and that DXA measurement of body fatness is not necessarily superior in estimating cardiovascular risk. The results also indicate that risk factors respond differently to body fatness in men and women.

Keywords: (maximum 5): body composition, cardiovascular risk, DXA

149/487. Saturated fatty acids and coronary heart disease in EPIC-NL; associations differ by type and food source

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Introduction: The association between dietary saturated fatty acids (SFA) and coronary heart disease (CHD) risk is debated.

Objectives: We investigated whether dietary SFA was associated with CHD risk, and whether associations depended on (1) the substituting macronutrient; (2) the SFA food source; and (3) the carbon chain length of SFA.

Method / Design: Among 35,597 participants from the EPIC-NL cohort, baseline (1993-1997) SFA intake was measured using a food frequency questionnaire. With multivariable Cox' regression CHD risks were estimated for substitution of SFA with other macronutrients, and for higher intakes of total SFA (per 5 percent of daily energy intake [en%]), SFA from different food sources (per 1 en%), and SFA types (per 0.1 en% or 1 en%).

Results: During 12 years of follow-up 1,807 CHD events occurred. Total SFA intake was associated with a lower CHD risk (Hazard Ratio (HR) per 5en%=0.83, 95%CI:0.74-0.93). Substitution of SFA with animal protein, cis-monounsaturated fat, polyunsaturated fat (PUFA) or carbohydrates was significantly associated with higher CHD risks (HR between 1.27 and 1.37 per 5en%). Slightly lower CHD risks were observed for intakes of SFA from milk (HR1en%=0.94: 0.90-0.98), cheese (HR1en%=0.96: 0.93-0.98), and butter (HR1en%=0.96: 0.93-0.99), and for intakes of C14:0 (HR1en%=0.78: 0.65-0.93) and the sum of C4:0-C10:0 (HR0.1en%=0.97: 0.95-1.00). No associations were observed for SFA from other sources (meat, solid and liquid fats, snacks, or cakes), or other SFA types.

Conclusions: In this Dutch population higher SFA intake was not associated with higher CHD risk. The lower CHD risk observed appeared to be driven mainly by dairy SFA, short-to medium-chain SFA and C14:0. Residual confounding by cholesterol-lowering therapy and trans-fat or limited variation in PUFA intake may explain our findings. Analyses need to be repeated in populations with larger differences in SFA intake and different SFA food sources.

Keywords: (maximum 5): saturated fatty acids, coronary heart disease, nutrition, epidemiology

149/489. Health effects of breastfeeding, a systematic literature review

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Introduction: The majority of the Dutch mothers do not comply with the WHO-recommendation to give exclusive breastfeeding for at least six months. Policy of the Dutch government related to breastfeeding aims to supply up-to-date and accurate information on the health effects of breastfeeding.

Objectives: This study summarizes the current evidence on the health effects of breastfeeding on mother and child.

Method / Design: A comprehensive literature search on the health effects of breastfeeding was performed in Medline in June 2014. Some years ago we reported already on this topic. Therefore, the search was limited to articles published after the previous report in 2006 and focussed on 'western' study populations. First, relevant systematic literature reviews and meta-analyses were selected. In addition, for each outcome primary articles published after the search date of the included systematic literature review or meta-analysis were included. Based on these selected articles published since the former report, together with the former report, strength of the body of evidence for each outcome was evaluated following WHO-criteria as convincing, probable, insufficient, conflicting or no evidence.

Results: There is convincing evidence that breastfed infants run a lower risk of contracting certain infectious diseases, (gastrointestinal and respiratory tract infections and otitis media). Breastfeeding may also reduce the risk of developing obesity, asthma and wheezing in children and diabetes, rheumatoid arthritis and hypertension in their mothers (probable evidence). For a number of other diseases, the strength of the evidence for a beneficial effect is probable (children: childhood cancers, inflammatory bowel disease, Crohn's disease, ulcerative colitis, diabetes mellitus and sudden infant death syndrome; mothers: ovarian cancer, postpartum weight retention and hip fractures).

Conclusions: Breastfeeding has a beneficial effect on the health of both the child and the mother compared to formula feeding.

Keywords: (maximum 5): breastfeeding, infant health, maternal health, systematic literature review, western countries

149/492. Nutritional advice alters dietary intake and waist circumference of overweight individuals in a short-term period.

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Introduction: The dietary intake is an important factor that can influence weight gain and promote the accumulation of fat, especially in the abdominal area

Objectives: To evaluate the effect of qualitative nutritional advice on anthropometric and dietetic changes in overweight individuals.

Method / Design: Anthropometric (weight and WC) and dietary (24-hour diet recall) data of 101 overweight members of the university community were collected before and after 15 days. The individuals had qualitative nutritional guidance, with a primary focus on reducing the intake of fried foods, sweets, alcohol and on increasing the quantity of meals, intake of fruits and vegetables and whole foods. To quantify the intake of energy and macronutrients, the data were tabulated in the NDSR software. For qualitative assessment of food intake the food-based classification of eating episodes model was used. For comparison of variables the paired t test and McNemar for continuous and categorical variables were applied, respectively.

Results: In the post-guidance period, an improvement in the quality of food was observed, characterized by a significant reduction in the 257g quantity of ingested food, total energy 470 Kcal, together with an increase of 2.6% in protein contribution and maintaining the caloric contribution of other macronutrients. Furthermore, there was a reduction in food intake frequency of the group E (added sugar) in the snack and group D (pastries) at lunch, followed by an increase in food intake frequency group C (vegetables) in the same meal. These changes resulted in a reduction of 1.5 cm in WC, which can contribute to reducing the risk for developing metabolic disorders.

Conclusions: Results show that quality nutritional guidelines can be effective in improving the standard of food intake of overweight individuals in a short-term period, resulting in improvement of important anthropometric parameters related to the risk of developing metabolic complications.

Keywords: (maximum 5): NUTRITIONAL ADVICE. OBESITY. FOOD INTAKE.

149/496. Prospective associations between vitamin D status, vitamin D-related gene polymorphisms and risk of tobacco-related cancers

Author(s): (1) Mélanie Deschasaux; (2) Jean-Claude Souberbielle; (1) Paule Latino-Martel; (3) Angela Sutton; (4) Nathalie Charnaux; (5) Pilar Galan; (1) Serge Hercberg; (1) Emmanuelle Kesse-Guyot; (6) Khaled Ezzedine; (1) Mathilde Touvier.

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Introduction: Experimental evidence suggests that vitamin D may be protective against tobacco-related cancers through inhibition

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of the formation of tumors induced by tobacco carcinogens. To our knowledge, only one previous epidemiological study investigated the association between vitamin D status and tobacco-related cancer risk and no study focused on vitamin D-related gene polymorphisms.

Objectives: Our objectives were to prospectively study the association between plasma 25-hydroxyvitamin D (25OHD) concentration, vitamin D-related gene polymorphisms and the risk of tobacco-related cancers.

Method / Design: 209 tobacco-related cancers were diagnosed within the SU.VI.MAX cohort (1994-2007), and matched to 418 controls as part of a nested case-control study. Tobacco-related cancers (i.e. cancers for which tobacco is one of the risk factors) included several localizations in the respiratory, digestive, reproductive and urinary systems. Total plasma 25OHD was assessed with Roche Cobas® electrochemoluminescent assay. Polymorphisms were determined with TaqMan assay. Conditional logistic regression models were computed.

Results: A 25OHD concentration≥30ng/ml was associated with a reduced risk of tobacco-related cancers (OR≥30vs.<30ng/ml=0.59 (95%CI 0.35-0.99), P=0.046). This association was observed in former or current smokers (OR≥30vs.<30ng/ml=0.43 (0.23-0.84), P=0.01) but not in never smokers (P=0.8). VDR FokI AA genotype and RXR rs7861779 TT genotype were associated with an increased risk of tobacco-related cancers (OR MT vs. WT=1.87 (1.08-3.23), P-trend=0.02 and OR HT+MT vs. WT=1.60 (1.07-2.38), P=0.02 respectively).

Conclusions: In this prospective study, high vitamin D status (25OHD≥30ng/ml) was associated with a decreased risk of tobacco-related cancers, especially in smokers. These results, supported by mechanistic plausibility, suggest that vitamin D may contribute to tobacco-induced cancer prevention in smokers and deserve further investigation.

Keywords: (maximum 5): 25-hydroxyvitamin D, tobacco-related cancers, smoking status, single nucleotide polymorphisms, nested case-control study

149/498. Knowledge and awareness of relevant aspects of folate/folic acid among young men and women in Switzerland

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Introduction: Folate is an essential water-soluble vitamin with a key role in human metabolic pathways involving cell division and growth. Folic acid supplements are recommended 4 weeks before and during early pregnancy to significantly reduce risk of neural tube defects and other congenital defects. Yet many young women are unaware or not following this international recommendation. As in Europe, Switzerland does not have mandatory folic acid fortification, therefore prevention is under individual responsibility. Communicating and ensuring recommendation compliance are thus major challenges.

Objectives: To assess level of awareness and knowledge of young Swiss women and men on relevant aspects concerning folate/folic acid, i.e. dietary behavior, knowledge of food sources for folate and B12, optimal preparation methods, information sources, etc.

Method / Design: An on-line questionnaire was developed and answered by 428 women and 148 men, at Zurich University of Applied Sciences. Interviews with experts were conducted; communication media were assessed.

Results: 48% of study participants (n=576) answered correctly that folic acid is a life-essential vitamin. Compared with men, women were significantly more informed about the details of the folic acid recommendation (p<0.001). Dietary behavior of participants appeared favorable concerning folate: consumption of vegetables ≥ 4 times per week was 67% and 40% (raw); and 67% and 62% (cooked), for women and men, respectively. Concerning B12-foods, 80% participants correctly identified milk and meat as sources, but 25-43% incorrectly selected asparagus, wheat germ or spinach. Awareness of main folic-acid fortified products, i.e. fruit juices and breakfast cereals, was very high (100%).

Conclusions: This study identified several strengths and weaknesses in knowledge and awareness of young men and women in Switzerland on relevant aspects of folate-folic acid. A follow-up study is ongoing to assess and propose educational material on this topic in the Swiss school system.

Keywords: (maximum 5): folate, folic acid, neural tube defects, B-vitamins

149/499. Vitamin D and associations with gait speed in community dwelling old adults

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Introduction: Epidemiological studies have suggested a positive association between vitamin D status and physical function. Results from several other epidemiological studies point in the same direc-

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tion, but not all of them corrected for physical activity or body fatness, thus assumingly overestimating the association between vitamin D and physical function. There is some evidence from intervention studies that vitamin D supplementation might improve physical function in old adults. However, the heterogeneity of studies in older adults carried out to date has made it difficult to draw conclusions from their results.

Objectives: In order to get more knowledge on vitamin D and physical function, the present analysis investigated the associations between both serum 25-OH vitamin D status as well as dietary vitamin D intake with gait speed in community dwelling old adults with particular consideration of body fatness and physical activity.

Method / Design: Community living volunteers (N=236, 73.7±5.7 years, 58.2% female) were from the Greater Reykjavik Area and dietary intake (3 day food record), body composition and blood chemical variables (25-OH vitamin D) were measured.

Results: The majority of the participants reported regular leisure-time physical activity and two-thirds of those reached the recommended level of 30 minutes per day. The most frequent activities were outdoor walking (70.1%), outdoor swimming (37.9%) and indoor group based exercise for older adults (33.2%). Average serum 25-OH vitamin D levels were well above the commonly used lower reference of 50 nmol/L or about 67 ± 28 nmol/L.

Conclusions: In this cross-sectional analysis we found associations between dietary vitamin D, serum 25-OH vitamin D status and gait speed in community dwelling old adults. However these were not independent and mostly explained by the confounding of BMI and physical activity. Interestingly, this was true for both dietary vitamin D and vitamin D blood status.

Keywords: (maximum 5): Vitamin D, 6 minute walking distance, elderly

149/502. Outdoor physical activity, fish oil and vitamin D in older Icelandic adults.

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Introduction: In Nordic countries dietary vitamin D intake is regarded as particular important, because vitamin D synthesis in skin is limited due to long winters and cold summer allowing only little sun exposure.

Objectives: The aim of the present analysis was to investigate the associations between (OH)D status, outdoor physical activity (OPA) and fish oil supplementation, they main dietary source of vitamin D in Iceland, in community dwelling Icelandic elderly.

Method / Design: In this cross-sectional analysis, the participants' (N=236, 65-92 years) 25(OH)D was measured. Blood sampling season was categorized into fall, winter and spring. OPA was categorized into <30 min/d and ≥30 min/d. Associations of 25(OH)D with OPA were investigated using multivariate statistics.

Results: Of the participants, 8.5% were vitamin D deficient (< 30nmol/L) and 21.5% had poor status (≥30 but <50nmol/L). Fifty-two-point-six percent used fish oil regularly which was associated with a 16.8nmol/L higher 25(OH)D (P<0.001). OPA was associated with higher 25(OH)D when blood samples were taken in fall (10.2nmol, P=0.050), but not in winter (5.0nmol/L, n.s.) or spring (-0.6nmol/L, n.s.).

Conclusions: Although OPA is associated with increased 25(OH)D in fall, this association disappears during winter months in Icelandic elderly. It is therefore of great importance for this group to rely on sufficient amounts of vitamin D from food or dietary supplements in order to maintain 25(OH)D in an appropriate range.

Keywords: (maximum 5): Physical activity, vitamin D, fish oil

149/503. Screening of subjects at risk of severe vitamin D deficiency: a clustering approach

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Introduction: Avoiding vitamin D deficiency is essential regarding several health outcomes. Systematic blood testing may represent an important economic burden and systematic supplementation could lead, in some subjects, to a very high status, with unknown long-term consequences. Therefore, it is crucial to implement easy-to-apply strategies for screening at-risk patients.

Objectives: Our objective was thus to characterize individuals at high risk of severe vitamin D deficiency (25OHD<10ng/ml).

Method / Design: A combination of hierarchical and non-hierarchical cluster analysis was performed on 1528 French Caucasian adults (45-60y) from the SU.VI.MAX cohort. The following baseline variables (collected through self-administered questionnaires and anthropometric measurements) were included in the clustering procedure: severe vitamin D deficiency (yes/no, Roche Cobas® electrochemoluminescent assay on baseline plasma samples), gender, age, BMI, physical activity, educational level, dietary intake of vitamin D, latitude, sun exposure, Fitzpatrick phototype, and month of blood draw.

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Results: Two clusters were identified. Cluster 1 consisted of all participants with severe vitamin D deficiency and was characterized by the overrepresentation of: very low sun exposure, obesity, female gender, blood draw at the end of winter or early spring, Northern latitudes, irregular or low physical activity and the fairest skin phototypes. Cluster 2 consisted of all participants without severe vitamin D deficiency.

Conclusions: This study presented for the first time a clustering analysis to identify high-risk individuals for severe vitamin D deficiency. This approach, based on easy-to-assess phenotypic, sociodemographic and lifestyle characteristics, can help to improve clinical practice by better targeting patients at need for vitamin D supplementation and/or blood testing.

Keywords: (maximum 5): 25-hydroxyvitamin D; cluster analysis; severe vitamin D deficiency; clinical practice

149/505. Midlife dietary patterns and healthy aging among French adults: a prospective study

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Introduction: Multidimensional concepts referred to as "healthy aging" have recently become popular in geriatric research. These concepts aim to capture health during aging as a whole, beyond specific medical conditions or body functions. Few studies have investigated the association of diet and healthy aging.

Objectives: To investigate the association between empirically derived dietary patterns in midlife and healthy aging.

Method / Design: Baseline dietary data from repeated 24-h dietary records of a subsample of the SUpplémentation en Vitamines et Minéraux AntioXydants (SU.VI.MAX) Study permitted the extraction of dietary patterns using principal component analysis on 37 food groups. Healthy aging was assessed in 2007-2009 among 2,796 participants of the SU.VI.MAX study aged 45-60 years at baseline (1994-1995), initially free of diabetes, cardiovascular disease and cancer. Healthy aging was defined as not developing any major chronic disease, good physical and cognitive functioning, no limitations in instrumental activities of daily living, no depressive symptoms, no health-related limitations in social life, good overall self-perceived health and no function-limiting pain. The association between dietary patterns (in tertiles, T) and healthy aging was evaluated using multivariable logistic regression, and a potential interaction with energy intake was investigated.

Results: A "western" and a "healthy" dietary pattern were identified. Higher adherence to the western dietary pattern was associated with lower odds of healthy aging, but the association was attenuated when accounting for confounders. The healthy pattern was not associated with healthy aging among subjects with high energy intake. Among subjects with low energy intake on the other hand, higher scores on the healthy dietary pattern were related to higher odds of healthy aging: Odds ratio for T3 vs. T1: 1.49 (95% confidence interval=1.11, 2.00; P for trend=0.01).

Conclusions: Adherence to a healthy diet in midlife providing micronutrients, fiber and antioxidants while regulating energy intake may help to promote healthy aging.

Keywords: (maximum 5): dietary patterns, healthy aging

149/510. Price adjustment to reduce French fries consumption among university students: an on-campus restaurant experiment

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Introduction: Willingness-to-pay has been found to be a determinant of university students' (un)healthy eating behaviours. As pricing strategies are proven to be effective in other populations, price adjustments may be an effective strategy to improve students' dietary intakes.

Objectives: The purpose of this study was to examine the effect of a 10% and 20% price increase on French fries consumption among Belgian university students.

Method / Design: This pre-experimental study used a pre-post, between-subjects design to examine the effect of French fries price increases on students' French fries consumption in the on-campus restaurant of the Vrije Universiteit Brussel (with approximately 600 to 700 student visits per day). Baseline sales data were collected during a pre-intervention week. During two intervention weeks students had to pay respectively €0.5 and €1 extra (a menu normally costs €5) when choosing for French fries instead of rice or (mashed) potatoes. To control for meal bias, the same menus were provided during the pre-intervention and intervention weeks. French fries sale counts relative to the total amount of menu sales were used as the outcome measure. The Binomial test for one proportion was performed in R to analyse differences in French fries sale counts between pre-intervention and intervention weeks.

Results: In comparison to baseline sales data (52.8% of all students eating lunch at the on-campus restaurant consumed French fries), significant decreases in French fries consumption to respectively 41.9% ($p<0.001$) and 31.0% ($p<0.001$) were found during the first (10% price increase) and the second intervention week (20% price increase).

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Gender proportion among students choosing for French fries did not differ between baseline (68.8%) and intervention weeks (69.6% males, p=0.605 and 67.8% males, p=0.574 resp.).

Conclusions: For both male and female students French fries price increases were effective in reducing French fries consumption in a Belgian university on-campus restaurant.

Keywords: (maximum 5): French fries, university students, on-campus restaurant, pricing

149/513. The potential role of fruit and vegetables in depression: a systematic review

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Introduction: Increasing evidence suggests that fruit and vegetables (FV) may have the potential to influence depressed mood. However, to date, no review has attempted to systematically evaluate existing literature on the topic.

Objectives: To systematically review evidence surrounding FV intake and depression.

Method / Design: Four electronic databases (MEDLINE, EMBASE, PsycINFO and CINAHL) were searched for relevant articles, published in the English language, up to May 2013. Observational and experimental studies were included if they examined FV intake in relation to depressed mood amongst healthy adults. Data from selected papers were extracted and recorded in structured tables. Papers were categorised firstly according to study design (observational/experimental) and further sub-categorised based on whether they examined the association/effect of FV independently with depression, or the association/effect of FV, in addition to other lifestyle/dietary components, with depression.

Results: A total of 56 studies were identified that met the eligibility criteria. The majority (93 %, n=52) had observational study designs. Amongst the observational studies that examined FV independently with depressed mood (n=29), just over half (52 %, n=15) reported heterogeneous findings (i.e. significant associations were detected for certain subsets of participants e.g. males/females, types of FV or particular subscales of questionnaires, but not for others). However, amongst the observational studies which examined the association between FV, alongside other lifestyle/dietary components (n=23), and depression, the majority (70 %, n=16) reported significant associations. None of the four experimental studies reported any significant effects of increased FV consumption on depressed mood.

Conclusions: Whilst some promising findings exist with regards to FV intake in combination with other lifestyle/dietary components and depression, overall, results are inconsistent. Based on the predominantly observational nature of existing literature, this review concludes that future well-designed randomised controlled trials are required to investigate the relationship further.

Keywords: (maximum 5): Systematic Review: Fruit and vegetables: Depression

149/526. Exchanging key food items in daily diet improves fat quality and reduces total cholesterol and ldl cholesterol– a randomized controlled trial

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Introduction: Reduced intake of saturated fatty acids (SFA) combined with increased intake of polyunsaturated fatty acids (PUFA) is the main focus of dietary recommendations to reduce plasma cholesterol and risk of cardiovascular disease.

Objectives: To investigate the effect of exchanging key food items in daily diet and to improve fat quality (replacing SFA with PUFA) on plasma total cholesterol and LDL cholesterol, and to understand the molecular mechanisms behind this effect.

Method / Design: An eight-week double-blinded randomized, controlled trial with two groups including healthy adults aged 25-70 y with moderate hypercholesterolaemia and LDL cholesterol≥ 3.5 mmol/L was performed. The intervention group (Ex-diet group) received commercially available food items in which saturated fat was replaced by sunflower and rapeseed oil. The control group (C-diet group) received similar commercially food items with a higher content of SFA and lower content of PUFA. In both groups, the minimum daily intake of each food item was planned according to data from the National dietary survey in Norway. Before the baseline visit, all subjects (n=99) performed a run-in period where the control food items were consumed daily for two weeks. To investigate the molecular mechanisms of improving fat quality, peripheral blood mononuclear cells (PBMCs) were isolated and mRNA gene expression analysis was performed using TaqMan Array Micro Fluidic Cards.

Results: In the Ex-diet group, serum total cholesterol (p<0.001), LDL-C (p<0.001), HDL-C (p=0.006), and apoB (p<0.001) was reduced, compared to the C-diet group. The percentage change between the two groups at the end of the study was -9 % and -11 % in total cholesterol and LDL-C levels, respectively. Data from the PBMC mRNA expression analyses before and after intervention will be presented.

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Conclusions: Exchanging regular-consumed food items in daily diet and increasing the PUFA/SFA ratio reduces serum total cholesterol and LDL-C.

Keywords: (maximum 5): Saturate fat, Polyunsaturated fat, CVD, LDL-cholesterol

149/530. Biomarkers of nutrition status in sarcopenic older adults - results from the Maastricht Sarcopenia Study

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Introduction: Nutrition is an important pillar of treating sarcopenia. Multiple studies indicate a relationship between nutrients and muscle mass, strength and physical performance. Data are, however, limited on whether sarcopenic older adults differ in their nutrition status, compared to non-sarcopenic older adults.

Objectives: The present study compared biomarkers of nutrition status between sarcopenic and non-sarcopenic older adults.

Method / Design: The cross-sectional Maastricht Sarcopenia Study (MaSS) included 227 older adults (≥ 65 years), recruited in different community care settings in Maastricht, the Netherlands. Sarcopenia was defined using the European Working Group on Sarcopenia in Older People algorithm. Characteristics like Mini-Nutritional Assessment (MNA) and Mini-Mental State Examination (MMSE) were recorded. Serum 25-hydroxyvitamin D, magnesium and α-tocopherol (adjusted for cholesterol), red blood cell fatty acid profile and homocysteine were selected regarding their relationship with muscle parameters. Statistical inference was performed with t-test and ANOVA for inclusion of covariates.

Results: Sarcopenic older adults differed significantly in age ($p<0.001$), MNA-SF score ($p=0.039$) living situation ($p<0.001$), MMSE ($p=0.003$), the presence and number of comorbidities ($p=0.021$, $p<0.001$, respectively) and BMI ($p=0.048$) compared to the non-sarcopenic older adults. The 25-hydroxyvitamin D ($p=0.004$), eicosapentaenoic acid (EPA) ($p=0.007$), linoleic acid (LA) ($p=0.016$) levels were lower and homocysteine levels ($p<0.001$) were higher in sarcopenic older adults. Differences between sarcopenic and non-sarcopenic older adults remained significant for LA and homocysteine levels after inclusion of the covariates (e.g. age, sex, MNA, MMSE, BMI, smoking). Correcting for the covariates age and living situation decreased the differences in 25-hydroxyvitamin D and EPA to the level that the difference was no longer statistically significant.

Conclusions: The results suggest that sarcopenic older adults differ in their linoleic acid and homocysteine levels compared to non-sarcopenic older adults. The differences in 25-hydroxyvitamin D and EPA levels were found to be related to differences in age and living situation.

Keywords: (maximum 5): sarcopenia, nutrient status, older adults.

149/531. Anti_inflammatory diet alleviates malnutrition, inflammation and oxidative stress in hemodialysis patients :a randomized trial

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Introduction: High oxidative stress and inflammation are the two main causes of protein energy wasting (PEW) in hemodialysis (HD) patients.

Objectives: In this study we investigated the efficacy of renal anti-inflammatory diet therapy on nutritional, oxidative stress and inflammatory markers.

Method / Design: In this randomized open labeled two- arm parallel trial, 94 patients on stable HD were randomly allocated to two equal groups to receive anti-inflammatory diet or nutrition education for 10 weeks. Patients in both groups were provided with individualized nutrition counseling .Serum levels of albumin, prealbumin, malondialdehyde (MDA), interleukin-6 (IL-6), C-reactive protein (CRP), total antioxidant capacity (TAC), ferritin, transferrin, sodium, potassium, phosphate, serum urea nitrogen (SUN) and creatinine as well as the subjective global assessment (SGA) score, malnutrition–inflammation score (MIS), and body composition were measured at the baseline and at the end of the trial. The primary outcome was a change in serum albumin levels.

Results: The SGA score and MIS ($P < 0.001$) and also serum levels of MDA and CRP ($P = 0.04$) decreased significantly in the diet therapy group compared to the control group. Moreover, serum levels of TAC increased significantly in the diet therapy group compared with decreasing levels in the control group ($P < 0.001$). In addition a significant increase was observed in body mass index (BMI) ($P = 0.004$), total weight ($P = 0.001$), dry lean weight ($P = 0.001$) , body cell

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mass (BCM) (P = 0.02), and fat free mass index (FFMI) (P < 0.001). Anti- inflammatory diet therapy also hindered a decrease in lean body mass compared with the control group (P = 0.002). There were no significant differences between the two groups in terms of changes in other inflammatory and nutritional markers.

Conclusions: Anti_inflammatory diet therapy reduced inflammation, oxidative stress and malnutrition in HD patients.

Keywords: (maximum 5): Inflammation, diet, hemodialysis, malnutrition

149/533. Improvement of salt and fatty acids intake among Dutch young children due to reformulation

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Introduction: High intake of salt, trans fatty acids and saturated fatty acids is associated with adverse health effects. Food companies are encouraged to reformulate foods in order to improve nutrient intake to prevent non-communicable diseases.

Objectives: This study estimates the impact of food reformulation between 2006 and 2013 on the usual intake of salt, trans fatty acids and saturated fatty acids of Dutch young children.

Method / Design: Data from the Dutch food consumption survey 2005/2006 among 1,279 children aged 2 to 6 years were used. The nutrient intake was calculated using the Dutch food composition database (NEVO) of 2006, as well as an updated version from 2013. The usual intake was calculated using SPADE-software. The impact of reformulation was estimated by comparing the 95% confidence intervals of the mean usual intakes and the percentage of children who adhered to the guidelines calculated with both NEVO-tables.

Results: The average trans fatty acid intake was significantly reduced, from 0.8 En% in 2006 to 0.4 En% in 2013. In 2013, all children complied with the guidelines of trans fatty acid intake, while this was not the case in 2006. The average intake of salt (g/day) and saturated fatty acids (En%) and the percentages of children who adhered to the guidelines were, although slightly improved, not significantly different comparing the intake between 2006 and 2013.

Conclusions: The trans fatty acid intake was improved due to the achievements of the food industry to lower trans fatty acid content of foods. The usual salt and saturated fatty acids intake did not change. There is still improvement needed regarding reformulation of salt and saturated fatty acids in food products. It is recommended to estimate also the changes in dietary habits over time.

Keywords: (maximum 5): Reformulation, salt, fatty acids, food consumption survey, young children

149/534. Associations between habitual school-day breakfast consumption frequency and academic achievement in British adolescents

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Introduction: Breakfast has been suggested to positively affect cognitive and academic performance in children.

Objectives: To examine cross-sectional associations between habitual school-day breakfast consumption frequency and General Certificate of Secondary Education (GCSE) attainment, a national academic qualification obtained by most British children in the final years of education.

Method / Design: Adolescents aged 16-18 years (n=294; females: 77.2%) completed a retrospective 7-day food diary to report breakfast intake and a questionnaire to report GCSE grades. A breakfast eating occasion was defined as any food or drink containing ≥5% Total Energy Expenditure consumed up to 10.00am on school-days. Habitual weekly school-day breakfast consumption frequency was categorised as rare (0-1 school-days), occasional (2-3 school-days) or frequent (4-5 school-days). GCSE grades (A, B, C, etc.) were aggregated into point scores (A* = 58, A = 52, B = 46 etc.) and hierarchical linear regression models were applied. Three aggregate point scores were created: total uncapped (sum of all subjects taken), total capped (best 8 subjects taken) and mean point score per subject. Pupils' grades in Mathematics and English were analysed using ordinal logistic regression.

Results: Rarely consuming breakfast predicted lower total capped point score (β= -0.13, $p<0.05$), and mean point score per subject (β= - 0.14, $p<0.05$) following adjustment for confounders. Rarely eating breakfast depressed total GCSE point score by 10.25 points (maximum = 464) and mean point per qualification by 1.20 points (maximum = 58). Students from low/middle SES rarely consuming breakfast were significantly less likely to achieve higher Mathematics grades compared to frequent breakfast consumers (adjusted cumulative odds ratio: 0.35 95% CI: 0.17-0.72, $p<0.01$).

Conclusions: Habitual school-day breakfast consumption frequency amongst UK adolescents is a significant correlate of GCSE achievement. These results offer promising associative evidence which warrants further exploration in well controlled studies.

Keywords: (maximum 5): BREAKFAST, LEARNING, ACADEMIC PERFORMANCE, SCHOOL PERFORMANCE, ADOLESCENTS

149/535. The effect of vitamin D on atopic dermatitis – a systematic review

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Introduction: Atopic dermatitis (AD) is the most common chronic inflammatory disease in children in industrialized countries. An intense itching, dry skin and inflammatory skin alterations characterize this disease in particular. Experience has shown that the symptoms occur in childhood and early adolescence. Severe eczema can be treated with a UV light therapy, what should be avoided with children.

Objectives: This review seeks to discover whether vitamin D has an effect on atopic dermatitis in children, adolescents and adults.

Method / Design: This systematic review was conducted according to the guidelines of the PRISMA (preferred reporting items for systematic reviews and meta-analysis) statement for meta-analyzes and systematic reviews, exclusively in the database ScienceDirect. Inclusion and exclusion criteria have been described according to the PICOS criteria. The search combined the terms atopic dermatitis AND vitamin D.

Results: The electronic search revealed 819 citations. The review contains five scientific investigations, including trials with children and teenager such as with adults. The studies about adults show that patients with AD have significantly lower levels of serum vitamin D. It was also shown that the probability to develop AD is higher with a deficiency of vitamin D. Beyond this it was investigated that a daily oral supplementation can increase serum concentration. The studies with children/adolescents achieve no correlation between AD and vitamin D in case of the degree of severity and that the severity might be higher with a vitamin D deficiency. A vitamin D supplementation over one month has positive effects on AD in children and teenager.

Conclusions: Overall, the study situation is still very limited and inconclusive. Significant correlations and effects were detected, but these should be confirmed and generalized by other trials of high quality. Generally it could be shown that there is a link between AD and vitamin D.

Keywords: (maximum 5): Vitamin D, atopic dermatitis, 25-hydroxyvitamin D, 25(OH)D

149/539. Dietary changes needed to reach nutritionally adequate diets for French adults with different income levels

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Introduction: Higher dietary quality is generally associated with higher socioeconomic status

Objectives: To study the dietary changes needed to achieve nutritional adequacy (i.e. the fulfillment of all nutrient recommendations) at different levels of income in a population of French adults.

Method / Design: Dietary intakes of 1,719 adults from the national dietary survey INCA2 were used as observed diets. Nutrient intakes and diet costs were estimated using the French food database completed with mean national food prices. Nutritional quality was assessed with the Mean Adequacy Ratio (MAR, %/day). Starting from each observed diet, an iso-caloric, iso-cost and nutritionally adequate optimized diet was generated with individual diet modeling. The dietary changes needed to reach nutritional adequacy were compared between income quintiles (Q1 being the lowest), before and after optimization, adjusting for sex, age, household-type and energy intake.

Results: Despite similar energy intakes, the MAR increased from 80.1 %/d in Q1 to 83.6 %/d in Q5. Lower income individuals consumed lower cost diets that contained significantly less fruits and vegetables (from 338g/d in Q1 to 418g/d in Q5) and more starches (from 253g/d in Q1 to 233g/d in Q5). No significant differences were found between quintiles for the other food-groups, including fats and sweets. On average, optimization increased fruit and vegetables (+165g/day), starches (+118g/d) and dairy products (+23g/d) whereas meat/eggs/fish, mixed dishes, and fats and sweets decreased. Food-group changes needed to meet nutritional adequacy were not different across quintiles, except for dairy products, the increase of which was higher for low income quintiles.

Conclusions: The present results confirm that lower income is associated with lower nutritional quality. However, they suggest that reaching nutritional adequacy at no extra cost is possible for all individuals in a general population, and that the development of income-specific dietary advices is not justified.

Keywords: (maximum 5): diet modelling, income, nutrition, diet cost, nutrition economics

149/540. Breastfeeding practices, maternal characteristics and nutritional status in rural and urban settings in Northern Ghana

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Introduction: The first 1000 days of life is a critical period for intervention aimed at improving child nutrition and health, but appropriate breastfeeding practices are crucial during this period. Child's feeding practices vary with location, and this could influence nutritional status of the child.

Objectives: This study assessed breastfeeding practices and nutritional Status in children (0-24 months) living in two settings; rural and urban, Northern Ghana.

Method / Design: A cross-sectional study was conducted among 300 lactating mothers with children 0-24 months from Tamale and Savelugu, Northern Ghana. These mothers were purposefully selected, and enrolled into the study and after consenting. Mothers provided information on breastfeeding practices such as timely initiation of

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breast feeding and exclusive breastfeeding. Child length and weight were also measured to assess nutritional status. We reported descriptive statistics of study characteristics and performed Chi-squared test to assess relationships among nutritional status of children, maternal characteristics and breastfeeding practices. A $p<0.05$ was considered significant.

Results: Mean ± SE maternal age was 27.2 ± 0.3 years. The prevalence of early initiation was 84.7% (rural) and 89.0% (urban). Exclusive breastfeeding rates were 89.0% (rural) and 98.4% (urban) settings, and continuous breastfeeding was 91.5% (rural) and 98.8% (urban). Stunting, underweight and wasting rates were 11.6%, 15.7% and 13.3% respectively. We did not find any association between the maternal characteristics and early initiation in both settings, except for occupation ($p<0.05$), which had a significant association in the urban. Maternal age and educational level were the only characteristics associated with exclusive breastfeeding in the rural setting. Nutritional status between rural and urban settings was different ($p<0.05$).

Conclusions: Breastfeeding practices were optimal but malnutrition rates were high. Maternal age and educational attainment was associated with exclusive breastfeeding. Nutritional status was not associated with early initiation and continuous breastfeeding.

Keywords: (maximum 5): Breastfeeding practices, Nutritional status

149/542. Relationships between satiety, mood and cognitive function following a small or large high carbohydrate breakfast.

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Introduction: Research suggests that satiety can positively influence cognitive function by improving mood state. To date, few published studies have measured satiety and mood concurrently with objective measures of cognitive function.

Objectives: To examine the effects of satiety and mood on cognitive function by manipulating breakfast size.

Method / Design: A within-subjects design was employed in 22 healthy male participants (age 21.8 ± 2.51 years; BMI 22.6 ± 1.93) who received either no breakfast (NB; water), a high carbohydrate low-energy (HCLE) or high carbohydrate high-energy (HCHE) breakfast in a counterbalanced order on three separate test days. Subjective satiety (hunger, fullness, desire to eat, prospective consumption) and mood (alertness, irritation, contentment, stress) were assessed periodically using visual analogue scales (VAS). Additionally, objective satiety was examined using an ad libitum lunch. Cognitive function (immediate and delayed verbal and spatial memory, executive function) was tested at 30 and 130 minutes after breakfast.

Results: Mood and satiety related VAS ratings showed different profiles according to breakfast condition. Significant main effects of breakfast condition were found for ratings of satiety (HE>LE>NB), lunch intake (NB>LE>HE), and ratings of irritation and stress (NB>LE>HE). Furthermore, participants reported to be significantly more content and alert after consuming breakfast. Delayed spatial memory was significantly worse after the HCLE breakfast compared to both the NB and HCHE conditions. No other significant main effects of breakfast on measures of cognitive function were found. Analysis revealed no clear relationships between ratings of mood and satiety and measures of cognitive function.

Conclusions: Both the HCLE and HCHE breakfast conditions positively affected satiety, and measures of mood but these appear uncoupled with concomitant effects on cognition.

Keywords: (maximum 5): SATIETY, MOOD, COGNITIVE FUNCTION, BREAKFAST

149/551. Effect of milk ingredients on glucose and inflammation in overweight subjects; a randomized controlled study

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Introduction: Postprandial hyperglycemia has been implicated in a low-grade inflammatory response.

Objectives: Investigate whether whey protein and micronutrients in milk, in normal and relatively high amounts, can beneficially affect glucose regulation and low-grade inflammation in healthy subjects.

Method / Design: Randomized controlled parallel trial during 7 weeks. Subjects were 40 healthy, overweight men, aged 50-65 years. Intervention included either 3 x 250 ml of milk, with extra whey protein and vitamins (MW), one portion at each main meal, or the same quantity of semi-skimmed milk (M). A standardized high-energy drink in the morning, at start and end of the study, was used to evaluate postprandial response. Main study outcomes were the change in fasting concentration and postprandial plasma responses of glucose, insulin and IL-6. Secondary outcomes included biomarkers of bone resorption and muscle mass.

Results: Drinking M before the high-energy drink reduced the acute glucose response, without increasing the insulin response. The MW group showed no additional effect on the glucose response reduction, but showed an increase in the acute insulin response. The 7-week intervention showed an additional small improvement in postprandial glucose response, when milk was consumed before the high-calorie meal. Without the milk preload, the postprandial glucose response curve was unchanged. Fasting glucose and insulin did not

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change over time. There was a weak improvement in most of the inflammation markers after the intervention period. Fasting osteoprotegerin and 24-hour urinary creatinine were increased after 7 weeks of daily consumption of MW compared to normal milk.

Conclusions: Drinking semi-skimmed milk reduced the postprandial glucose response, without increasing the insulin response, and led to a small improvement in inflammation markers over time. MW had no additional effect on glucose response reduction, but increased insulin response. However, it also had a potentially beneficial effect on bone resorption and muscle mass.

Keywords: (maximum 5): milk, glucose metabolism, postprandial inflammation

149/555. Hypoglycemic effects of Corn steep liquor extracts in streptozotocin-induced diabetic rat

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Introduction: Traditionally, Corn-steep fermenting liquor has been used to prepare infusion for treatment of various diseases.

Objectives: This study was to investigate the hypoglycemic effects of three extracts (Citrullus colocynthis, Gladiolus psittacinus and Circuligo pilosa) prepared with Corn-steep fermenting liquor and its effect on heamotogical parameters in diabetic rats.

Method / Design: Diabetes was induced by single intraperitoneal administration of streptozotocin (50mg/kg). Normal as well as diabetic rats were divided into six groups to receive different treatments for 15days. The effects of extracts were monitored on body weight, blood sugar and heamatological indices.

Results: Qualitative phytochemical analysis showed the presence of phenol, quinones, coumerin, saponins and flavonoids. Acute toxicity showed that Gladiolus psittacinus is toxic above 800mg/kg but other extracts did not show any sign of toxicity up to the dose of 2900mg/kg. Corn steep liquor extracts were able to significantly reduce the elevated blood glucose level of diabetic rats, also body weight and heamatological indices in diabetic rats were improved by the administration of the extracts.

Conclusions: It can be concluded that corn steep fermenting liquor extracts can be used in the management of diabetes thereby justifying its use in folk medicine.

Keywords: (maximum 5): Diabetes, Corn-steep fermenting liquor, Citrullus colocynthis, Gladiolus psittacinus, Circuligo pilosa

149/556. Sensory characteristics of meatballs with up to 6% added rye bran or pea fiber

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Introduction: When improving the nutritional profile of meatballs in order to obtain a nutritional claim for dietary fiber, it is important to consider the changes in the product's sensory quality.

Objectives: The aim was to investigate the sensory characteristics and dose-response relationship of dietary fibre added to meatballs.

Method / Design: Pea fiber (PEA) or rye bran (RYE) were added to meatballs in doses from 3 g to 6 g dietary fibre per 100 g in order to reach the conditions for the nutritional claims "source of dietary fibre" and "high in dietary fibre", respectively. Meatballs without added fibre were used as a control. A trained sensory panel (n = 9) evaluated the meatballs using sensory descriptive attributes in terms of odor, appearance, texture and flavor.

Results: The addition of PEA and RYE to meatballs showed significant changes in the texture attributes.

PEA meatballs showed a dose-response relationship and became more crumbly ($p<0.001$), firm ($p<0.001$), and gritty ($p<0.001$), however less juicy ($p<0.001$) with increasing fiber content. For RYE meatballs, a dose-response relationship existed for grainy texture ($p<0.001$), but also for grainy flavor ($p<0.001$), the odor of grain ($p<0.001$) and the inner pigment ($p<0.001$), that all increased with increasing fiber content. Compared to the meatballs without added fiber, RYE differed mostly by having grainy attributes affecting appearance, odor, texture and flavor. There was no significant difference in juiciness between the meatballs without added fibre and the RYE meatballs.

Conclusions: The sensory quality of meatballs was affected by the addition of dietary fibre in up to 6 g per 100 g. Rye bran and pea fibre affected the sensory attributes differently. However, whether these sensory changes affect consumer acceptability need to be confirmed in consumer studies.

Keywords: (maximum 5): Meat, dietary fiber, nutritional claim, sensory characteristics, sensory evaluation.

149/565. Nutritional status of patients on continuous ambulatory peritoneal dialysis

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Introduction: Protein-energy malnutrition is common complication in patients on continuous ambulatory peritoneal dialysis

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(CAPD). It is an independent determinant of morbidity and mortality in CAPD patients. In peritoneal dialysis, protein-energy malnutrition relates to both inadequate food intake and abnormal nutrient metabolism.

Objectives: The aim of this study was to evaluate the nutritional status of CAPD patients.

Method / Design: This cross-sectional study involved stable randomly selected patients on continuous ambulatory peritoneal dialysis. Patients who had severe anemia, peritonitis or any inflammatory conditions for at least 3 months before the analysis, malignant disease and acute exacerbation of heart failure, were excluded. The nutritional status was evaluated by anthropometric parameters (body mass index, percentage of body fat, mid-arm circumference, triceps skinfold thickness and mid-arm muscle circumference) and biochemical parameters (serum albumin, total cholesterol, triglycerides and bicarbonates levels). Also nutritional status was evaluated by subjective global assessment.

Results: All patients were more than 3 years on CAPD. Although, average body mass index was 24,7±1.9 kg/m2 our results showed that 63,3% CAPD patients had mild to severe decreased muscle mass. Low levels of serum albumin were recorded in 78,6% CAPD patients. According to subjective global assessment score 42,9% of patients on peritoneal dialysis were malnourished.

Conclusions: Protein-energy malnutrition is highly prevalent among our patients on continuous ambulatory peritoneal dialysis. There is no single best nutritional marker in CAPD patient. In order to prevent malnutrition it is necessary monitoring several nutritional markers and giving more nutrition information to patients on peritoneal dialysis.

Keywords: (maximum 5): nutritional status, malnutrition, subjective global assessment, peritoneal dialysis

149/574. Dietary protein intake and the risk of sarcopenia among perimenopausal Polish women

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Introduction: Sarcopenia is defined as muscle-mass loss and muscle stamina with increasing age. It inevitably leads to exacerbating the quality of life as well as being unable to self-maintain. An appropriate protein intake allows to gain and retain proper muscle mass. It is suggested that an increase in protein intake above the RDA may reduce the progressive loss of muscle mass.

Objectives: The aim of this study was to enquire into the relation between the risk of sarcopenia and dietary protein intake among perimenopausal women.

Method / Design: 495 perimenopausal women, aged 32-63, were examined. The analysis of body composition was conducted via the electrical bioimpedance method. Sarcopenia vulnerability and its occurrence was computed and based on Appendicular Lean Mass index (aLM/ht2) on the basis of total fat tissue mass and body height assuming the cut-off points for the Polish population. The consumption evaluation was performed and a 24-hour interview repeated sevenfold at irregular intervals was taken into account. Logistic regression models estimated associations between sarcopenia and energy, total and animal protein intakes, physical activity, body fat content, body mass and age.

Results: The relationships were observed for age, body mass and body fat content between groups with and without sarcopenia. The risk of sarcopenia was significantly lower for total dietary protein intake (OR=0.98 95%CI=0.97-0.99), dietary animal protein intake (OR=0.98 95%CI=0.96-0.99), age (OR=0.90 95%CI=0.86-0.93), body mass (OR=0.73 95%CI=0.69-0.79) and body fat content (OR=0.88 95%CI=0.85-0.92).

Conclusions: An increase in total and animal protein intake may protect muscle tissue albeit its intake did not differ notably among the women who participated in the research. The research on the influence of individual nutritive components upon the quality of muscle tissue and its protection with increasing age may allow to demarcate dietary recommendations in order to improve the quality of life of the elderly.

Keywords: (maximum 5): sarcopenia, menopause, proteins, diet, aging

149/581. Adherence to Mediterranean diet, genetic susceptibility and progression to advanced macular degeneration

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Introduction: Adherence to a Mediterranean-type diet is linked to lower risk of mortality and chronic disease, but the association with the progression of age-related macular degeneration (AMD) and genetic susceptibility is unknown.

Objectives: We examined the association of adherence to the Mediterranean diet and genetic susceptibility with progression to advanced AMD.

Method / Design: Among 2552 subjects in the Age-Related Eye Disease Study, 1059 eyes progressed to advanced AMD over 13 years. Baseline data for demographic and behavioral covariates were collected using questionnaires. Dietary data were collected from food frequency

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questionnaires. The alternate Mediterranean Diet score (aMeDi score: 0 to 9) was constructed using intake of vegetables, fruits, legumes, whole grains, nuts, fish, red and processed meats, moderate alcohol, and the ratio of monounsaturated to saturated fats. Ten genetic loci in seven genes (CFH, ARMS2, C2, C3, CFB, COL8A1 and RAD51B) were examined. Survival analysis was used to assess individual eyes for associations between incident AMD and aMeDi score and interaction effects between aMeDi score and genetic variation on risk of AMD.

Results: A higher aMeDi score (6-9) was significantly associated with a reduced risk of progression to advanced AMD after adjusting for demographic, behavioral and ocular covariates, and after the inclusion of ten genetic variants (HR=0.79, 95%CI: 0.66-0.97, p trend=0.026; HR=0.78, 95%CI: 0.63-0.93, p trend=0.005, respectively).

aMeDi score was significantly associated with a lower risk of incident advanced AMD among subjects carrying the CFH Y402H non-risk (T) allele (p trend=0.0004; p interaction=0.03). The aMeDi score was not associated with AMD among subjects homozygous for the risk (C) allele.

Conclusions: Higher adherence to a Mediterranean diet was associated with reduced risk of progression to advanced AMD, which may be modified by genetic susceptibility.

Keywords: (maximum 5): Mediterranean Diet, Dietary patterns, Macular degeneration, genetics, epidemiology.

149/583. Prevalence of obesity in young patients with squamous intraepithelial lesion and cervical cancer

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Introduction: Cervical cancer (CC) is the second cause of death in women with neoplasms in Mexico. Although CC is preventable when the precursor stages are detected (squamous intraepithelial lesions, SILs), this cancer continues with a high incidence in Mexico. Obesity has a potential effect during cancer development, and this can influence to develop CC at a younger age (< 40 years old).

Objectives: The goal of this study is to determine the prevalence of obesity in young women diagnosed with SILs or CC, and associate obesity and some obesity risk factors with SILs and CC.

Method / Design: Women under 40 years old who attended the Dysplasia Clinic at Sanitary Jurisdiction II of Ciudad Juarez with SILs or CC were selected. Obesity was determined by Body Mass Index (BMI), Body fat percentage (BFP) and abdominal obesity (AO) trough anthropometric measurements (weight, height, skinfold and waist circumference). We performed associations between the presence of obesity, physical inactivity and family history of obesity with the presence of SILs and CC by Pearson's Chi-square test.

Results: The patients were distributed by diagnostic: SILs (low-SIL (n=45) and high-SIL (n=62)) and CC (n= 14). The prevalence of obesity in all women (n=121) was 31.4 % (BMI), 56.2 % (BFP) and 65.3 % (AO). The prevalence of obesity on CC group was higher (42.9 % (BMI), 92.9 % (BFP) and 92.9 % (AO)) than SILs. Obesity by BFP and AO showed a significant association in patients with CC (OR 11.8, p =0.004; OR 8.1, p =0.033 respectably). No association was shown between SILs and obesity parameters.

Conclusions: In this study, the associations between obesity and CC showed an important risk factor to consider during CC development on young women. Additionally, this could influence during treatment in the future. For this reason, nutritional intervention is needed in these patients.

Keywords: (maximum 5): obesity, cervical cancer, SIL

149/584. Dietary Inflammatory Index is associated to low impact fractures in adult men: The Brazilian Osteoporosis Study (BRAZOS)

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Introduction: Adequate nutrition, dietary calcium and vitamin D intake are important to maintain bone health. Evidence suggests that nutrients such as vitamins and minerals may also contribute to bone loss during aging and has an effect on chronic inflammation. Recently, the Dietary Inflammatory Index (DII) has been developed to assess and evaluate the inflammatory potential of individual diets.

Objectives: To evaluate the DII in a representative sample of men and women aged 40 years or older in Brazil, as well as to verify its association to low impact fractures.

Method / Design: The DII was calculated using the Brazos database, the first epidemiological study carried out in a representative sample of Brazilian men and women aged 40 years or older. Research was conducted through in-home interviews administered by a trained team. Nutrition Database System for Research (NDSR) software program was used to analyse data on the intake of nutrients, later used to calculate DII on Statistical Analysis Software (SAS).

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Results: A total of 2269 subjects had their DII score calculated using information from 24h-R data. Males had lower DII than females (DII=1.12±1.04 versus DII=1.24±0.99). However, men with low impact fractures had significantly higher DII compared to those with no history of fractures (1.24±1.06 versus 1.08±1.04). Women taking statins had lower DII, indicating greater potential in implementing an anti-inflammatory diet.

Conclusions: Our findings suggest that a pro-inflammatory diet is associated to low impact fractures in Brazilian adult men, but not in women.

Keywords: (maximum 5): diet, inflammation, low impact fractures, osteoporosis, dietary inflammatory index

149/588. Number of restaurants and obesity among Brazilian adults: A multilevel analysis

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Introduction: Obesity is a global problem of epidemic proportions and has significant health consequences, especially in the development and progression of many chronic diseases

Objectives: Estimate the association of the number of restaurants and individual factors with obesity in adults in a Brazilian urban context

Method / Design: A cross-sectional study was conducted including adults, aged 18 years and older, who were participants in the Surveillance System for Risk and Protective Factors for Chronic Diseases by Telephone Survey (Vigitel) from 2008 to 2010 in the city of Belo Horizonte, Minas Gerais. For this study, the dependent variable of obesity was defined as a BMI ≥ 30 kg/m2. Each participant's residence geographic coordinates were based on their zip code. The coverage areas (CAs) of the Basic Health Units (BHUs) were used as neighbourhood units. The environmental variable was the number of restaurants of the CA. The STATA statistical package (svy function) was used for the statistical analyses. A fixed-effects multilevel logistic regression with random intercept was applied. Estimates of the odds ratio (OR) and 95% confidence interval (95% CI) were used. For all analyses, a 5% significance level was defined.

Results: This study included 5,273 individuals. The prevalence of obesity was 12.13% (95% CI: 11.20 to 13.12). For every increase in the number of restaurants (OR = 0.97, 95% CI: 0.96 to 0.99), the likelihood of obesity significantly decreases. This association remained statistically significant after controlled by age, sex, education and consumption of meat with visible fat.

Conclusions: The results showed that the food environment of the neighbourhood may influence the prevalence of obesity among adults. Thus, addressing the obesity problem will require the development of effective intervention strategies and the expansion of programs that address aspects of the physical and social environment. FOUNDING: MINISTRY OF HEALTH, BRAZIL.

Keywords: (maximum 5): KEYWORDS: MULTILEVEL ANALYSIS; OBESITY; PUBLIC HEALTH.

149/601. Safety evaluation studies of soy fortified high nutrient density wheat-cassava biscuit for school age children in developing low income countries

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Introduction: Undenutrition is a growing challenge in most developing countries of the world particularly in sub Saharan Africa especially among children including school age children(age 5 to 13 years). One of such ways to combat this problem is through development and utilization of fortified food such as biscuit as an intervention product for the target school age group

Objectives: To conduct safety studies on soy fortified biscuit

Method / Design: Soy fortified biscuit was developed using 20% soy flour and produced using standard baking procedures, soy free commercial biscuit and standard Rat diet- Rat chow were procured from market.

They were individually administered to experimental albino rats(120g each) of at least six rats per group of three groups for 28 days previously acclimatized for seven days. After 28daye, the rats were sacrificed and their serum was used for kidney, liver, lipid and gluthathione tests using individual standard documented procedures.

Results: The results obtained for each safety parameter showed that the serum values per group especially for the soy fortified biscuit were very comparable with that of the control/standard group

Conclusions: The soy fortified biscuit developed in this study was very safe for human consumption as there was no adverse effect on the organs investigated and contained no significant level of low density lipoprotein

Keywords: (maximum 5): safety, biscuit, soy, developing,fortify

149/602. Squash as an alternative to solve malnutrition problems in developing countries

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Introduction: Squash (Cucurbita moschata, pepo and maxima), is a crop that had been used in Cameroonian diet in the past. In fact, all parts of this crop: leaves, pulp, young shoots and seeds were used in human nutrition. Nowadays squash is a marginalized crop in terms of cultivation, marketing, and use in food habits in Cameroon

Objectives: Revalorization of squash as functional food in human nutrition

Method / Design: This work will highlight according to literature review, the nutritional and nutraceutical aspects of squash (leaves, seeds, flowers, shoots and pulp) in relation with human health benefits; particularly malnutrition problems in developing countries

Results: Scientific data on squash highlights its richness on nutrients such as carotenoids, vitamin C, dietary fiber, minerals, fatty acids, essential amino acids and phenolic compounds.

Conclusions: Squash can be used as functional food to prevent or solve some aspects of double burden of malnutrition (micronutrient deficiencies such as vitamin A, obesity and cardiovascular disease problems).

Keywords: (maximum 5): Squash, functional food, malnutrition, Cameroon

149/609. Associations between Dietary Intake of choline, betaine and Risk of Primary liver Cancer

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Introduction: Intakes of choline and betaine have been associated with a variety of diseases, including cancer, but findings on primary liver cancer (PLC) risk are limited.

Objectives: The aim of the present study was to investigate the association between dietary intake of choline, betaine and methionine with the first incident primary liver cancer in Guangzhou, China.

Method / Design: A 1:1 matched case-control study with 380 incident of PLC cases (first diagnosed within 1 month) and 380 controls matched by sex, age (5-year interval) were conducted. A 79-item food-frequency questionnaire was used to assess the habitual dietary intake of choline, betaine, methionine and other nutrients or energy by a face-to-face interview. Univariate and multivariate conditional logistic regressions were used to analyze the association.

Results: PLC patients had lower choline and betaine intake but higher methionine intake compared with controls (all P<0.001). A significantly inverse association of dietary intakes of choline, betaine and them combined. The odds ratios (95%CI) of PLC for the highest (vs. lowest) tertile of the intakes were 0.29 (0.15–0.58) (Ptrend <0.001) for choline, 0.45 (0.23–0.86) (Ptrend =0.013) for betaine, and 0.30 (0.15–0.58) (Ptrend <0.001) for combined choline and betaine. However there was not significant association between dietary methionine intake and PLC risk (Ptrend =0.166). For choline compound, higher intake of phosphatidylcholine, free choline, glycerophosphocholine and phosphocholine (but not sphingomyelin) was associated with lower risk of PLC (all Ptrend <0.05). The favorable association between total choline intake and PLC risk was stronger among participants with lower folate intake level (<341 vs. ≥341 μg/d) (OR: 0.24 vs. 0.35, Pinteraction=0.01).

Conclusions: Our findings suggest that higher intake of dietary choline and betaine intake may be protective against PLC, especially for low folate intake individuals.

Keywords: (maximum 5): choline; betaine; primary liver cancer; case-control study

149/612. Effect of the Intake of High-SDS Product on Metabolic and Inflammatory Markers in Subjects with Impaired Glucose Tolerance

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Introduction: Postprandial glycemia has been implicated in the development of chronic metabolic diseases.

Objectives: To compare metabolic and inflammatory responses following the ingestion of cereal products high in Slowly Digestible Starch (SDS) in subjects with impaired glucose tolerance.

Method / Design: In a cross over design, 20 subjects participated to 3 sessions : one session tested a glucose solution (54g = available carbohydrates content of the two other breakfasts), two sessions testing either a biscuit high in SDS or a rusk without SDS with 250 mL of milk and a hot beverage. The 2 sessions with cereal products followed a 3-weeks period where the corresponding cereal product was daily consumed. Glycemia, insulinemia, blood lipid profile and markers for inflammation and oxidative stress were followed during a 240 minutes postprandial period.

Results: Glycemic responses following both cereal products were lower compared to glucose solution. iAUC(0-120 min) of glycemia

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was significantly lower (-32 %) following the breakfast with biscuit high in SDS compared to rusk without SDS. The insulinemic response was lower following the breakfast with the biscuit compared to the 2 other sessions. Significant differences were observed between glucose solution and the cereal products on triglycerides and MDA which were higher with cereal products compared to glucose solution and on NEFA and GSH which were lower with cereal products than with glucose solution. No significant difference was observed between the 2 groups with cereal products for blood lipid profile, markers of inflammation and of oxidative stress.

Conclusions: Breakfast with a high-SDS biscuit lead to lower glycemic and insulinemic responses compared to breakfast including a rusk with no SDS in subjects with altered glucose tolerance. The ingestion for 3 weeks of the cereal products did not modified fasting and postprandial markers of inflammation and oxidative stress.

Keywords: (maximum 5): Slowly Digestible starch, cereal products, glycemic response, insulinemic response, inflammation

149/616. Association between food consumption and metabolic syndrome components in adolescents

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Introduction: Metabolic syndrome (MS) is a complex disorder represented by a set of cardiovascular risk factors commonly related to insulin resistance and abdominal fat. Although MS is well defined in adults, studies evaluating its determinants in adolescence are still scarce.

Objectives: Determine the prevalence of MS and its determinants associated with food consumption of adolescents.

Method / Design: Cross-sectional study were evaluated 302 school children aged between 15 and 17 years of both sexes, from schools in Juiz de Fora, Minas Gerais, Brazil. Data collection was performed in 2010. Screening was performed to determine the nutritional status. The students were divided into two groups (overweight / normal weight) matched for sex, age and type of school. All underwent dietary assessment, clinical biochemistry and metabolic syndrome to classification according to the criteria proposed by Faria (2007), which include the presence of at least three of the following factors: body mass index (BMI), triglycerides, high blood pressure, diabetes mellitus or impaired fasting glucose. Statistical analyzes were performed using SPSS software, version 17.0.

Results: 152 were overweight and 150 were normal. The prevalence of MS was 15.8%. Calcium intake was positively correlated with high density lipoprotein cholesterol (HDL) and negatively with BMI. The consumption of fibers showed a direct relationship with HDL components. The lipid composition increased saturated fatty acids intake was accompanied by the monounsaturated fatty acids and polyunsaturated fatty acids.

Conclusions: Calcium intake, fiber and saturated fatty acids were correlated with some of the determinants of metabolic syndrome. It was noted the importance of studies about diet quality as a way to further clarify the metabolic syndrome in adolescents. FUNDING: Fundação de Amparo à Pesquisa do Estado de Minas Gerais (FAPEMIG).

Keywords: (maximum 5): Metabolic Syndrome X; Adolescent; Food Consumption.

149/619. Egg consumption, egg sources of choline, phosphatidylcholine and methionine and risk of hepatocellular carcinoma: a case-control study

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Introduction: Intake of egg has been report to associate with risk of some cancers, but the finding are not consistent and information on hepatocellular carcinoma (HCC) risk is limited

Objectives: We examined the association between egg intake and its nutritional components of choline, phosphatidylcholine, methionine with the first incident of HCC in Chinese

Method / Design: A 1:1 case-control study with 381 HCC cases and 381 healthy controls was conducted between September 2013 and December 2014, in Guangzhou, China. Face-to-face interviews were carried to collect habitual dietary information using a 79-item food frequency questionnaire. Dietary intake of energy and other nutrients including choline, phosphatidylcholine and methionine were estimated using China food Composition Table. Univariate and multivariate unconditional logistic regression were used to analyze the association by calculating odds ratios and 95% CI

Results: HCC patients had lower intake of eggs and egg source of total choline, phosphatidylcholine (PC) compared with controls.

Compared with lowest quartiles for egg intake, the highest quartiles had significantly lower risk of HCC (OR: 0.57; 95% CI: 0.35-0.91; trend P=0.016). A significant positive HCC risk association was observed for total choline (highest vs. lowest quartiles, OR=0.38; 95% CI: 0.23-0.63, trend P<0.001), total PC (OR=0.57; 95% CI: 0.35-0.23, trend P=0.011). The same association was also observed for egg sources of above nutrients (choline: OR=0.47; 95% CI: 0.33-0.70; PC: OR=0.57; 95% CI: 0.36-0.93) . Total dietary methionine was associated with increased HCC risk (OR=1.65; 95% CI: 0.1.03-2.64), whereas the egg source of methionine and the ratio of methionine from egg/diets was associated with decreased HCC risk (OR=0.47; 95% CI: 0.29-0.76). There was not association between the rations of choline and PC from egg/diet and HCC risk

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Conclusions: Egg consumption may decrease HCC risk among Chinese. This favorable association could be explained by choline, phosphatidylcholine and methionine from egg

Keywords: (maximum 5): Egg, choline, phosphatidylcholine, methionine, hepatocellular carcinoma

149/620. Vitamin D, Its determinants, and Physical Performances in the Healthy Aging Longitudinal Study in Taiwan (HALST)

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Introduction: In Taiwan, the average vitamin D intake is only half the US recommendation but the vitamin D status is usually adequate. Vitamin D adequacy may be associated with maintaining physical performance in the elderly.

Objectives: The aims of the study were to identify the risk factors for vitamin D deficiency and to evaluate the associations between vitamin D status and physical performances in the ongoing Healthy Aging Longitudinal Study in Taiwan.

Method / Design: 5,664 community-dwelling participants who were ≥55 years old were recruited since 2008. The serum 25(OH)D concentrations were originally determined by ELISA and then calibrated against DEQAS standards. The physical performance were measured for handgrip strength, Short Physical Performance Battery, timed get up and go, six-minute walk test, and single leg stands. Multiple linear regression and logistic regression were used to estimate the associations.

Results: Vitamin D inadequacy (<50 nmol/L) was related to higher education (vs. primary school, OR=1.62 for more than high school in men and OR=0.54 for Illiteracy in women), BMI (≥30 vs. 18.5-25, OR=1.82 for men and 1.55 for women), and vegetable intake (4th vs. 1st quartile, OR=1.57 for men and 2.34 for women). On the contrary, higher fish (4th vs. 1st quartile, OR=0.44 for men and 0.27 for women) and milk intake (4th vs. 1st quartile, OR=0.45 for men and 0.68 for women) were inversely associated with vitamin D inadequacy. The association between vitamin D status and physical performances were not linear. Participants with adequate vitamin D status (50-125 nmol/L) had better physical performances than participants in the other groups.

Conclusions: Serum 25(OH)D concentration 50-125 nmol/L was associated with the better physical performance in this community-dwelling elderly population in Taiwan.

Keywords: (maximum 5): vitamin D, physical performance, epidemiology, HALST

149/624. Does screen time affect the cardio metabolic risk factors among young adults?

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Introduction: The association between sedentary time and cardio metabolic risk has aroused recent interest among researchers with the advent of increased digital and mobile devices. The dependency of the younger population on such devices is increasingly accountable for overweight and obesity.

Objectives: To examine the association between screen time (time spent on television, computer, mobile and smart devices) and cardio metabolic risk among a group of young Chinese adults.

Method / Design: A cross-sectional study was conducted among 100 young Chinese adults. Screen time and socio-demographics were self-reported while the cardio metabolic risk factors were measured by the researchers (body mass index, waist circumference, systolic and diastolic blood pressure, low-density (LDL-C), high-density (HDL-C) and total cholesterol (TC), triglycerides and glucose). Total screen time was categorised into ≥7 hours or <7 hours per day. Chi square test was used to assess the association between the variables in the study.

Results: The total screen time usage of the participants was 8.38+ 3.8 hours per day. Fifty six percent of the subjects spent more than 7 hours/day on different types of screen devices. The total screen time was significantly associated with systolic blood pressure, triglyceride level and LDL-C level ($p<0.05$).Computer use alone was significantly associated ($p<0.05$) with overall food and beverage consumption during screen use. Watching TV was significantly associated with raised systolic blood pressure ($p<0.05$).

Conclusions: Screen time was associated with cardio metabolic risk factors in the present study. However, the results of this study should be interpreted with caution as a cause effect relationship could not be established. Hence long-term prospective research is recommended to explore the clinical relevance of the small associations reported in this study by controlling for the confounders.

Keywords: (maximum 5): Screen time: young adults: cardio metabolic risk

149/626. Effect of school-based prevention programs on alcohol consumption of adolescents in Europe – a systematic review

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Introduction: Alcohol consumption and its health effects are a common cause of death in Germany and Europe. Mostly children and adolescents underestimate this fact. The earlier alcohol consumption in life starts, the more likely a person is to develop a risky drinking behavior. Therefore children and adolescents are an important target group of alcohol prevention programs.

Objectives: The aim of this review is to investigate the effects of school-based prevention programs on alcohol consumption of children and adolescents (6-18 years) in Europe.

Method / Design: The review follows the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement guidelines. The database "Pubmed" was used for the research of studies combining the search terms 'alcohol abuse', 'alcohol consumption', 'alcohol' , 'prevention', 'school-based' and 'adolescents'.

Results: The electronic search revealed 336 citations. Finally, a total of nine studies (mean age 13 years) are divided in groups regarding to the type of intervention: teaching-based interventions, group-based interventions and combined interventions. The prevention programs that refer to lifetime- and 30-month prevalence of binge drinking achieve the greatest success, however the first contact with alcohol, cannot be avoided or delayed. Three of the nine studies examined the alcohol prevention for young people, who have got a high risk of alcohol abuse. In this group the highest program effects are reached by using group meetings.

Conclusions: A combined alcohol prevention program for adolescents is recommended. This is divided into two group sessions per 90 minutes and eight school lessons, accompanied by out of school parental education.

Keywords: (maximum 5): school-based prevention, alcohol consumption, adolescents

149/627. The Beneficial Effects of Alpha-Lipoic Acid in Critically Ill Patients: A Prospective, Randomized, Placebo-Controlled Trial

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Introduction: Critical illness is associated with several metabolic, endocrine and biochemical changes. Oxidative stress and insulin resistance are two common problems in intensive care unit patients.

Objectives: The aim of this study was to determine whether intervention with alpha-lipoic acid (ALA) influences the oxidative stress, insulin resistance and clinical outcomes in critically ill patients.

Method / Design: 80 critically ill patients who were expected to stay at least seven days in the intensive care unit (ICU) and required enteral feeding were randomly allocated to two equal groups to receive either ALA(900 mg) or placebo daily for 10 days. Serum levels of total antioxidant capacity(TAC), malondialdehyde(MDA), Insulin, glucose(GLC), C-reactive protein(CRP), interleukin-6, albumin(Alb), prealbumin(preAlb), total protein(total-pr) and total lymphocyte count(TLC) as well as insulin resistance were measured at baseline and at the end of ALA supplement phase. Clinical outcomes (length of ICU/hospital stay and mortality, 28-day mortality and ventilator free days) were also recorded.

Results: TAC increased significantly in the ALA supplemented group compared to the placebo group($P<0.001$). Moreover, serum levels of GLC decreased significantly in the ALA group compared to lack of changes in the placebo group($p=0.011$). ALA supplementation also hindered an increase in insulin resistance($P=0.015$). There were no significant differences in other biochemical markers and clinical outcomes between the two groups.

Conclusions: ALA may be an effective supplement to improve antioxidant defense and insulin resistance in critically ill patients.

Keywords: (maximum 5): Alpha lipoic acid; critically ill; antioxidant; oxidative stress; insulin resistance.

149/630. The effect of 20% discount on fruit and vegetables for three months on supermarket purchases

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Introduction: Price discounts and space management interventions in supermarkets are frequently cited as a promising intervention opportunity to stimulate fruit and vegetable (F&V) purchases. Nevertheless, experimental evidence from real life settings is limited.

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Objectives: The objective of this study was to examine the effects of a 20% discount on F&Vs combined with a space management intervention or a space management intervention alone on supermarket purchases.

Method / Design: A space management intervention to promote F%V sales was performed in two large discount supermarkets ("placement"). In addition a 20% discount on fruit and vegetable was introduced for three months in one of the supermarkets ("placement + price"). The effect was evaluated using sales data from all supermarkets from the same supermarket chain on Bornholm before, during and after intervention. Data was analysed using multi-level analyses.

Results: The sales of fresh F&V increased by 25.2% (P=0.02) during the intervention period in the "placement+price" intervention supermarket compared to the control supermarkets. In the "Only placement" intervention supermarket the sale of fresh F&V increased by 14.0%, but non-significantly (P=0.152)) compared to the control supermarkets. The increase in sale was most pronounced for vegetables. The sales of organic vegetables increased by 29.8% (P=0.0.5) in the "placement+price" and by 33.1% (P=0.03) in the "Only placement" supermarket compared to the control supermarkets. No significant increase in sales of organic fruits was found. No significant increase in sales of candy, cakes, sugary beverages and unhealthy snacks were seen.

Conclusions: In conclusion a 20% price reduction on fruit and vegetables increased sales significantly. The effect was most pronounced for sales of vegetables. The space management intervention was primarily effective for organic vegetables. No negative/unhealthy substitution effects were found.

Keywords: (maximum 5): Price; Supermarkets; Intervention; Fruit and Vegetables; Prevention

149/637. Nutritional Assessment in Critically Ill patients: a cohort study from Shiraz, IRAN.

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Introduction: Malnutrition is an important factor in critically ill patients' survival. Lack of nutritional assessment at admission and during patients ICU stay has detrimental influence on attention to nutrition improvement by medical team and complicate patients' treatment.

Objectives: The purpose of the present study was to assess nutritional status in intensive care unit (ICU) patients on the day of admission and discharge by a detailed nutritional assessment and determining the relation between different indicators and nutritional outcome in ICU.

Method / Design: In a cohort study, one hundred and twenty five patients were followed from admission to discharge at eight ICUs in Shiraz, Iran. Patients' nutritional status was assessed using subjective global assessment (SGA), anthropometric measurements, biochemical indices and body composition indicators. Diet prescription and intake was also evaluated. Number of days without enteral feeding, days delayed from ICU admission to start enteral feeding, and length of ICU stay were also recorded.

Results: Malnutrition prevalence significantly increased on the day of discharge (58.62%) compared to the day of admission (28.8%), using SGA (p<0.001). Patients' weight, MUAC, MAMC, TSF and calf circumference decreased significantly as well (p<0.001). Lean mass weight and body cell mass were also decreased significantly (p<0.001). Biochemical indices did not show any notable changes except for magnesium which decreased significantly (p=0.013). A negative significant correlation was observed between malnutrition on the discharge day and anthropometric measurements. A positive and significant correlation was observed among the number of days without enteral feeding, days delayed from ICU admission to start enteral feeding, and length of ICU stay with malnutrition on the day of discharge.

Conclusions: Discharge day malnutrition increased in ICU patients using SGA. Anthropometric measurements are better predictors for nutritional outcome of critically ill patients when compared to biochemical tests.

Keywords: (maximum 5): Malnutrition, critical illness, intensive care unit, nutritional assessment.

149/644. Sugar intake in relation to other foods in the diet – Clues to understand sugar-obesity associations?

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Introduction: Introduction: Obesity is associated with the sugar-sweetened beverages (SSB) exposure. Sugar as nutrient is less frequently studied, but inverse associations with obesity emerge. Although misreporting serves as an acceptable explanation, the associations of sugar intake with the overall food consumption are rarely reported.

Objectives: Objectives: To evaluate cross-sectional associations between sugar intake and food groups

Method / Design: Methods: The data comprised 4842 DILGOM 2007 Study subjects aged 25-74 years. Diet was assessed with a validated 131-item FFQ. Total sucrose and fructose formed the sugar

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intake variable. The SAS GLM procedure was used to produce model-adjusted consumptions of food groups by sugar intake quartiles. Adjustments included gender, age and energy intake. Linear trends across quartiles were tested using the sugar intake quartile medians as continuous and each food group as dependent variable at a time.

Results: Results: The consumption of the sugar sources (sugars, sweets, chocolate, SSB, sweet bakery products, fruit juice, fruits, berries, and vegetables) was statistically significantly higher in the top sugar intake quartile compared to the lowest quartile. Those in the top sugar intake quartile consumed less wholegrain cereals, potato, meat, fish, milk products, butter, vegetable margarine and alcoholic beverages than those in the lowest quartile. No differences emerged in coffee and tea consumption across the quartiles.

Conclusions: Conclusions: The diet characterized by high sugar intake differs from the diet characterized by low sugar intake. The former may include aspects (e.g. low meat, high fruit and vegetable intake), which should be considered when studying sugar-obesity relationships. Generally, associations between sugar intake and overall food consumption should be understood better.

Keywords: (maximum 5): sugar intake, sucrose, fructose, food consumption, obesity

149/651. Scaling-up community-based programmes for childhood obesity prevention using EPODE methodology and WHO Appraisal Tool

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Introduction: Childhood obesity and overweight is a major public health concern in Europe. Programmes across the region use various approaches to prevent this issue, encountering challenges in the implementation field. The current study aims to appraise the methodology of 13 community-based programmes (CBPs) for strengthening and up-scaling their process, based on the EPODE methodology pillars and on the WHO Good Practice Appraisal Tool.

Objectives: To identify the strengths and weaknesses of 13 CBPs for childhood obesity prevention in reference to the four EPODE pillars and using the WHO Good Practice Appraisal Tool.

Method / Design: This is a descriptive research to identify strengths and weakness of the participant programmes. Data collection was conducted through the WHO Good Practice Appraisal Tool and semi-structured interviews with the principal programme coordinators. The interviews assessed the programmes' approach to political commitment, public-private partnerships, social marketing and scientific evaluation and dissemination. Three researchers appraised the information in reference to the EPODE pillars, using a scoring scale from 0 to 2.

Results: 46% of the programmes had structural public-private partnerships with no interference with the methods/contents of programmes. The social marketing approach was lacking target group analysis and focus on environmental change in most of the programmes. The communication and dissemination methods were lacking for the majority of the programmes. 77% of the programmes conducted an evaluation, but usually that did not include all the important aspects of the programme. Results from the WHO Good Practice Appraisal Tool and detailed results from the interview guide will be presented during the congress.

Conclusions: The context and methods of implementation varied between the CBPs. We identified various aspects to be improved. This work is now done thanks to tailored feedbacks, trainings and workshops. The next step is the progress appraisal of the 13 CBPs 2 years after this first evaluation.

Keywords: (maximum 5): community-based programmes, childhood obesity, EPODE

149/662. Evaluation of a national malnutrition prevention pilot programme in the UK

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Introduction: Malnutrition (undernutrition) is a major cause and consequence of poor health in the UK and the problem is widespread. Estimates suggest that around one million people over 65 years old are malnourished or at risk, of which, 93% are living in the community.

Objectives: A one year pilot programme, managed by Age UK and funded by the Department of Health, was designed to test the implementation of the Malnutrition Task Force best practice guidelines in five areas. A change management organisation was selected to support the pilots and this process evaluation will explore participants' experiences and report on lessons learned.

Method / Design: A mixed method but primarily qualitative approach was applied. Forty one-to-one semi-structured telephone interviews were undertaken with key individuals. These were recorded and framework analysis was used to make sense of emerging themes, along with interrogation of other data source. A logic model was developed to focus on identifying the causal mechanisms by which the pilots were successful and whether this was different for different people in different implementation contexts.

Results: Pilot participants reported local leadership; governance structure; teamwork; third sector facilitation; improved malnutrition knowledge and belonging to a national pilot as positive drivers for change. The role of the change agent was welcomed although quality improvement expertise was received variably. For some of the areas with well-established malnutrition work the pilot was seen as a dis-

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traction. Views on sustainability of the pilot programme varied in relation to each area's starting point suggesting that future projects should be asked to fulfil specific 'readiness' criteria.

Conclusions: A nationally led malnutrition prevention programme, with third sector collaboration and funded project management support, has the potential to stimulate joint working practices and innovation to prevent malnutrition at community level.

Keywords: (maximum 5): evaluation, malnutrition, older people,

149/665. Relationships between menstrual cycle phase, dietary fibre intake, bowel function and digestive symptoms

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Introduction: The effects of dietary fibre on laxation are well-known. However, the majority of the population fails to meet dietary fibre recommendations.

Objectives: To examine bowel function and digestive discomfort during the menstrual cycle and the effect of increasing cereal fibre intake on digestive function.

Method / Design: A representative online survey of 1012 UK premenopausal women examined bowel function and digestive discomfort during the menstrual cycle. A subsequent diary study included 57 women, tracked for one whole menstrual cycle. A randomised controlled trial (RCT) compared effects of two 12 week dietary interventions; general healthy eating alone (HE) and HE plus advice to increase fibre (HE+F) intake to 25g/day, in 71 overweight women. The Bristol Stool Form Scale, laxation frequency and digestive symptom ratings were completed daily.

Results: Over 164 different patterns of stool form across the cycle were identified in the online survey with only 33% of women showing typical patterns of bowel function. Hormonal contraceptive use was associated with more stable stool form suggesting that female hormonal fluctuations do affect bowel function. In the RCT, women following HE+F significantly increased their fibre intake up to 25g/day whereas those following HE did not. Multiple ordinal logistic regressions showed that those following HE+F felt less bowel pain and less indigestion than those following HE. Stool form was related to fibre intake and improved during the course of the intervention in the HE+F group. Stool form ratings shifted into the healthy range in line with increased intake of dietary fibre in women following the HE+F diet.

Conclusions: Bowel function is an important indicator of health which can be altered by diet as well as hormonal milieu. Increasing dietary fibre intake improved stool form and digestive symptoms and alleviated fluctuations during the menstrual cycle.

Keywords: (maximum 5): DIETARY FIBRE, DIGESTIVE SYMPTOMS, BOWEL FUNCTION, MENSTRUAL CYCLE.

149/668. Socio-economic inequalities: a risk factor for overweight and obesity in children in Bulgaria

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Introduction: Introduction: The EPHE evaluation study is a three-year study in seven community-based programmes The programme from Bulgaria is "Healthy kids in Bulgaria".

Objectives: Aim: The aim of the study was to identify inequalities between not good and good income families by using a parental questionnaire in Bulgarian population.

Method / Design: Materials and methods: A total of 205 children (46.8% boys, 52.7% girls; mean age of 7 years) from three schools in Sofia and their parents participated in the study. The EPHE questionnaire was filled in from each family with on fruit and vegetable consumption, soft drinks, water intake, sedentary behavior, and their family-environmental determinants, sleep habits of the child.

Results: Results: Children from good income families had significantly higher fruit, fruit juices and soft drinks consumption compared to the children from not good income families ($p< 0.001$, $p< 0.05$, $p< 0.05$, respectively).There is no significant difference in the vegetable consumption (5-6 days a week) between low- and high income groups. The children from not good income families spent significantly more total screen time compared to the children from high-income families, 25.7 hours and 18 hours, respectively, $p<0.05$.

Conclusions: Conclusion: Family environment is a crucial factor for development of healthy behavior and healthy body weight in the family, respectively in the child.

Keywords: (maximum 5): KEYWORDS: Inequalities, childhood obesity, prevention

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149/673. Quercetin: Concentration-dependent induction of signaling pathways in human primary hepatocytes – a trancriptomic study

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Introduction: Quercetin is a flavonoid widespread occurring in plant kingdom and consumed regularly with human diet (16 mg/day). Quercetin supplements with recommended doses up to 2 g/day are offered due to reported positive effects on health.

Objectives: Molecular effects of supplemental doses on human liver have not been assessed yet. Therefore, we investigated the molecular effects of quercetin on human hepatocytes to improve assessing the risk of quercetin supplementation on human health.

Method / Design: Molecular effects of three different concentrations of quercetin on gene expression in human hepatocytes were investigated by microarray analysis (human genome GeneChip HG-U133 plus 2.0, Affymetrix). Possible new signaling pathways were verified using reporter gene assays and verified by real-time RT-PCR.

Results: Quercetin concentrations representing the normal intake showed only weak effects on mRNA expression in liver cells. In contrast, supplemental doses affect immune response and p53 signaling and might be associated with cancer. Additionally, quercetin showed inhibitory effects on transcriptional activation and mRNA-expression of HNF4α and on its target genes ABCC3, ABCG5, SULT2A1 and UGT1A1. Inhibitory effects were also found on the ligand binding domains of FXR, LXRα and PXR.

Conclusions: Normal intake of quercetin seems to affect gene expression in hepatocytes only to a minor degree, whereas supplement doses may have great effects, while supplement doses may have great effects on gene expression in hepatocytes. However, since it is not clarified whether such high doses of quercetin exert positive or negative effects, a careful handling of quercetin supplements is advised.

Keywords: (maximum 5): flavonoids, quercetin, supplementation, hepatotoxicity

149/682. Monitoring of iodine deficiency disorders in Bulgaria

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Introduction: Iodine deficiency disorders were a public health problem in Bulgaria. The universal salt iodisation as a key strategy for elimination of iodine deficiency disorders in country.

Objectives: To monitor the impact of the intervention on the iodine status of pregnant women and children 6-10 years old in the endemic region of the country.

Method / Design: To monitor the iodine deficiency disorders in Bulgaria in 2012 was conducted cross-sectional survey for estimation the iodine status and iodine intake at the population level by urinary iodine concentration of random selected 804 persons (404 children aged 6-10 years, 250 pregnant women in the II and III-rd trimester and 150 women of childbearing age, 19-42 years). The determination of urinary iodine concentration was performed with reference method recommended by the World Health Organization.

Results: After the analysis and evaluation of the data it were identified the adequate iodine intake and iodine nutritional status: in 49% of studied children aged 6-10 years; among 39.2% of pregnant women in second and third trimester of pregnancy and in 48% of non-pregnant women. The median urinary iodine concentration in pupils were close to the highest level of the range for adequate intake and 28.5% of children were with iodine intake above needs, while 10.6% were in risk for adverse effect and iodine-induced hyperthyroidism. With low levels of urinary iodine concentration were 40.4% of pregnant women, which determines deficient iodine status of them.

Conclusions: The health education about the Iodine deficiency disorders need to be repeated in the public health programmes and salt producers

Keywords: (maximum 5): iodine deficiency, children, pregnant women

149/688. Mediterranean diet and preserved brain structural connectivity in older subjects

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Introduction: The Mediterranean diet (MeDi) has been related to a lower risk of Alzheimer's disease (AD), yet the underlying mechanisms are unknown. We hypothesized that protection against neurodegeneration would translate into higher grey matter volumes, while vascular pathways would be more specifically reflected by preserved white matter microstructure.

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Objectives: We examined the association between higher adherence to the MeDi and preserved brain grey matter volume and white matter microstructure an average 9 years later, in a cohort of older individuals.

Method / Design: We included 146 participants from the Bordeaux Three-City study not demented when they completed a dietary questionnaire, who underwent a 3-Tesla MRI examination an average 9 years later, including diffusion tensor imaging. Adherence to the MeDi was reflected by a 9-point score based on higher intakes of vegetables, fruits, legumes, cereals, fish; lower intakes of meats and dairies, moderate alcohol consumption and a higher ratio of monounsaturated:saturated fat.

Results: In voxel-by-voxel analyses adjusted for age, gender, education and APOEε4 allele carrier status, and controlled for multiple comparisons, adherence to the MeDi was significantly associated with preserved white matter microstructure (ie, lower diffusivities and higher fractional anisotropy) in extensive brain areas ($P<0.05$ familywise-error corrected for multiple comparisons); the relation of the MeDi to lower diffusivity values remained virtually unchanged after further adjustment for a large set of lifestyle, vascular and cognitive factors. In contrast, we found no relation with grey matter volumes.

Conclusions: The MeDi appears to benefit brain health through preservation of structural connectivity. The strong relation of the MeDi with white matter microstructure in extensive areas with no substantial association with grey matter volumes suggests that the MeDi may benefit the brain through a favorable impact on cerebral vasculature; mediation by early vascular mechanisms deserves further research.

Keywords: (maximum 5): Diet, Mediterranean; Prospective studies; Risk factors in epidemiology; Neuroimaging

149/697. Fish intake, Alzheimer disease genes and cognitive decline in five large cohorts of older subjects

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Introduction: Identifying preventive factors for Alzheimer Disease (AD) is critical. Long-chain omega-3 polyunsaturated fatty acids (n-3 PUFA) may be related to brain benefits, while modest randomized trials have been inconclusive, although one found interaction with ApoE genotype. Indeed, evidence suggests fatty acid-gene interactions in AD. Most AD genes (eg, ApoE4, CLU, CR1) are involved in lipid metabolism or inflammation, a pathway by which n-3 PUFA may act.

Objectives: We pooled 5 cohorts (the Three-City study, the Nurses' Health Study, the Women's Health Study, the Chicago Health and Aging Project and the Memory and Aging Project) to conduct a powerful investigation of fish intake on cognitive decline, and potential interactions of fish with ApoE4 and 13 candidate AD single nucleotide polymorphisms (SNPs).

Method / Design: We included a total of N=23,673 Caucasians aged ≥65 years who provided information on fish consumption and were subsequently followed for cognition from 4 to 9 years. The primary outcomes were change in global cognition and verbal memory (both based on average Z-scores of cognitive tests). We estimated cohort-specific associations between fish intake and cognitive change using linear mixed models adjusted for age, gender and education, and meta-analysed the results.

Results: Compared to non-fish eaters, greater fish consumers (≥2 servings/week) had a slower decline in episodic memory (pooled difference in mean Z-scores: 4+ servings/week=0.021, 95%CI 0.005, 0.037, and 2-3/wk=0.007, 95%CI 0.001, 0.013, P-for-trend=0.02); these associations were not meaningfully modified after adjustment for a large set of potential confounders. However, there was no association with global cognitive change. We did not find any significant fish-by-gene interactions.

Conclusions: In this pooled analysis including five large cohorts of older subjects, intake of 2+ servings/week of fish was significantly associated with slower decline in verbal memory. We did not find robust evidence of fish-by-gene interactions with AD genes.

Keywords: (maximum 5): fish, omega-3 fatty acids, genetics, cognition, cohort studies

149/698. No association between vitamin D and handgrip strength in community-dwelling elderly women from Germany

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Introduction: There is some evidence that vitamin D may be involved in the development and progression of sarcopenia, the age-related decline in muscle mass and function. However, the association of 25-hydroxyvitamin D [25(OH)D] – the biomarker of vitamin D status – with handgrip strength was mainly investigated in middle-aged

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or frail subjects without a comprehensive adjustment for confounding variables, such as body composition, lifestyle and diet.

Objectives: This study investigates the association of serum 25(OH)D concentrations with handgrip strength in community-dwelling, right-handed, elderly women without chronic kidney disease and intake of vitamin D supplements, anticonvulsants or cytostatic drugs.

Method / Design: Cross-sectional data of 67 female participants (70–91 years) of the longitudinal study on nutrition and health status in senior citizens from Giessen (GISELA study) were investigated. Serum concentrations of 25(OH)D (immunoassay), handgrip strength (dynamometer), absolute fat-free mass (FFM, bioelectrical impedance analysis), vitamin D intake (3-day estimated dietary record) and lifestyle factors (questionnaire) were assessed. Simple and multiple linear regression analyses were performed with handgrip strength as dependent variable and 25(OH)D as independent variable. Age, FFM, vitamin D intake, time spent outdoors and physical activity were considered as co-variables.

Results: Median (range) vitamin D status and handgrip strength was 41 (13–95) nmol/L and 23 (14–35) kg, respectively. In regression analyses, 25(OH)D was not associated with handgrip strength, neither before (β=–0.140; P=0.259) nor after (β=–0.068; P=0.585) adjustments. The same was true when absolute FFM was replaced by relative FFM, body mass index or waist circumference. Likewise, the results remained essentially unchanged after exclusion of subjects with difficulties in pressing the dynamometer because of arthrosis, trembling or pain.

Conclusions: The present study provides no evidence for a significant association between 25(OH)D concentrations and handgrip strength in community-dwelling elderly women.

Keywords: (maximum 5): 25-hydroxyvitamin D, handgrip strength, muscle function, elderly

149/700. Anti-inflammatory effects of antroquinonol on high-fat-high-fructose diet-induced metabolic syndrome in rats

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Introduction: Metabolic syndrome contributed to the increasing risk of cardiovascular diseases and diabetes, and abdominal fat accumulation and inflammation triggers its progression. Antroquinonol, an bioactive compound derived from the Antrodia cinnamomea, was reported to show anti-inflammation activities.

Objectives: The aim of this study is to investigate the long-term effects of antroquinonol on metabolic disorders and to clarify the possible mechanisms.

Method / Design: Forty male Wistar rats were randomized into four groups: the control group fed with AIN-93M diet, the three experimental groups fed with high-fructose-high-fat diet with 0 (H), 6 (A) or 30 (B) mg/kg-BW antroquinonol for 16 weeks. At the end of the experiment, we measured blood pressure of rats and collected blood, abdominal fat, liver tissues, and feces for analysis.

Results: We found that administration of antroquinonol significantly retarded the elevation of body weight gain, decreased abdominal fat weight and angiotensinogen levels in adipose tissue. The results of homeostasis model assessment insulin resistance (HOMA-IR) and adiponectin/leptin ratio also showed that insulin resistance was improved by antroquinonol. In addition, the two antroquinonol groups also had lower inflammatory cytokines TNF-α, IL-1β and IL-6 levels in liver tissues. Gut microbiome was disturbance in H group. Antroquinonol regulated gut microbial composition. Western blotting analysis of liver revealed that the expression of toll-like receptor 4 (TLR4) and nuclear factor kappa B (NF-kB) tend to be lower in antroquinonol groups.

Conclusions: Antroquinonol may ameliorate inflammation and insulin resistance in metabolic syndrome via TLR4 and NF-kB-dependent pathway.

Keywords: (maximum 5): antroquinonol, metabolic syndrome, abdominal fat, inflammation, toll-like receptor 4

149/704. New approach for personalised nutrition during chemotherapy: chemosensory impairment, dietary habits and lipid biomarkers for nutritional status.

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Introduction: Taste and smell (chemosensory) alterations are common and distressing among cancer patients under chemotherapy treatments. These alterations may affect appetite, food preference, energy intake and significantly affect food enjoyment, leading to a decreased quality of life. The specific nature of these changes are poorly described and seldom linked to dietary intake, biomarkers or to specific chemotherapy treatments.

Objectives: Study of qualitative chemosensory alterations in cancer patients under chemotherapy and its correlation with chemotherapy treatment, dietary habits and molecular biomarkers.

Method / Design: Subjects were recruited from the Oncology Outpatient Unit of Onkologikoa hospital (n=150). Clinical data were obtained from medical records. They were interviewed during their chemotherapy treatments. A questionnaire was designed to assess subjective awareness of taste and smell alterations, including strange tastes, satiety and appetite. General data concerning dietary habits were also collected in a food frequency questionnaire. Membrane lipidome expressed as the fatty acid composition of patients' erythrocyte

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phospholipids was analysed (n=50). A preliminary evaluation of the usefulness of membrane lipidome as biomarker correlated with dietary and chemosensory alterations was performed.

Results: The most common complaints were taste changes (72%), smell changes (44%), bad taste in the mouth (44%) and perception of strange taste such as metallic (41%). Dietary habits and lipidome profiles were for the first time combined with chemosensory data of patients under chemotherapy treatment, evidencing correlations between nutritional elements, molecular status and sensorial alterations.

Conclusions: Combination of qualitative study of chemosensory impairments with quantitative determination of molecular profiles connected to diet and metabolism can provide a multidisciplinary and effective strategy to address oncological patients' needs. This valuable information will help to design specific food products, capable of alleviate symptoms, and above all, prevent malnutrition in a personalised nutrition approach.

Keywords: (maximum 5): chemosensory impairment, malnutrition, cancer, lipidome profile, personalised nutrition.

149/705. Acrylamide and glycidamide hemoglobin adduct levels and risk of endometrial and epithelial ovarian cancer in EPIC

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Introduction: Acrylamide (AA) is classified by IARC as a probable human carcinogen. Four prospective studies have evaluated the association between AA intake and endometrial cancer (EC) risk; and one case-control and four cohort studies have evaluated the association between AA intake and risk of epithelial ovarian cancer (EOC); however inconsistent results have been found for both outcomes. To date, one study has examined the association between AA biomarkers and EOC risk.

Objectives: Evaluate the association between AA and glycidamide (GA) biomarkers and risk of developing EC and EOC in non-smoking postmenopausal women.

Method / Design: Hemoglobin adducts were measured in red blood cells. Four exposure variables were evaluated: hemoglobin adducts of AA and GA (HbAA, HbGA), their sum (HbAA+HbGA), and ratio (HbGA/HbAA). Two nested-case control studies of EC (383 cases, 171 Type1, and 800 controls) and EOC (334 cases, 191 serous, and 800 controls) were performed. The association between adducts and risk was evaluated using multivariable logistic regression models. Exposure variables were analyzed in quintiles or quartiles based on control distributions.

Results: None of the biomarkers variables had an effect on EC risk (overall/Type1), and none of the subgroups investigated demonstrated effect measure modification (EMM). When comparing levels of the highest versus lowest quintile of biomarkers and EOC risk, HbAA, HbGA, and HbAA+HbGA were positively associated [ORQ5vsQ1(95%CI):1.64(1.00-2.69), 2.02(1.22-3.34), 2.14(1.30-3.54), respectively]; however no evidence for monotonic-dose response trends were observed. Evidence for EMM by body mass index was observed for HbAA and HbGA (LRT P-value: 0.02 and 0.04, respectively) and EOC risk. Analyses by alcohol intake did not provide evidence for EMM.

Conclusions: In non-smoking postmenopausal women from the EPIC cohort, no associations between hemoglobin adducts of AA/GA and the risk of EC or Type1-EC were found; however we observed suggestive evidence that biomarkers of AA (i.e.,HbGA) may increase risk of EOC.

Keywords: (maximum 5): acrylamide, glycidamide, hemoglobin adducts, EPIC

149/707. The influence of nutritional program on hormonal and inflammation profile in kidney transplant recipients

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Introduction: In kidney transplant recipient (KTR) inflammation and hormonal disorders are a serious problem that affects nutritional status and graft survival. The influence of a dietary treatment on hormonal and inflammation profile remains unknown.

Objectives: To evaluate the effects of nutritional program (NP) without energy deficit but with modification of dietary intake of protein, saturated fatty acids, cholesterol, sodium, and phosphorus on serum concentration of pituitary-thyroid axis hormones, insulin, growth hormone (GH), insulin-like growth factor – 1 (IGF-1), adiponectin, resistin, renal function and anthropometric parameters in KTR.

Method / Design: 28 KTR with BMI 28.0 ± 3.5 kg/m2, estimated glomerular filtration rate (GFR) 55.0 ± 14.2 ml/min/1.73m2 were

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recruited to NP. The recommended diet included protein 0.9 g/kg of ideal body mass, < 35% of calories from total fat and < 7% from saturated fatty acids, cholesterol < 200 mg/day and phosphorus < 1000 mg/day. Total energy expenditure was calculated as the basic metabolic rate multiplied by the appropriate activity factor. Before and after NP renal function as well as anthropometric, serum hormonal and inflammation parameters were measured.

Results: NP did not cause significant changes in body mass, fat mass, fat free mass and GFR. At the end of NP significant increase in T3 and T4 serum concentration were observed as well as reduction in the serum TNF-alpha level (p=0,005; p=0,005; p=0,045 - respectively). Alterations serum T3, GH, insulin and TNF-alpha concentration correlated negatively with its baseline value (r = -0.415, p = 0.039; r = -0.596, p = 0.002; r = -0.645, p = 0.001; r = -0.545, p = 0.005 - respectively).

Conclusions: Diet with low intake of saturated fatty acids, cholesterol, phosphorus and protein (0,9 g/kg) has a beneficial effect on serum T3, T4, GH, insulin and TNF-alpha level.

Keywords: (maximum 5): diet, cytokines, hormones, kidney transplantation

149/709. Effects of wholegrain rye and wheat on body composition and appetite sensation

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Introduction: Intake of wholegrain products have previously been shown to be inversely associated with weight gain, possibly due to effects on satiety. The high amounts of dietary fiber within wholegrain may play a role. Both composition and amounts of dietary fiber differ between wholegrain types; however, no studies have compared the effects of different wholegrain types on longer-term appetite and body weight regulation.

Objectives: The aim of the study was to compare wholegrain rye (WGR) and wholegrain wheat (WGW) to refined wheat (RW) on changes in appetite sensation and anthropometric outcomes.

Method / Design: The study was performed as a 6-week randomized parallel intervention study with 75 healthy subjects (42 females, 32 males) with a BMI between 25-32 kg/m2. The subjects were randomly assigned to either WGR, WGW or RW, and they substituted all their habitual cereal products with study products provided. At examination days (week 0 and 6), body weight, waist circumference and saggital abdominal diameter (SAD) were measured in the fasting state. Body composition was measured by DEXA. Subjective appetite sensation (hunger, fullness, thirst, prospective food consumption and well-being) was assessed and was measured in the fasting state and every 30 min until 240 min after the breakfast meal, which included the study product, was served. Dietary intake was assessed using a 4-day diet record before each of the two examination days.

Results: We will present results on the effects of different wholegrain types on anthropometric measures, appetite and dietary intake.

Conclusions: This is the first study to provide evidence for a potential difference between wholegrain rye and wheat on body weight regulation.

Keywords: (maximum 5): Wholegrain, wheat, rye, appetite sensation, body weight regulation

149/710. Potential of wholegrain wheat or rye to modify gut microbiota, colonic fermentation and gastrointestinal symptoms

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Introduction: A healthy gut and the microbial community it hosts are increasingly recognized as playing an important role in overall health and quality of life.

Objectives: The objectives of this study are to investigate if wholegrain wheat and rye compared to refined wheat are potential diet changes that can improve gut health and functionality, and if improvements differ between wholegrain wheat and rye.

Method / Design: In collaboration with Lantmännen Cerealia, this researcher-blinded, randomized, three-arm parallel study was carried out in 75 healthy, adult subjects (42 females, 33 males). Within six weeks duration subjects replaced all cereal foods of their habitual diet with provided study products from one of three intervention groups: wholegrain rye (WGR), wholegrain wheat (WGW) or refined wheat (RW). Prior to study start (week 0) and after 6 weeks, subjects collected a stool sample, which was analyzed for pH, short chain fatty acid concentrations and microbiota composition using tag-encoded 16S rRNA gene targeted high throughput amplicon sequencing. At an examination day at week 0 and 6, subjects were served a breakfast test meal consisting of cereals corresponding to their diet intervention group. Breath hydrogen was measured prior to consumption and every 30 min during the subsequent 240 min. A questionnaire about gastrointestinal symptoms, stool frequency and stool consistency was filled in by the subjects in week 0, 2, 4 and 6.

Results: The results presented will provide evidence for a potential beneficial effect of wholegrain consumption on gastrointestinal symptoms and improvement of gut microbiota composition and functionality.

Conclusions: This study will furthermore be among the first to reveal possible differences between wholegrain rye and wheat in their health-promoting effects which may be attributed to differences in content and composition of dietary fiber and other bioactive compounds.

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Keywords: (maximum 5): Wholegrain, Rye, Wheat, Microbiota, Gut Health

149/712. Effect of wholegrain rye vs. wholegrain wheat on markers of cardiovascular disease and type-2 diabetes.

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Introduction: Observational studies suggest an inverse association between wholegrain intake and cardiovascular disease (CVD) risk, and some intervention studies confirm this. Results may differ depending on grain type; however, few studies have investigated whether the effect differs between different types of wholegrains, which may derive from differences in content and composition of dietary fibers and other bioactive compounds.

Objectives: Here, we compare the effect substituting habitual cereal products with either wholegrain wheat (WGW), wholegrain rye (WGR) or refined wheat (RW), on markers of CVD, type-2 diabetes (T2D) and inflammation.

Method / Design: This study was conducted in collaboration with Lantmännen Cerelia. In total, 75 males and females between the ages of 30-65 years, with a body mass index (BMI) of 25-32 kg/m2 and no prior diagnose of CVD and/or T2D were randomized to substitute their habitual cereal products with WGR, WGW or RW products in a 6 week intervention. Fasting blood samples were collected before and after the intervention and analyzed for markers of CVD, T2D as well as inflammation. BMI, blood pressure, 4-day dietary record and assessment of physical activity level was likewise obtained before and after the intervention. Alkylresorcinols was measured in the blood samples to evaluate compliance, alongside the participants' self-reported intake of study products.

Results: We will present results on blood pressure, blood lipids, insulin and glucose following the intervention. Further, high sensitivity C-reactive protein and interleukin-6 will be presented in relation to the possible role of inflammation in the pathogenesis of CVD and T2D.

Conclusions: These results will provide evidence for potential differences between wheat and rye wholegrains in their health-promoting effects.

Keywords: (maximum 5): wholegrain, rye wheat, blood pressure, insulin sensitivity

149/715. Increases in plasma plant sterols stabilize within four weeks of plant sterol intake and are independent of cholesterol metabolism efficiency

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Introduction: Plant sterols (PS) lower LDL-cholesterol through partial inhibition of intestinal cholesterol absorption. This effect occurs rather rapidly and the maximal LDL-cholesterol lowering effect of PS is usually achieved within the first weeks of intake. Although PS themselves are poorly absorbed, increased intakes of PS do result in increased plasma concentrations.

Objectives: This study aimed to investigate the time curve of changes in plasma sitosterol and campesterol during 12 weeks of PS intake. Furthermore, the impact of surrogate markers of endogenous cholesterol synthesis and intestinal cholesterol absorption on changes in plasma PS was investigated.

Method / Design: The study was a double-blind, randomized, placebo-controlled, parallel-group study. After a 4-week run-in period, 240 hypercholesterolemic but otherwise healthy men and women consumed low-fat spreads without or with added PS (3 g/d) for 12 weeks. Blood sampling was performed at week 0, 4, 8 and 12 to measure plasma non-cholesterol sterols and serum lipids. Basal cholesterol-standardized concentrations of lathosterol and of sitosterol+campesterol were used as markers of cholesterol synthesis and absorption, respectively. Plasma PS data were log transformed before statistical analysis. This study was registered at clinicaltrials.gov (NCT01803178).

Results: Plasma PS concentrations were unaltered in the placebo group. In the PS group, plasma sitosterol and campesterol concentrations increased within the first 4 weeks of intervention by 69% (95%CI:58;82) starting at 7.2 µmol/L and by 28% (95%CI:19;39) starting at 11.4 µmol/L, respectively, and remained stable during the following 8 weeks (P-value>0.05). Increases in plasma PS were not significantly different between high and low cholesterol synthesizers (5.9% (95%CI:-4.4;17.3) for sitosterol and -3.6% (95%CI:-12.1;5.7) for campesterol) or between high and low cholesterol absorbers (-4.2% (95%CI:-14.6;7.5) for sitosterol and -0.2% (95%CI:-10.4;11.1) for campesterol).

Conclusions: Increases in plasma sitosterol and campesterol stabilize within 4 weeks of PS intake and are not impacted by cholesterol synthesis or absorption efficiency.

Keywords: (maximum 5): plantsterols, cholesterol, timecurves, absorption, synthesis

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149/718. New insights from EuroDISH mapping of food and health research infrastructure

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Introduction: Recent initiatives have encouraged the formalisation of research infrastructure in Europe. This is designed to unify fragmented facilities, resources and services and facilitate world-class research of complex public health challenges (e.g., related to non-communicable disease).

Objectives: EuroDISH aimed to design a protocol to map the status quo of food and health research.

Method / Design: Research infrastructure was mapped in four areas of food and health research, represented by a DISH model: Determinants of dietary behaviour (D); Intake of foods and nutrients (I); Status and functional markers of nutritional health (S); Health and disease risk of foods and nutrients (H). A common protocol was used throughout to co-ordinate data collection and recording of results for four teams of researchers. The definition of research infrastructure was based upon previous work by ESFRI (European Strategy Forum Research Infrastructures) and MERIL (Mapping European Research Infrastructure Landscape). The study design consisted of desk research, qualitative semi-structured interviews (n=30) and a stakeholder workshop (n=49). Identified research infrastructure was classified using MERIL criteria and thematic qualitative analysis.

Results: Infrastructure in the food and health research area is fragmented and disparate. Difficulties were seen identifying research infrastructure and classifying stages of research infrastructure development. Particular problems were found identifying the degree a project, a network or a national infrastructure could be considered a research infrastructure and establishing the boundary of a research infrastructure (integral hard/soft facilities, resources or services).

Conclusions: A considered approach is required to survey research infrastructure and interpret potential gaps or needs. Transparent, up-to-date information on available research resources, facilities and services is required to keep pace with infrastructure changes and research needs.

Acknowledgements: A Böhm, R Dhonukshe-Rutten, P Finglas, C Hoppe, J Iversen, G Perozzi, K Poppe, N Slimani, H Snoek, P van 't Veer and K Zimmerman.

Keywords: (maximum 5): Nutrition; health determinants; dietary intake; nutritional status; public health

149/725. Dietary intake of vitamin K and risk of prostate cancer in a cohort of U.S. health professionals

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Introduction: Introduction: Growth inhibitory effects of vitamin K on prostate cancer cells have been shown in experimental studies. The association between habitual vitamin K intake and risk of prostate cancer has rarely been investigated. In a prospective cohort study from Germany dietary intake of menaquinones, but not phylloquinone, was associated with reduced risk of advanced prostate cancer.

Objectives: To investigate the association between dietary intake of phylloquinone and menaquinones and risk of prostate cancer in 44,087 men participating in the prospective Health Professionals Follow-up Study.

Method / Design: Dietary vitamin K intake was estimated from food frequency questionnaires administered by the participants every four years between 1986 and 2006 using the US department of agriculture database. Multivariable adjusted hazard ratios (HRs) and 95% confidence intervals (CI) were calculated using Cox Proportional Hazards regression.

Results: Between 1986 and 2010, 6,293 prostate cancer cases were diagnosed (1,034 advanced stage/fatal, 4,585 organ-confined). Higher phylloquinone intake was significantly associated with lower risk of organ-confined prostate cancer (HR 0.90, 95% CI 0.81, 0.99, P-trend 0.003), but not with total (HR 0.96, 95% CI 0.88, 1.04, P- trend 0.15) or advanced/fatal (HR 1.09, 95% CI 0.88, 1.33, P-trend 0.51) prostate cancer. Menaquinones intake was non-significantly associated with a 14% lower risk of advanced/fatal prostate cancer (HR 0.86, 95% CI 0.70, 1.05, P-trend 0.14) but was not associated with total (HR 0.97, 95% CI 0.89, 1.05, P for trend 0.19) and organ-confined prostate cancer (HR 1.01, 95% CI 0.92, 1.12, P-trend 0.57).

Conclusions: In this large prospective US cohort higher phylloquinone intake was associated with a modestly lower risk of organ-confined prostate cancer. Our study does not support the hypothesis that dietary intake of menaquinones is inversely associated with prostate cancer risk.

Keywords: (maximum 5): phylloquinone, menaquinone, prostate cancer

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149/726. Associations between inflammatory parameters and fat-free mass in community-dwelling elderly women from Germany

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Introduction: A decline in fat-free mass (FFM) is commonly observed with increasing age, and may be caused by a variety of factors including hormonal changes, sedentary lifestyle, malnutrition, chronic diseases or subclinical chronic inflammation. The association between inflammatory markers and relative FFM (%FFM) has been rarely studied in consideration of lifestyle and dietary factors in elderly subjects.

Objectives: The aim of this study is to evaluate the relationship between inflammatory markers and %FFM by considering lifestyle and dietary factors.

Method / Design: We analyzed cross-sectional data of 85 women aged 70 to 91 years who participated in the follow-up 2012 of the longitudinal study on nutrition and health status in senior citizens from Giessen (GISELA study) and who did not take rheumatic drugs, cytostatic drugs or corticoids. Plasma concentrations of C-reactive protein (CRP), interleukin-6 (IL-6) and interleukin-10 (IL-10) were measured using enzyme-linked immunosorbent assays. FFM was assessed by bioelectrical impedance analysis. Simple and multiple linear regression analyses were performed with %FFM as dependent variable, and the respective inflammatory marker as independent variable. Age, physical activity, smoking, intake of energy and alcohol were considered as co-variables.

Results: Median (range) %FFM, CRP, IL-6 and IL-10 was 57 (46–75) %, 2.9 (0.3–9.1) mg/L, 35 (23–73) pg/mL and 259 (146–538) pg/mL, respectively. In regression analyses, only CRP showed an association with %FFM before ($\beta=-0.379$, $P<0.001$) and after ($\beta=-0.392$, $P<0.001$) adjustments. After excluding subjects with history of cancer or rheumatism, results remained essentially unchanged. When the cohort was stratified by median body mass index (< vs. ≥ 26.8 kg/m^2), CRP was inversely associated with %FFM in both groups.

Conclusions: In community-dwelling elderly women, CRP concentrations appear to be independently and inversely associated with %FFM. Whether this association is causal or driven by body fat or underlying diseases warrants further investigation.

Keywords: (maximum 5): cytokines, C-reactive protein, body composition, fat-free mass, elderly

149/728. Antagonistic effect of cla isomers on expression of selected cell cycle genes in cancer cells

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Introduction: Our previous studies showed that cis9,trans11 and trans10,cis12 CLA isomers may exhibit a strong tendency towards inhibiting proliferation of breast, prostate and melanoma tumour cell lines. It is suggested that they may reduce tumour growth by regulating cell cycle protein level.

Objectives: The aim of this study was to determine the effect of CLA isomers on expression of selected genes associated with cell cycle regulation: TP53, c-Myc, HIF1 and MEK 1/2.

Method / Design: Experiments were performed with the use human breast cancer cell line T47D (ATCC) treated with CLA isomers: cis9,trans11 and trans10,cis12. Gene expression was determined through RT-qPCR or Western Blot method.

Results: Our study has shown that individual CLA isomers may influence expression of the analyzed genes in various ways. An increase in expression of TP53 gene was observed in the effect of cis9,trans11-CLA treatment, whereas no change in its expression occured if trans10,cis12-CLA isomer was used. In the case of proto-oncogene c-Myc, a significant increase in expression of the mRNA level was observed under the influence of trans10,cis12-CLA isomer in the absence of cis9,trans11-CLA impact. It was confirmed by the activation of MEK 1/2 protein. The trans10,cis12-CLA isomer induced an increase in expression of HIF-1α, simultaneously decreasing expression of mitochondrial DNA. An opposite effect was observed for cis9,trans11-CLA isomer.

Conclusions: CLA as a mixture of cis9,trans11 and trans10,cis12 isomers is commonly used as a dietary supplement. Our studies show that the two isomers have different action mechanisms. Cis9,trans11-CLA isomer has an antitumor effect on breast cancer cell line. In the case of trans10,cis12-CLA isomer, activation of proto-oncogenes was also observed despite high activity of the isomer in inhibition of cancer cells proliferation. This issue requires further study.

This work was supported by the NCN Poland, project no. 2011/03/B/NZ9/01423

Keywords: (maximum 5): CLA isomers, breast cancer, cell cycles, gene

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149/730. Prevalence of disordered eating attitudes and behaviours among Bulgarian adolescents

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Introduction: Eating disorders are severe conditions and early identification can lead to earlier treatment reducing serious physical and psychological complications.

Objectives: To examine the prevalence of adolescents aged 14-18 years in Bulgaria at risk for eating disorders and their relationship to BMI.

Method / Design: In a cross-sectional survey national-representative sample of 1558 schoolchildren aged 14-18 years (822 females, 736 males) was screened for eating disorders (response rate 90%) Eating Attitude Test-26 (EAT-26) was self-administered supplemented by behavioural questions on presence and frequencies of eating disorder symptoms. Weight and height were measured; BMI was assessed using IOTF criteria.

Results: Estimated rate of adolescents at increased risk for an eating disorder was 30% for girls and 15.1 % for boys (20.3% of girls and 8% of boys with scores "positively" on the EAT-26 and additionally 9.7% of girls and 7.1% of boys who met the threshold of one or more of the behavioural criteria). Obsessive dieting mainly contributed to the positive score on EAT-26. Of the girls who scored positively 11.4% reported vomiting or abusing laxatives/ diuretics in the preceding week to control their weight, the prevalence of those boys was 5%. Of the all interviewed females 3.8% reported eating disorder symptoms. At risk for eating disorder were 21.3% of underweighted female and 12.5% of male adolescents, 29% of girls and 14.4% of boys with normal weight, 39.3% of girls and 17.2% of boys with overweight and obesity. Only 1.3% of screened adolescents have been in treatment for eating disorder.

Conclusions: Widespread disordered eating attitudes and behaviours among Bulgarian adolescents of age 14-18 years were identified. Only minority of adolescents received treatment for their eating problems that place screening for eating disorders as important public health concern.

Keywords: (maximum 5): Adolescents, Eating Disorders

149/733. Assessment of nutritional status of elderly hospitalized patients: A comparison with the MNA and GNRI

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Introduction: Malnutrition is a major problem in hospitalized older people. The Mini Nutritional Assessment (MNA) is recommended for assessing nutritional status in the elderly. Another index for predicting the risk of nutrition-related complications, the Geriatric Nutritional Risk Index (GNRI), was recently proposed.

Objectives: This study is aimed to investigate GNRI's ability to assess the nutritional status and its association with the length of hospital stay when compared with the MNA.

Method / Design: Two hundred and eleven 65+ years old patients with cardiovascular diseases were included into the study. Nutritional risk was assessed both with MNA and GNRI. The agreement between the assessment methods was analyzed with Cohen's Kappa test. Multiple logistic regressions were used to determine the association between nutritional risk category and length of hospital stay.

Results: Anthropometry and biochemical parameters were determined in 211 hospitalized elderly 119 males (mean age:73.38±7.29 years) and 92 females (mean age:73.93±6.37 years) with cardiovascular diseases. Nutritional risk and nutritional state were graded by the GNRI and MNA, respectively. According to the GNRI and MNA, the prevalence of high risk (GNRI< 92)/malnutrition (MNA<17), moderate risk (GNRI 92–98)/malnutrition at-risk (MNA 17–23.5) and no risk (GNRI>98)/good status (MNA > 24) were 15.8/8.5 %, 22.2/43.1% and 62.0/48.4 %, respectively, with poor agreement in scoring the patient (Cohen's kappa test: k=0.25; p<0.001) at admission to the hospital, while 23.8/9.5%, 33.2/47.4% and 43.0/43.1%, respectively, with poor agreement in scoring the patient (Cohen's kappa test: k=0.24; p<0.001) at discharge from hospital. MNA also showed a stronger association (OR:3.28, p<0.001) with length of hospital stay than GNRI (OR:2.35, p<0.05).

Conclusions: The GNRI showed poor agreement with the MNA in nutritional assessment and weaker association with length of hospital stay. MNA should be preferred to that of the GNRI for hospitalized elderly cardiovascular patients.

Keywords: (maximum 5): Geriatric Nutritional Risk Index, Mini Nutritional Assessment, Length of Hospital Stay

149/736. Acute coffee consumption does not promote self-reported gastrointestinal disturbances or stress in healthy individuals

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Introduction: Some consumers report that certain types of coffee, particularly cold instant coffee, cause them mild gastrointestinal disturbances. If this holds true, this may be attributed to increased stress response.

Objectives: The purpose of this study was to investigate the acute effects of coffee consumption on self-reported gastrointestinal symptoms, salivary alpha-amylase cortisol and gastrin concentrations, blood pressure and psychometric evaluations.

Method / Design: This was a randomized, single blinded, crossover clinical trial, in which 40 healthy individuals (20 men, 20 women), 20-55 years of age, randomly consumed four 200 ml coffee beverages containing 160mg caffeine (hot and cold instant coffee, cold espresso, hot filtered coffee), one week apart. Completed questionnaires and salivary a-amylase were collected at 0,15,30,60minutes and salivary cortisol were collected at 0,60, 120,180minutes and salivary gastrin were collected at 0,15,30,60minutes after coffee consumption. Blood pressure was measured at the beginning and end of each intervention. ClinicalTrials.gov ID: NCT02253628

Results: Salivary alpha-amylase concentrations increased significantly after coffee consumption at 30 and 60minutes, without differences between coffee types, and did not return to baseline levels at 60minutes in both men and women (all, $p>0.005$). Salivary cortisol decreased significantly 60minutes after coffee consumption and remained lower than baseline, without differences between coffee types in both men and women. All test coffees increased temporarily salivary gastrin concentrations, without differences between and among coffees and between men and women. No differences were found between coffees, in both men and women, for self-reported gastrointestinal symptoms, psychometric indices, and blood pressure.

Conclusions: Acute coffee consumption containing 160 mg caffeine does not promote self-reported gastrointestinal disturbances or stress in healthy men and women, but increases feelings of relaxation, alertness and good mood.

Keywords: (maximum 5): coffee, stress, gastrointestinal disturbances

149/738. Effect of fatty acid extracts from cla-enriched and non-enriched egg yolks on MCF-7 transcriptome profile

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Introduction: Our previous study showed that fatty acid extract obtained from CLA-enriched egg yolks (FA-CLA) suppressed the viability of MCF-7 cancer cell line more effectively than extract from non-enriched egg yolks (FA).

Objectives: In this study, for the first time, we analyzed the effect of those extracts on MCF-7 transcriptome profile, applying the whole human genome microarray assay.

Method / Design: Microarray assay was performed on the human MCF-7 breast cancer cell line. Experiment involved treatment with FA-CLA and FA extracts at the concentrations of 0.5 mg/ml and included negative control (NC) - no treatment or only with the solvent. Transcriptome profiles were analysed with SurePrint G3 Human Gene Expression 8x60K v2 Microarray. The statistical analysis was performed using Gene Spring 12.6.1 software (Agilent, USA). The statistical significance was evaluated with one-way ANOVA and Tukey's HSD Post-hoc test ($p < 0.05$).

Results: Among 160 identified genes differently expressed between all treated groups we determined 34 transcripts, unique only to FA-CLA vs. FA comparison. Within those, 13 genes were uncharacterized in available databases. From the remaining 21 genes we identified 15 that, according to the available data, can be linked to the cancer development and/or progression and which are involved in important cellular processes, including regulation of cell cycle, apoptosis or cell metabolism.

Conclusions: Microarray results do not give a clear answer whether CLA-enriched egg yolk could be used, as a functional food, in the cancer prevention. However, our data provides a valuable basis for further research, especially regarding reduced cancer cells proliferation and simultaneously increased mRNA expression of the gene members of mTOR pathway.

ACKNOWLEDGMENTS: This work was financed by the 2012–2015 Polish National Science Center grant no. DEC-2011/03/B/NZ9/01423.

Keywords: (maximum 5): conjugated linoleic acid, CLA-enriched egg yolks, MCF-7, transcriptomic profile, microarrays.

149/744. Nuts and seeds intake and pancreatic cancer risk in the EPIC cohort

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Spain.

Introduction: Nuts and seeds contain many potentially beneficial bioactive compounds that may influence obesity- and diabetes-related cancers such as pancreatic cancer (PC). The Nurses' Health Study (NHS) examined the association between nut consumption and total and cause-specific mortality, and observed inverse association with total mortality among both men and women. Additionally, the NHS prospectively evaluated the association between nuts consumption and PC risk, and concluded that nut consumption was inversely associated with PC risk.

Objectives: Evaluate the association between nuts and seeds intake and PC risk. Secondary objectives were to determine whether this association differed by smoking status, diabetes, body mass index (BMI), and fruits and vegetables intake.

Method / Design: This study was carried out in the European Prospective Investigation into Cancer and Nutrition (EPIC) cohort with a mean follow-up of 11 years, and 865 incident PC. Multivariate Cox proportional hazards models were used to assess the association between nuts and seeds intake and PC risk. Nuts and seeds intake was evaluated both as a continuous variable (per30g/day) and as a categorical variable (non-consumers as a reference group, and consumers were divided into quartiles).

Results: An inverse association was observed between high nuts and seeds intake and PC risk (HRQ4vsNon-consumers:0.73,95% CI:0.56-0.96); however, no evidence for a linear dose-response trend was observed. The same pattern was observed when we additionally adjusted for a Mediterranean diet score, and when we excluded the first two years of follow-up. The continuous variable was non-significant inversely associated (HR:0.78,95%CI:0.56-1.09).There was no effect measure modification by gender, smoking status, diabetes, and BMI.

Conclusions: A slight reduction in PC risk with high consumption of nuts and seeds was observed; however, no evidence for a monotonic dose-response was found. Further studies of the association between nuts and seeds (with consideration of nut/seed types) should be carried out

Keywords: (maximum 5): nuts, pancreatic-cancer, EPIC, cohort

149/745. Bioactive compounds content in leaves of buckwheat

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Introduction: Plants which contains bioactive compounds, especially antioxidants are important part of human daily diets. The buckwheat leaves can be a good source of these compounds.

Objective: The objective of this studies was assessment of polyphenolic compounds content, antioxidant activity as well as the level of dietary fibre in leaves of different varieties buckwheat.

Objectives: The objective of this studies was assessment of polyphenolic compounds content, antioxidant activity as well as the level of dietary fibre in leaves of different varieties buckwheat.

Method / Design: Leaves have been obtained from field experiment conducted inplant breeding and seed production company Małopolska Hodowla Roslin, Poland. The following genotypes were evaluated DW-15, Japan 18, Japan 8 Geihoku, Japan 8, DWO- dwarf, and 12011/00197. Leaves have been collected in 2011and naturally dry. In dry leaves the concentration of dietary fiber were analyzed. From leaves methanolic and water extracts were prepared to evaluate the content of polyphenolic compounds and ability to extinguish an ABTS•+ free radical.

Results: The highest content of dietary fiber was measured in leaves of genotypes DW15, Japan 8 Geikhoku as compared to the other leaves with exception of leaves of genotype DWO - dwarf. The highest concentration of polyphenolic compounds in methanol and water extract was measured in genotype Japan 8 and DWO - dwarf as compared to the other genotypes. The highest ability of to scavenge ABTS•+ free radical in water extract had genotype Japan 8 compared to other genotypes with exception of variety DWO - dwarf.

Conclusions: Due to the high content of bioactive components buckwheat' leaves can be used for the production of functional food especially drinks.

The study was financed by Ministry of Science and Higher Education grant no. DS3700/WTZ/2011-2012

Keywords: (maximum 5): bioactive compounds, buckwheat, leaves

149/750. Prospective association between cardiovascular disease risk and an individual dietary index based on the British FSA-NPS

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Introduction: Although individual-based strategies can successfully improve an individual's diet quality, public health strategies are essential to produce a substantial and sustained population impact. They include providing to the consumer nutrition information

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to help in making informed choices. Several nutritional food labeling systems have been proposed to fulfil this purpose, among which the Food Standard Agency-Nutrient Profiling System (FSA-NPS).

Objectives: Our aim was to prospectively investigate the association between the Food Standards Agency Nutrient Profiling System Dietary Index (FSA-NPS DI) score and cardiovascular diseases (CVDs) risk.

Method / Design: 6515 participants to the SU.VI.MAX cohort (1994-2007), who completed at least six 24h dietary records during the first 2y of the study, were followed-up for 11.2 years. Multivariate Cox proportional hazards models (Hazard ratios and 95% confidence intervals) were used to characterize the associations between the FSA-NPS DI score, computed for each subject (higher values representing lower nutritional quality of the diet) and the incidence of CVDs.

Results: 181 major cardiovascular events were reported (59 myocardial infarctions, 43 strokes, 79 anginas). Poorer nutritional choices, characterized by higher FSA-NPS DI, was associated with an increased overall cardiovascular disease risk (HRfor a 1-point increment=1.14 (1.03-1.27); HRQ4vs.Q1=1.61(1.05-2.47); Ptrend Q1–Q4=0.03). This association tended to be more specifically observed in subjects with higher cardiovascular risk such as currents smokers (HRfor a 1-point increment=1.39 (1.11-1.73), Pinteraction=0.01) and those less physically active (HRfor a 1-point increment=1.26 (1.08-1.46), Pinteraction=0.04).

Conclusions: Our results suggest that the FSA-NPS DI score is associated with a higher risk of developing a CVD. This score could therefore be a useful tool in public health prevention strategy.

Keywords: (maximum 5): Cardiovascular risk, FSA-NPS, Nutrient Profiling System, Nutrition policy, Prospective study

149/751. Effect of a novel functional food on satiety and postprandial glucose concentrations in healthy adults

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Introduction: Novel functional foods that may affect satiety and postprandial normoglycaemia are of great importance.

Objectives: To investigate the hypothesis that consumption of a novel food made with carob flour and honey as a snack before a meal, compared to a isoenergetic cookie will: a) have a significant effect on satiety, b) will reduce appetite for dessert after lunch and c) will cause lower postprandial glycemic response.

Method / Design: Fifty healthy, normal body weight volunteers participated in this randomized cross-over design trial. All volunteers consumed breakfast (60g white bread with 30g honey) after 12hr fast. After 2hrs all volunteers consumed one of two snacks (carob and cookie) on two different days, one week apart. After 3hrs volunteers consumed ad-libitum lunch (chicken, rice) and dessert (chocolate cake). Finger-prick glucose was measured at fasting state, 120minutes after breakfast and before snack, 120minutes after snack, before lunch, 60 and 120minutes after lunch. Satiety was assessed with food weighing. Subjective appetite and satiety were assessed with visual analogue scales before snack and for every 45minutes up to 180minutes after snack and lunch.

Results: Volunteers who consumed the carob snack consumed significantly smaller quantity of rice (34g, p=0.037), without differences in the total energy consumed, and reported increased satiety and lower hunger only at 45minutes after snack consumption. Volunteers who consumed the carob snack had significantly lower postprandial glucose concentrations 120minutes after lunch (p=0,008).

Conclusions: Because the snacks were isoenergetic we hypothesize that the decreased carbohydrate consumption during lunch, the acute increased satiety and the second meal phenomenon observed after the carob snack, may be due to its high content of soluble fiber. Functional foods made with carob flour and honey may aid in satiety and lower postprandial glycemic response beyond their nutrient content.

Keywords: (maximum 5): snack, carob, functional food, second-meal phenomenon, glucemic response

149/753. Sweet beverage intake and type 2 diabetes

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Introduction: Substantial observational evidence supports a link between consumption of sugar-sweetened beverages (SSB), including soft drinks and cordials, and type 2 diabetes (T2D). Evidence for artificially-sweetened beverages (ASB) and juice is more limited and, little is known about the association of other SSB such as sweetened tea, coffee, and milk beverages with T2D. Although reducing SSB consumption is recommended, suitable alternatives have not been evaluated.

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Objectives: To evaluate the association of types of SSB (soft drinks, sweetened-milk beverages, sweetened tea/coffee), ASB, and juice and the contribution of sweet beverages to energy intake, with incident T2D and, determine the effects of substituting non-SSB for SSB and the population attributable fraction of T2D due to sweet beverages.

Method / Design: Beverage consumption was assessed using 7-day food diaries in the EPIC-Norfolk Study, UK (n=25639 adults). During 10.8 years follow-up, 847 T2D cases were verified.

Results: In adjusted Cox regression analyses there were positive associations [hazard ratio (HR)(95%CI) per serving/day] for soft drinks, 1.21(1.05,1.39), sweetened-milk beverages, 1.22(1.05,1.43), and ASB, 1.22(1.11,1.33) but not sweetened tea/coffee, 0.98(0.94,1.02) juice, 1.01(0.88,1.15). Further adjustment for adiposity attenuated the association of ASB, 1.06(0.93,1.20). There was a positive dose-response relationship with total sweet beverages (HR per 5% energy, 1.18(1.11,1.26). Substituting ASB for any SSB did not reduce incidence, after accounting for energy intake and adiposity. Substituting one serving/day of water and of unsweetened tea/coffee for soft drinks and for sweetened-milk beverages each reduced incidence by 14%. If sweet beverage consumers reduced intakes to 2% energy, 15% of incident diabetes might be prevented.

Conclusions: Consumption of soft drinks, sweetened-milk beverages and energy from total sweet beverages were associated with higher T2D risk. Water or unsweetened tea/coffee appear to be suitable alternatives to SSB for diabetes prevention. These findings support implementation of population-based interventions to reduce SSB consumption and increase consumption of suitable alternatives.

Keywords: (maximum 5): diabetes, beverages, population impact

149/754. Heme iron intake is positively associated with metabolic syndrome

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Introduction: Iron overload has been associated to the formation of reactive oxygen species that causes DNA damage and lipid peroxidation. Evidences from epidemiological studies suggest that heme iron intake may be related to chronic diseases, especially metabolic syndrome (MetS), but this association is not yet clear.

Objectives: To investigate the associations of heme iron, nonheme iron and total iron intake with MetS.

Method / Design: Cross-sectional population-based survey performed in 2008 which enrolled 561 adults and elderly living in the urban area of São Paulo, Brazil. Sociodemographic, lifestyle, anthropometric, biochemical and blood pressure data were collected at the household. Dietary intake was measured by two 24-hour dietary recall collected on non-consecutive days. The nutrients were adjusted for energy and usual intake was estimated using the Multiple Source Method (MSM). Metabolic syndrome was characterized by the presence of at least three of the following: hypertension, hyperglycemia, dyslipidemia and central obesity. Association between heme iron, nonheme iron, total iron intakes and metabolic syndrome was performed using logistic regression. The model was adjusted for sex, age, alcohol consumption, per capita family income, smoking, race, body mass index, physical activity, high-sensitivity C-reactive protein and energy, saturated fat and vitamin C intakes. All analyzes considered the complexity of the sample design.

Results: Individuals with higher heme iron intake (fifth quintile) were positively associated with MetS when compared to those of the first quintile (OR= 2.39, 95% CI= 1.10-5.21). This association was not observed when analyzed the nonheme iron intake. Total iron intake in the fourth quintile was inversely associated with MetS when compared to reference quintile (OR= 0.50; 95% CI= 0.26-0.95).

Conclusions: This study showed positive association of heme iron intake but not of nonheme iron and total iron intakes with MetS, after adjusting for demographics and behavioral confounders.

Keywords: (maximum 5): Iron, Diet, Metabolic syndrome, Health survey

149/757. Intake of antioxidant micronurients and hepatocellular carcinoma risk within the epic cohort

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Introduction: Higher consumption of fruits and vegetables has been suggested to be inversely related to hepatocellular carcinoma (HCC), the most common liver cancer, although the evidence is stronger for the latter. One suggested mechanism may pertain to antioxidant properties of some fruit and vegetable components.

Objectives: The aim was to investigate HCC risk associations between antioxidant micronutrients: β-carotene, ascorbic acid and tocopherol.

Method / Design: Within European Prospective Investigation into Cancer and Nutrition Cohort (EPIC) of >520,000 participants

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from ten countries, 191 HCC cases were identified after eleven years of follow up. Habitual diet was assessed by validated country-specific dietary questionnaires from which antioxidant vitamin intakes were estimated using the EPIC Nutrient Database. Crude and multivariable (adjusted for relevant confounders) Cox regression models were used to estimate hazard ratios(HR) and 95% confidence intervals(CI) for HCC risk, comparing lowest versus higher levels of intake.

Results: In crude models, higher intakes of β-carotene showed an inverse HCC risk association, which was no longer statistically significant after multivariable adjustment. Intakes of ascorbic acid and tocopherol were not associated with HCC risk in either crude or multivariable models. A combined variable of all three vitamins demonstrated a statistically non-significant inverse association (HR highest vs. lowest quartile HR=0.64, 95%CI:0.27-1.52).

Conclusions: Dietary intakes of β-carotene, ascorbic acid and tocopherol do not appear to be HCC preventive. However, given the known measurement errors with dietary intake and nutrient assessments, it may be prudent for future studies to assess blood levels of these and other important antioxidant nutrients.

Keywords: (maximum 5): hepatocellular carcinoma risk, prospective cohort, antioxidants, vitamin intake

149/759. Determination of waist/hip ratio and related factors in Turkish adult males living in Konya

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Introduction: Although Body Mass Index (BMI), is a good indicator of total fat content, it does not provide complete information regarding its distribution in the body. Fat accumulated in abdominal area poses higher health risks. For optimal health, recommended waist/hip ratio defined by WHO is <0.90 for males and <0.85 for females. Prevalence of hypertension, hypertriglyceridemia, hyperinsulinemia, and glucose intolerance were demonstrated to be higher in individuals with high waist/hip ratio.

Objectives: This study was conducted to determine the waist/hip ratio and related factors in Turkish adult males living in the city center of Konya province.

Method / Design: 1330 individuals aged between 18-70 years were randomly selected from males who approached the family health centers for any reason and were included into the scope of the study. Research datas were collected by face to face interview using a questionnaire prepared by the researchers based on literature review. Means, standard deviations, percentages and t-test were used for data analyses.

Results: Mean age of participants was 45.42 ±15.5 years and 38.8% were primary or secondary school graduates. 75% had a BMI of ≥ 25 and 74.4 % stated that they did not engage in any kind of sports activity. 41.7 % mentioned that they suffered from at least one chronic disease. Mean waist and hip circumferences was determined to be 97.75±13.5 cm and 104.73±9.9 cm respectively. Waist/hip ratio was determined to be 0.933±0.08. The difference between waist/hip ratio of individuals who engaged in sports activities and those who did not, were not significant (p>0.05). However, waist/hip ratio had a significant relation with BMI (p<0.0001). Waist/hip ratio of individuals with at least one chronic disease was also found to be significantly higher from the ones who did not (p<0.0001).

Conclusions: Public awareness on this topic must be increased through educational programs.

Keywords: (maximum 5): BMI, waist hip ratio, chronic diseases

149/768. Association between maternal protein intake and inflammatory markers during pregnancy.

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Introduction: Limited knowledge exists about diet induced inflammation during pregnancy.

Objectives: Our objective was to examine the association between maternal diet and inflammation in healthy pregnant women.

Method / Design: A cohort of Danish women who gave birth in 1988-89. From a total of 965 women recruited, 671 women reported their diet (food frequency questionnaire, combined with a face-to-face-interview), provided a blood sample in week 30 of gestation and had complete information on pre-pregnancy weight and weight gain up to week 30 of gestation. Multivariate regression models were used to examine the associations between maternal diet and inflammatory markers.

Results: The mean total energy intake was 8.5 MJ/d. The mean carbohydrate intake was 246 g/day (51E%), fat intake 69 g/dag (31E%) and protein intake 78 g/day (16E%) (animal protein 53 g/day (11E%) and plant protein 22 g/day (5%E)). When examining the relationship between maternal intake of macronutrients and concentrations of inflammatory markers, adjusted models showed that both serum C-reactive protein (CRP) (95% confidence interval (CI; 0, 10) and serum amyloid A (SAA) (95%CI: 1, 10) increased by 6% per 10g increase in total protein intake. Further analyses showed discrepancies between different types of proteins. As an example, each 10g increase in animal protein was associated with 6% higher CRP (95%CI: 0.4, 11) and SAA levels (95%CI: 1, 10). By contrast, each 10g increase in plant prote-

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ins was associated with 25% lower CRP levels (95%CI: -38, -11) and 13% lower SAA levels (95%CI: -24, -01). Additional adjustment for gestational weight gain did not substantially attenuate the observed associations. Fat intake, glycemic index and glycemic load were not significantly associated with these inflammatory markers.

Conclusions: High animal protein intake during pregnancy may have pro-inflammatory effects; by contrast, plant protein intake was negatively associated with inflammation.

Keywords: (maximum 5): Inflammation, protein intake, C-reactive protein, Serum amyloid A.

149/769. Associations between food, macronutrient intake, and obesity-related biomarkers in healthy children and adolescents

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Introduction: The obesity prevalence in children and adolescents has increased worldwide during the past 30 years. The metabolic consequences of childhood obesity have been demonstrated and obesity-related biomarkers have been classified. Identifying associations between dietary factors and such biomarkers could help to detect nutrition-related metabolic changes early in life.

Objectives: We aimed at identifying dietary factors, which were associated with obesity-related biomarkers in healthy children and adolescents aged 3-18 years.

Method / Design: A systematic literature review following the PRISMA Statement was conducted to identify eligible studies, which examined associations in children and adolescents between the intake of foods or macronutrients and 13 obesity-related biomarkers (e.g., blood glucose, insulin, blood lipids). Our search in Pubmed / Medline resulted in 2,053 hits. After the selection process 69 articles were included, reporting 926 single observations on dietary factors and biomarkers.

Results: We included 55 articles from cross-sectional studies and 14 articles from longitudinal studies. Quality assessment revealed most articles to be of moderate quality (n = 45; low: n = 25; high: n = 3). Overall, 80.6% of the observations showed no association between dietary factors and the selected obesity-related biomarkers. Considering biomarkers separately most associations (36,5%) were found for C-reactive protein (total n = 52), while for all other biomarkers associations were below 30%.

Conclusions: The studies included do not support associations of dietary factors with most of the obesity-related biomarkers in the age group of children and adolescents. One explanation might be that the markers explored are not appropriate to indicate early metabolic changes due to dietary intake. Problematic is the moderate and low quality in the majority of studies. Therefore, besides better controlling for potential confounders, the development of novel methods to assess dietary intake may be useful to draw clear conclusions in future studies.

Keywords: (maximum 5): food intake, biomarkers, obesity, children, adolescents

149/772. Cocoa flavanols increase cerebral haemoglobin levels acutely during cognitive task performance in healthy young adults

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Introduction: Consumption of cocoa flavanols (CF) has been shown to increase flow-mediated vasodilation, and cerebral blood flow/velocity as measured by arterial spin labelling and transcranial doppler acutely at rest. Acute effects on cognition following ingestion of CF have also been shown during performance of mentally demanding tasks.

Objectives: The present randomised, placebo-controlled, double-blind, counterbalanced-crossover study investigated the acute effect of CF consumption on cognition, mental fatigue and cerebral blood flow during completion of a 30 minute version of a mentally demanding paradigm.

Method / Design: Twenty healthy, young, adults consumed a cocoa drink containing 500 mg CF or a matched control in a counterbalanced order. Cognition and mental fatigue were assessed with a shortened version of the Cognitive Demand Battery previously shown to be sensitive to CF supplementation in its 60 minute form. Tasks were completed at baseline and following a 60 minute absorption period. Changes in oxygenated and deoxygenated haemoglobin were monitored throughout via near infrared spectroscopy (NIRS), with their combined total providing a proxy for cerebral blood flow (CBF).

Results: Compared to placebo, the consumption of 500 mg CF significantly increased deoxygenated and total haemoglobin levels throughout a 60 minute absorption period and during task completion, with more pronounced elevations during cognitive tasks. No effects on cognition or mental fatigue were observed. In addition, no positive correlations between CBF and behaviour were observed following CF.

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Conclusions: These findings demonstrate the ability of CF to increase CBF during performance of cognitive tasks. Replication of previously identified cognitive effects was not achieved. The present results suggest that previously demonstrated improvements to cognition and mental fatigue following CF consumption may not be related to increases in CBF parameters. It is also possible that behavioural effects may only become apparent following prolonged task completion, when neural resources are depleted.

Keywords: (maximum 5): Cocoa, Flavanol, Cerebral Haemodynamics, Cognition

149/775. Pubertal flavonoid intake from fruit and vegetables in relation to adult type 2 diabetes markers

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Introduction: Flavonoids may be responsible for the benefits of a diet rich in fruit and vegetables in preventing type 2 diabetes. Precise estimation of flavonoid intake from fruit and vegetables (FlavFV) is hampered by reliance on self-reports and flavonoid content databases.

Objectives: This study aimed to explore the prospective association of FlavFV intake during puberty with type 2 diabetes markers in younger adulthood using both dietary records and an urinary exposition biomarker.

Method / Design: The analysis included healthy participants from the DONALD Study who had provided a fasting blood sample in adulthood (18-39 y) with measurements of homeostasis model assessment insulin resistance (HOMA-IR), alanine aminotransferase (ALT), and γ-glutamyltransferase (GGT). Habitual FlavFV intake during puberty (girls: 9-15 y, boys: 10-16 y) was estimated by a minimum of two 3-d dietary records (n=259) and by urinary excretion of the exposition biomarker hippuric acid (HA) from at least two 24-h urine samples (n=222).

Results: Higher urinary excretion of HA in puberty was associated with lower values of adult GGT (P for trend = 0.0005) and ALT (P for trend = 0.009) in multivariable regression models adjusted for relevant confounders. Predicted mean values (95%-CI) in tertiles of HA excretion were 14.8 (12.7 – 17.3), 12.6 (10.9 – 14.4) and 11.6 (9.9 – 13.6) for GGT and 22.7 (20.2 – 25.6), 19.8 (17.9 – 22.0) and 19.8 (17.6 – 22.4) for ALT. A similar tendency was found for adult HOMA-IR (P for trend = 0.08). FlavFV intake estimated by dietary records was not related to the analysed adult markers (P for trend > 0.05).

Conclusions: A possible beneficial effect of pubertal FlavFV on adult type 2 diabetes markers was revealed on the exposition biomarker level only.

Keywords: (maximum 5): biomarker, flavonoids, type 2 diabetes risk markers, urinary hippuric acid

149/776. Searching for triggers that increase risk of malnutrition in community-dwelling older adults with Alzheimer's disease

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Introduction: Home-dwelling older adults (OA) with Alzheimer's disease (AD) frequently have a poor diet and manifest food-related problems, even in early stages of the disease. Although seniors with compromised cognition are followed at outpatient memory or geriatric clinics, nutritional assessment is rarely done.

Objectives: : To identify triggers of risk factors for malnutrition in this population to permit development of a clinical tool.

Method / Design: A three-stage search of scientific and 'grey' literature targeting OA with early-stage AD was carried out. This included 1) a literature review on nutrition problems in this clientele to determine which aspects of malnutrition or undernutrition are most linked to morbidity or mortality; 2) a review of nutrition screening tools to characterise parameters for assessment of nutritional risk and nutritional status; and 3) a second literature review to pinpoint "short-term dietary solutions" for handling eating and/or nutrition problems.

Results: Some 80 articles and reports were found and read. The literature was systematically reviewed and findings were summarised and organised in Excel files in order of importance. This was done both as a function of the criteria identified as having an impact on morbidity and mortality and in relation to the categories of recommendations ascertained as short-term dietary solutions for handling nutrition problems. The tool was constructed, and a preliminary version was evaluated by three groups of clinician experts (10 physicians, 10 nurses, and 10 dietitians) in a two-stage Delphi consultation.

Conclusions: The triggers recognised as malnutrition risk factors were used to develop a clinical tool to alert health care professionals and family caregivers to reversible food, nutrition, behavioural,

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functional and living situation problems in the AD patient, and to the appropriate action which will allow the individual to remain at home as long as possible.

Keywords: (maximum 5): older adults, nutrition risk, malnutrition, Alzheimer's Disease, clinical tool

149/784. Role of diet, physical activity and media in body size and dissatisfaction in Ghanaian adolescents

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Introduction: A factor that can contribute to the risk of obesity is body dissatisfaction, possibly by changes in dieting behaviours and physical activity levels. The media might play a critical role in body size dissatisfaction especially during the vulnerable phase of adolescence. Almost no research has been done on body size perceptions in African adolescents.

Objectives: We will test the relationship of body size perception and dissatisfaction with physical activity level, eating pattern, eating behaviour and media influence.

Method / Design: This is a cross-sectional study in 370 adolescents 11-18yr from Ghana. Questionnaires were administered to obtain information on body size perceptions (via Stunkard figures), physical activity (by IPAQ), eating behaviour (by EAT26), diet and quality (by FFQ) and media (by SATAQ). Dissatisfaction scores were calculated from current body size and ideal body size. Analyses were adjusted for age, sex and socioeconomic status.

Results: 8.1% of participants reported their ideal body size to be underweight, 63.5% as normal body size and 28.4% as the obese body size. 41.6% found their body too small and 18.4% found their body too large. Participants whose ideal body size was normal had higher physical activity levels compared to their obese counterparts. A significant difference in dieting was obtained in relation to ideal body size: participants who considered the underweight body size as ideal were more involved in dieting behaviours compared to those who considered the normal or overweight body size to be ideal. These factors were not associated with diet quality. Adolescents that found their body too large reported higher media pressure and general internalization.

Conclusions: A small body size as the ideal was associated with more dieting and physical activity. This dieting might have negative health implications. The media is important influencing this type of distorted body image.

Keywords: (maximum 5): body dissatisfaction, dieting, diet quality, physical activity, media influence

149/786. Fermented dairy intake and association with anthropometric profile in Russian adults: RLMS-HS

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Introduction: Fermented dairy products comprise a large food group in Russia and are an important source of dietary nutrients like protein, calcium, fat. Obesity is a rising public health issue in Russia. Observing the role of fermented dairy in the maintenance of healthy weight is important.

Objectives: To explore the association between obesity prevalence and fermented dairy products consumption in Russian adults.

Method / Design: Dietary intake (single 24h recall) and anthropometric measures were obtained for 72,400 adults (≥19 y.o.) from RLMS-HSE 1994-2012 study. Logistic regression models were used to explore the relationships between fermented dairy products consumption and obesity prevalence (BMI >30.0 compared with 18.5-25.0), controlling for age and gender.

Results: Daily average intake (g/day) of yogurt, kefir and curd significantly increased from 1994 to 2012, local fermented drinks remained stable. Kefir intake was higher among men, whereas yogurt and curd consumption were significantly higher among women. Over 40 y/o, for both gender, kefir and curd consumption increased while yogurt consumption decreased. Sum of fermented dairy intake (kefir, yogurt, local fermented drinks) was inversely associated with obesity prevalence (OR 0.78, CI 0.62-0.97, P=0.032) in men. Among women, a significant inverse association was observed between yogurt consumption and obesity (OR 0.75, CI 0.60-0.93, P=0.012), curd consumption and obesity (OR 0.80, CI 0.73-0.87, P<0.001).

Conclusions: The observed association between fermented dairy intake and lower prevalence of obesity is dependent on the type of product consumed and gender: yogurt and curd were associated with lower obesity prevalence in women, while in men we observed comparable results only when considering the sum of fermented dairy products.

Keywords: (maximum 5): ADULTS; DIETARY INTAKE; FERMENTED DAIRY; OBESITY.

149/787. Intermediate results of the "EPODE for the Promotion of Health Equity" (EPHE) project.

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Introduction: Evidence shows that casual pathways of the social gradient in obesity can be related to a social gradient in several determinants of obesity. Health equity has become a top priority for the European Commission and policy agendas.

Objectives: In response, in 2012 the EPHE (EPODE for the Promotion of Health Equity) project was launched, to analyze the added value of Community-Based Programmes, based on EPODE methodology, for the reduction of socioeconomic inequalities in health-related diet and physical activity behaviours of families in 7 European communities. This paper shows the results of the intermediate phase of evaluation to identify decreased or closed inequity gaps in behaviours and determinants between groups with high and low socio-economic status after tailored intervention.

Method / Design: Seven European countries participate in the EPHE project. The follow-up cohort consisted of 1062 children aged 7-9 years and their parents (16% loss), from different socio-economic backgrounds. To measure the energy balance-related behaviours of the children and their determinants, a self-administrated questionnaire was addressed to the parents. The Mann-Whitney U test and Pearson's $\chi 2$ test were used to test differences between the socio-economic groups.

Results: The preliminary analysis indicated that inequities in screen exposure have been closed in the majority of the countries, whereas in soft drinks- and fruit and vegetables consumption in some countries. The close of inequity gaps was mainly due to improvement in behaviours of the low socio-economic status groups. Inequity gaps related to parental rules have been closed in many countries, but not related to home availability. The data analysis is still in process.

Conclusions: Our findings show that socio-economic inequities in energy-balance related behaviours and related determinants were closed in our follow-up cohort after tailored community-based interventions. Community-Based interventions based on the needs of the low socio-economic status groups are recommended.

Keywords: (maximum 5): health promotion, obesity, equity, community-based, EPODE

149/789. Higher dietary protein intake in infancy is associated with increased growth and fat-mass in childhood

Author(s): (1) Kim Braun; (2) Trudy Voortman; (3) Nicole Erler; (4) Vincent Jaddoe; (5) Edith van den Hooven; (6) Oscar H. Franco.

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Introduction: High protein intake in infancy might lead to a higher BMI in childhood. However, not much is known about different protein sources, or whether body fat or lean mass are affected.

Objectives: To explore associations between total, animal, and vegetable protein intake at 1 year and repeatedly measured growth until 6 years of age.

Method / Design: This study was performed in 3,564 children participating in the Generation R Study, a population-based prospective cohort study. Protein intake at 1 year was assessed using a semi-quantitative FFQ and was adjusted for energy intake. Height and weight were measured around the ages of 14, 18, 24, 30, 36, 45, and 72 months (6 years). Fat and lean mass were measured at 6 years using DXA. We calculated age- and sex-specific standard deviation (SD) scores for height, weight, BMI, fat-mass index (FMI), and fat-free mass index (FFMI).

Results: After adjustment for confounders, linear mixed models showed that a higher protein intake was associated with a higher weight and BMI at 14, 18, 24, 30, 36, 45 months and 6 years. Linear regression models showed that an increase of 10 g/d in total protein intake at 1 year was associated with a 0.09 SD higher height (95%CI 0.03;0.15), 0.10 SD higher weight (95%CI 0.05;0.16), 0.07 SD higher BMI (95%CI 0.02;0.12), and 0.06 SD higher FMI (95%CI 0.01;0.11), but not with FFMI at 6 years. Associations were slightly stronger for animal than for vegetable protein intake.

Conclusions: In this population of children, higher protein intake in early life was associated with a higher height, body weight, and BMI in childhood. The increase in BMI was fully explained by an increase in fat mass rather than lean mass. Future studies should investigate if protein intake in early childhood affects body composition and health later in life.

Keywords: (maximum 5): protein, infancy, growth, cohort.

149/794. Vitamin D deficiency in a multiethnic cohort of young children: Determinants and associations with cardiometabolic health

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Introduction: There is concern about a reemergence of vitamin D deficiency in children.

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Objectives: To describe vitamin D status and its determinants in a large multiethnic cohort of young children in the Netherlands; and to examine its associations with cardiometabolic health.

Method / Design: We measured serum 25-hydroxyvitamin D (25(OH)D) levels in 4,167 children at the age of 6 years, and we classified vitamin D status into optimal (25(OH)D≥75 nmol/L), sufficient (50 to <75 nmol/L), and deficient (<50 nmol/L). At the same age, children's body fat percentage (using DXA), blood pressure, blood lipids, and insulin levels were assessed.

Results: Serum 25(OH)D levels ranged from 4 to 211 nmol/L (median 64 nmol/L); 33.7% of the children had optimal vitamin D levels and 29.8% were vitamin D deficient. Prevalence of deficiency was higher in winter (51.3%) than in summer (10.3%); and was higher in non-Western children (54.5%) than in those with a Western ethnic background (17.6%). Other determinants of vitamin D deficiency in multivariable models included lower diet quality, more television watching, less playing outside, lower family income, and higher maternal BMI. After adjustment for confounders, vitamin D deficient children had 0.12 SD (95%CI 0.03;0.22) higher insulin levels; and vitamin D deficient girls, but not boys, had a 0.17 SD (95%CI 0.02;0.31) higher body fat percentage than those with optimal vitamin D levels. Vitamin D status was not associated with blood pressure or blood lipids.

Conclusions: Suboptimal vitamin D status is common among young children in the Netherlands. Important modifiable risk factors were low diet quality, sedentary behavior, and less playing outside. Vitamin D deficiency was associated with higher insulin levels and in girls with a higher body fat percentage. Future studies are needed to examine whether prevention of vitamin D deficiency in childhood improves later health outcomes.

Keywords: (maximum 5): 25-hydroxyvitamin D, vitamin D deficiency, children, obesity, cardiometabolic health

149/800. Cognitive performance impairment among obese children age 5-6 years old

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Introduction: Child obesity is emerging worldwide. The examination on the linkage between obesity and cognitive performance among children is limited.

Objectives: The focus of this study was to determine whether the obesity influence the child cognitive performance or not.

Method / Design: A cross-sectional study was conducted among 226 children age 5-6 years old who lived in Bogor, West-Java, Indonesia to identify the linkage between the nutritional status (using BMI for age z-score: N normal=163; obese=60) and some cognitive performance indicators (IQ, EQ, learning, and memory ability (using Projective Multi-phase Orientation method with Weschler scale).

Results: It was revealed that the memory ability score of obese children was significantly lower than the normal children (obese = 47.95; normal = 52.42; P-value<0.05). Their IQ score tended to be lower than the IQ of normal children (obese = 105.2; normal = 106.7; P-value<0.1). No significance different was showed from EQ, attention and learning ability by nutritional status. These impairments were showed either among boys or girls. The increasing adiposity which might induce inflammation and atrophy of grey matter in the hippocampus area seems become the plausible reason behind this phenomenon.

Conclusions: Child obesity impairs the cognitive development, particularly their memory ability and IQ.

Acknowledgements: This study was supported by Faculty for the Future program from Schlumberger Foundation.

Keywords: (maximum 5): Obesity, children, cognitive performance.

149/804. Daily consumption of cheese and fruits as a factor decreasing the risk of colorectal polyps

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Introduction: High incidence and mortality rates of colorectal cancer point to primary prevention of this malignancy as a challenge of modern medicine. The results of many previous studies suggest that regular consumption of foods rich in dietary fiber and calcium may be associated with reduced risk of colorectal cancer, while the frequent consumption of red meat leads to higher incidence of this malignancy.

Objectives: To analyze consumption of selected food products as potential protective/risk factors of precancerous lesions (polyps) formation in the large intestine.

Method / Design: The study included 460 individuals subjected to lower gastrointestinal endoscopy. On the basis of histopathological findings, the participants were divided into the group with colorectal polyps (n=237) and the polyp-free control group (n=223). Consumption frequencies of cereals, vegetables, fruits, meat, fish, dairy products, eggs and legumes among participants of the two groups were determined with a questionnaire survey. The results were subjected to statistical analysis.

Results: The polyp-free group included significantly larger fraction of respondents who declared daily consumption of cottage and ripening cheese (36.5% vs. 28.3%, OR=0.68, 95%CI 0.46-1.0, p=0.019) and fruits (69% vs. 60.3%, OR=0.63, 95%CI 0.42-0.93, p=0.050) than the group with colorectal polyps. No significant intergroup differences were documented with regards to the consumption frequency of the remaining food products.

Conclusions: Daily consumption of cheese and fruits may decrease the incidence of colorectal polyps by approximately one-third (by 37% and 32% for cheese and fruits, respectively).

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Keywords: (maximum 5): consumption frequency, food, colorectal polyps

149/806. Early BMI gain and insulin resistance in childhood: a longitudinal analyses.

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Introduction: The prevalence of overweight and related metabolic disease continues to increase throughout the world. While there is consistent and substantial evidence that weight gain early in life is associated with adult insulin resistance, few studies have been conducted in childhood and rare use conditional methods.

Objectives: The objective of this study was to investigate the association between body mass index (BMI) gain from birth to 7-8 years of age and insulin resistance on schoolchildren.

Method / Design: Cohort study conducted with children of low socioeconomic status from São Leopoldo, Brazil. At 7-8 years old fasting blood tests were performed to measure serum glucose and insulin concentration and homeostasis model assessment index of insulin resistance (HOMA-IR) values. The outcome was examined in relation to changes in growth measurements in three different periods (from birth to 12-16 months; from 12-16 months to 3-4 years; and from 3-4 to 7-8 years) using conditional BMI gain.

Results: In linear regression models adjusted for pre-pregnancy BMI, child's sex and skin color, exclusive breastfeeding, household income and child's current weight, BMI gain from 3-4 years to 7-8 years was a predictor of a higher increase in glucose (B=0.193, p=0.006) and HOMA-IR (B=0.143, p=0.028) measurements and there was a strong tendency for the association with insulin (B=0.126, p=0.055) values at school age. There was no significant impact of BMI gain from birth to 12-16 months on glucose profile at 7-8 years.

Conclusions: Our data suggest that BMI gain from preschool played a role in altering insulin resistance as early as school age children. These results provide evidence for the importance of child's growth closely monitored, especially in order to control metabolic impairment that might occur still in childhood.

Keywords: (maximum 5): weight gain, HOMA-IR, insulin, glucose

149/807. Anemia and Folate Deficiency in Georgia

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Introduction: In 2009 a cross-sectional, nationwide nutrition survey was carried out in Georgia. Were selected randomly households from which children (under 5) and non-pregnant women (15-49 y) were recruited. Pregnant women were recruited from facilities providing ante-natal care.

Objectives: 1. To study micronutrients deficiency situation in Georgia

2. To define the national nutritional strategy

Method / Design: Iron deficiency in survey participants was measured using ferritin concentration in plasma. The cut-off points are taken from WHO recommendations: 1) in children (under 5), a serum ferritin concentration <12μg/l, and 2) in non-pregnant women (15-49y), a serum ferritin concentration <15μg/l, and CRP<5.0mg/l. Folate deficiency was assessed using folate concentration measured in blood plasma. Plasma folate concentration <4.0ng/ml (10 nmol/l) was considered indicative of deficiency.

Results: Anemia is quite common in children under 5 years of age. The prevalence of anemia in Children (22.8 %) did not differ substantially by gender, but quite different between regional strata (9.2% - 32.2%). Severe anemia (0.6 %), moderate (9.4%), and mild anemia (12.8%) were differentiated. Only 1 % of children had Iron deficiency.

24.1% of non-pregnant women were with anemia (severe -0.4%, moderate-9.1%, and mild -14.6%). Only 1.6% of non-pregnant women had Iron deficiency.

25.6 % of pregnant women were diagnosed with anemia (severe -0.7%, moderate-7.7%, and mild anemia -17.2%).

More than one-third of non-pregnant women had folate deficiency (36.6%).

Conclusions: 1. Folate fortification is essential for preventing neural tube defects in newborns, extra folate intake should be provided to both non-pregnant and pregnant women.

2. The role of iron deficiency in producing anemia should be investigated further, using other markers of iron status (transferrin receptor concentration, erythrocyte protoporphyrin, etc)

Keywords: (maximum 5): Nutrition
Anemia
Folate
Iron

149/815. Is body mass index z-score a reliable indicator of adiposity among school-aged children in developing countries?

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Introduction: Body Mass Index z-score (BMI z-score) is widely promoted by WHO as indicator of child obesity in many developing countries, but to what extent its measurement correlates with child fatness in underprivileged settings was less investigated.

Objectives: This study aimed to assess the accuracy of BMI z-score compared to % body fat measured using reference method in detecting excess of body fat among Senegalese public school children.

Method / Design: The study was conducted on a sample of 155 children (75 boys, 80 girls), 8-11 years old randomly selected in elementary public schools of Dakar, Senegal. Weight and height were measured, BMI z-score height-for-age z-score calculated using WHO AnthroPlus. Body composition (fat free mass, fat mass, %BF) was measured by deuterium dilution. Sensitivity and specificity of BMI z-score were assessed by testing its ability to correctly detecting overweight/obesity (BMI-z-score>+1) according to Freedman age and sex-specific %BF cut-off. Receiver Operating Characteristic (ROC) and areas under the curves (AUCs) were used to assess the diagnostic performance of BMI z-score to measure body fat excess in children.

Results: The prevalence of overweight/obesity was 8.4% using %BF and 4.5% using BMI z-score (P=0.745). Thinness affected 30.1%, while 2.3% were stunted. Fat free mass was higher (23.8±3.4 kg vs. 21.2±3.4; P<0.001), and body fat lower (4.1±3.2 kg vs. 5.4±3.2; P<0.05) in boys compared to girls. BMI z-score was strongly correlated to %BF (r=0.625; p- 0.001). The specificity of BMI z-score to diagnose child overweight/obesity was high (100%), but the sensitivity was relatively low (53%). As indicated by AUC, BMI performed well in detecting excess body fat (AUC=0,913) and showed better performance in boys (0,978) than in girls (0,861).

Conclusions: BMI z-score is a reliable indicator of child adiposity, but its low sensitivity may underestimate the extent of obesity among Senegalese school-aged children, particularly in girls.

Keywords: (maximum 5): Keywords: BMI, adiposity, school-aged children, Senegal

149/816. A modelling approach to estimate the impact of sodium reduction in soups on cardiovascular health in the Netherlands

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Introduction: Reducing sodium intakes is a public health priority as it could reduce hypertension which is a major modifiable risk factor for cardiovascular disease. However, significant sodium reduction is a challenge, requiring salt is reduced gradually over time to ensure the product remains appealing to consumers.

Objectives: To model the potential health impact of reducing sodium in soups in the Netherlands.

Method / Design: An average sodium reduction of 25% in soups was chosen as product reformulation that might be achievable over time when executed in smaller steps. Different steps were applied to estimate the potential health impact. First, the blood pressure lowering associated with sodium intake reduction was estimated. Second, the anticipated blood pressure reduction was translated into reduced cardiovascular disease-related incidence cases and mortality, which included cerebrovascular accident (CVA), acute myocardial infarction (AMI), angina pectoris, and congestive heart failure (HF). Finally, the potentially preventable Disability-Adjusted Life Years (DALYs) were calculated.

Results: An average sodium reduction of 25% in soups might potentially reduce incidence and mortality cases of CVA, AMI, angina, and HF by respectively approximately 0.5%, 0.3%, and 0.2% per year. This could reduce the related burden of disease by approximately 800 DALYs.

Conclusions: The modelling approach described here can be used to provide insight into the potential impact of product reformulation on burden of disease. The modelling shows that a substantial sodium reduction in soups could potentially have a small impact on public health. When executed in more product groups/categories and countries the impact could add up to become more meaningful.

Keywords: (maximum 5): sodium reduction; product reformulation; health impact; modelling

149/819. Cereal based products designed for people with metabolic disorders.

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Introduction: Current global trends in food formulation are oriented towards biologically active food components with health benefits. Food design and the development of these products are challenge for research sector and food industry.

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Objectives: The aim of this work was to create functional cereal based products for people with metabolic disorders, i.e. coeliac disease and hyperlipoproteinemia, and to potentially increase the range of functional products on the market.

Method / Design: The systematic approach to a problem of studying and creating functional food has been conducted. Selected functional components of plant origin with confirmed biological activity on tested animals were characterized and used for the new product formulations. Safe and sensory acceptable products were tested on patients with defined metabolic disorder. Technological process optimization was also performed.

Results: The following functional ingredients were used for the products development: wholegrain buckwheat flour (50%) for wholegrain buckwheat bread; herbal blend (2%) in cookies with herbal blend for metabolism enhancement, soy bran (30%) for fat-reduced gluten-free cookies; wholegrain buckwheat flour (20%) for buckwheat-enriched wholegrain wheat pasta; berry pomace (30%) for gluten-free cookies with blueberry pomace.

Conclusions: Cookies, bread and pasta containing functional ingredients are formulated, characterized and they are sensory acceptable. It has to be acknowledged that this work is a part of the Project (TR–31029) supported by the Ministry of Science and Technological Development, Republic of Serbia.

Keywords: (maximum 5): Bakery product; Gluten-free product; hyperlipoproteinemia; Buckwheat; Berry pomace

149/821. Characterization and health benefits of buckwheat-enriched wheat bread

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Introduction: Functional added value products are created to achieve health benefits in humans. Wholegrain buckwheat flour contains rutin and other phenolic compounds known as potent antioxidants. These compounds also possess special medicinal properties such as antihypertensive and antihypercholesterolemic effects.

Objectives: The aim of this work was to 1. to produce the buckwheat-enriched wheat bread with the highest level of substitution, 2. to compare its quality with the wheat bread, and 3. to test its antihyperlipidemic efficiency.

Method / Design: Buckwheat-enriched wheat bread was produced by substitution of wheat flour with wholegrain buckwheat flour at the level of 50% in a wheat bread formulation. Two types of bread were characterized by nutritional quality, antioxidant profile, and sensory properties. Antihyperlipidemic efficiency of the buckwheat-enriched wheat bread was tested in normal weight patients on statin therapy over one-month dietetic intervention.

Results: The nutritional quality and antioxidant capacity of buckwheat-enriched wheat bread was significantly improved in comparison with the wheat bread (2.22 times higher total dietary fibre and 4.29 times higher total phenolics content).

Consumers gave advantage (71.88%) to the buckwheat-enriched wheat bread. Significant decrease in total cholesterol and LDL-cholesterol, as well as the ratio of LDL/HDL cholesterol was obtained by its consumption in statin treated patients.

Conclusions: The buckwheat-enriched wheat bread is added value product with antihyperlipidemic efficiency in normal weight patients on statin therapy.

It has to be acknowledged that this work is a part of the Project (TR–31029) supported by the Ministry of Education, Science and Technological Development, Republic of Serbia.

Keywords: (maximum 5): Buckwheat-enriched wheat bread; Wheat bread; Quality; Sensory properties; Antihyperlipidemic effect

149/824. Nutritional knowledge differences between Austrian school types - baseline results from the EDDY Project

Author(s): (1) Narine Barhordarian; (2) Oliver Helk; (1) Christina Pöppelmeyer; (1) Oskar Prochazka; (3) Nadja Cvjetkovic; (2) Sarah Mehany; (2) Kathrin Buchinger; (2) Kurt Widhalm.

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Introduction: Fostering nutritional knowledge through nutritional training increases the health competence of children and adolescents. Currently there is limited data available in Austria. Therefore it is necessary to find and evaluate concepts for school-based interventions and their impact on children's health competence.

Objectives: The EDDY project is a two-year randomized-controlled intervention study in 11 to 14 year old Viennese pupils. The aim is to increase the participant's health competence with age-appropriate training in nutrition and sports. One objective is to measure the effect of the nutritional education on the basis of a basic nutritional knowledge quiz.

Method / Design: The sample includes 147 Viennese pupils from four comparable schools – two middle schools (Neue Mittelschule) and two high schools (Gymnasium). Based on a quiz, the nutritional knowledge will be surveyed before and after the nutritional education as well as at the 6 and 12 months follow-up. The quiz consists of 12 questions.

Results: Baseline results show a significant difference ($p < 0,001$) in nutritional knowledge between the two school types. Out of 12 right answers the average nutritional knowledge score of high school pupils was 7,47 (± 1,41 SD) and of middle school pupils was 5,55 (± 2,04 SD).

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Conclusions: These first results show that the basic knowledge about nutrition varies in school types. It is important to take the socio-economic status into consideration as well as to question which consequences these results will have on basic research in public health nutrition.

Keywords: (maximum 5): NUTRITIONAL KNOWLEDGE: TYPE OF SCHOOL: SOCIO-ECONOMIC STATUS: SCHOOL-BASED INTERVENTION

149/828. Awareness and practices of dietary tumor prevention: assessment among doctors and patients

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Introduction: Patients often ask their doctors for dietary advices with anti-cancer actions. Population and scientific surveys create the basis for such recommendation, but the authentic use of information has not been formerly observed.

Objectives: The aim of the study was to raise awareness and practices about anti-cancer nutritional advices.

Method / Design: A questionnaire was distributed via the Internet to 8,530 healthy individuals, cancer patients, oncologists and GPs, with N=250 participants for analysis.

Results: Between healthy subjects, 86% were open to altering dietary patterns. Participants were induced of the positive action of dietary issues for which statistics exists (green tea, berries, tomatoes, vitamin D) but moreover for nutritional aspects for which information does not exist. Participants were 32% more keen to include than diminish nutritional issues. Half (51%) of the tumor patients did not believe their physicians were sufficiently well-informed regarding diet and tumor. The majority of (78%) doctors stated that patients ask about nutritional approaches to tumor. 59% of doctors recognized none or less than one week of official instruction on diet and illness prevention. 90% of oncologists considered dietary aspects can decrease cancer threat, but simply 49% have appraised the sustaining information. A lot of doctors (38% oncologists, 43% GPs) considered randomized placebo-proscribed clinical tests would be obligatory to persuade them to advise nutritional factors for their subjects.

Conclusions: Briefly, there is strong awareness and conviction in cancer threat diminution through dietary features. Patients often ask their doctors but the majority do not get counsel, regardless of the existence of helpful information. This survey recommends the need for ingenious scientific studies and enhanced doctor instruction on the collision of dietary features on cancer to tackle patient requirements.

Keywords: (maximum 5): Dietary, Tumor prevention, Albania

149/829. Pomegranate seed oil has cytotoxic effects on human breast cancer cell lines

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Introduction: Due to the widespread prevalence of the cancer and disadvantages of chemotherapies, in recent years attention to the natural compounds for using in the prevention and treatment of cancer has been quite extensive.

Objectives: The pomegranate seeds are a good source of compounds that can have anti-cancer effects according to the previous studies. In this study, the effects of pomegranate seed oil were evaluated on two human breast cancer cell lines (MCF-7 and MDA-MB468).

Method / Design: Cells were cultured and treated with different concentrations of pomegranate seed oil, and their viability , morphology, colony formation, invasion, migration, wound healing and cell adhesion were evaluated.

Results: IC50 was obtained after 24, 48 and 72 h treatment of cell lines MCF-7 and MDA-MB468. In an equivalent dose of 150 and200 µg / ml, respectively, the colony formation for MCF-7 and MDA-MB468 cell lines, is reduced compared to the control. The MCF-7 and MDA-MB468 cell migration was dropped after treatment with the oil. Invasion is not seen in MCF-7 cell line, but cellular invasion was dropped in 842 µg / ml for MDA-MB468 cells. Attachment assay showed that, cell binding at a dose equivalent to IC50 for both cell lines dramatically was reduced. Wound healing test results indicate that at a dose equivalent to 500 and 800 µg / ml, respectively, for MCF-7 and MDA-MB468 the cell lines, is prevented from cell migration toward the split.

Conclusions: The results indicate that pomegranate seed oil has the cytotoxicity effect on the cancer cell lines and may inhibit breast cancer cell proliferation and invasion. According to this study and previous studies, eating pomegranate can help to prevent and treat the breast cancer.

Keywords: (maximum 5): pomegranate seed oil, breast cancer, invasion, migration, cell lines

149/836. Association between body mass index adjusted for fat mass and cardiovascular risk factors in adolescents

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Introduction: Adolescents have been a vulnerable group for presenting high rates of overweight and obesity that generate cardiovascular risk. In this context, is important to conduct a correct assessment that can predict the risk.

Objectives: To evaluate, in adolescents, the association between Body Mass Index (BMI) adjusted for fat mass with cardiovascular risk factors and identify which variables can explain the values of the traditional BMI and adjusted BMI, analyzing if the same index can be used for this population.

Method / Design: Cross-sectional study made with students from public and private elementary schools, living in Juiz de Fora, Minas Gerais, Brazil, during 2011 and 2012. The evaluation was performed using a questionnaire including information of demographic characteristics, anthropometric (weight, height, waist circumference and body composition), biochemical (glucose and triglycerides, total cholesterol and fractions), sexual maturation and physical activity frequency. Statistical analyzes were performed using t Student test, Pearson Correlation and Multiple Linear Regression. All variables were interpreted using SPSS 17.0, assuming a significance level of 5%.

Results: The sample consisted of 403 adolescents aged between 11 and 14 years, with 185 male and 218 female, with average age of 12.3±1.2 years for boys and 12.4±1.1 years for girls, with no difference between them (p = 0.29). It was verified that 20% of adolescents exhibited overweight and 12.5% were obese. It was observed that all the parameters correlated to BMI adjusted for fat mass are related to the traditional BMI, indicating that the inclusion of this variable to BMI didn't show difference in diagnostic of overweight and obesity when compared to traditional BMI.

Conclusions: The use of BMI adjusted for fat mass in adolescents has not demonstrated diagnostic superiority compared to traditional BMI.

Keywords: (maximum 5): adolescent, adolescent nutrition, body mass index, nutrition assessment.

149/837. A school-based intervention to reduce excess weight in overweight and obese primary school children

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Introduction: Childhood obesity is a worldwide public health problem and urges implementation of interventions to combat it.

Objectives: This study evaluated the effect of an intervention for reducing excess weight gain in school children in Tehran.

Method / Design: A total of 334 obese and overweight students were recruited in the study. The demographic and anthropometric data were collected at beginning and end of the intervention. The intervention includes three components: education of nutrition for students, life style modification for parents, increased physical activity and changing canteens content.

Results: The intervention lasted 19 weeks in 2 schools, 18 weeks in 2 schools and 17 weeks in 2 schools. Test of analysis of variance (ANCOVA) indicated that our intervention reduced BMI-Z (Body Mass Index Z Score) and hip circumference in the intervention group (P=0.003 and P<0.001; respectively). Paired t-test and/or Wilcoxon tests indicated that triceps skin fold thickness and time spent for working with the computer were not changed in intervention group (P=0.51 and P=0. 1; respectively); however, they increased in the comparison group (P=<0.001 and P=0.04; respectively). Waist circumference increased in both groups (P=0.001, intervention group) but the increase was more in the comparison group (P<0.001). Based on ANCOVA no significant reduction was seen in time spent on TV viewing in either group (P=0.08). With regard to physical activity, while vigorous physical activity increased in the intervention group (P<0.001) in the comparison group only an increase in moderate activity was seen (P<0.001). Energy and fat intakes, compared to the comparison group, increased significantly in the intervention group (P<0.001).

Conclusions: The multi-component intervention reduced BMI and improved some anthropometric indicators in the pupils. Our proposed model, provides a pattern for researcher and policy makers, which can be used for other similar settings.

Keywords: (maximum 5): Obesity, Intervention studies, Schools, Physical activity, Diet

149/844. Lack of impact of SSB on indices of carbohydrate metabolism

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Introduction: Fructose-induced insulin resistance has been previously shown in animals. However, the implications of findings for humans are unclear as these models typically use very high doses of fructose and from sources not commonly consumed. Therefore, little is known about how the typical consumption of fructose or sugar in general in humans affects glucose regulation.

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Objectives: To explore whether there is a link between sugar sweetened beverage (SSB) consumption and risk factors for diabetes.

Method / Design: This was a 6 month study in which all participants followed the ADA exchange diet for weight-maintenance. 66 participants were randomly assigned to one of three groups in which they were required to incorporate 2 servings per day of 1) regular soda, 2) diet soda, or 3) water. Qualified participants underwent baseline measurements of weight, fasting glucose and insulin, and a standard 2 hour OGTT. Area under the Curve (AUC) for the OGTT was determined by the trapezoidal method and insulin resistance was derived using the Homeostasis Model Assessment (HOMA-IR). Measurements were repeated after 6 months.

Results: In the entire study population weight was unchanged (160.7 ± 24.5 vs 161.4 ± 24.2lbs, p>0.05), and was not affected by the type of beverage consumed. There were no changes in fasting glucose (89.7 ± 5.2 vs 89.7 ± 6.5 mg/dl, p>0.05), insulin (7.3 ± 4.4 vs 6.8 ± 3.7 μIU/ml, p<0.001), HOMA-IR (1.6 ± 1.0 vs 1.5 ± 0.9, p>0.05), or glucose AUC (12.9 ± 2.8 vs 13.1 ± 2.8 min*g/dl, p>0.05). None of these measures were affected by the type of beverage consumed (p>0.05).

Conclusions: When consumed as part of a balanced, energy controlled diet, the sugar and fructose delivered from 2 servings a day of regular soda does not promote negative changes in glucose regulation.

Keywords: (maximum 5): Sugar sweetened beverages, Fructose, Insulin Resistance

149/848. Alteration of adipokines and pulmonary function in obese asthmatic adolescents

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Introduction: Obesity and asthma prevalence have been increasing over the past decade. Obesity is an independent risk for asthma. Obesity-associated asthma has been proposed to be a distinct entity. The mechanistic basis for these associations in humans is not established, although a possible role for adipokines has been invoked.

Objectives: The aim of this study was to evaluate serum levels of leptin, high-molecular-weight (HMW) adiponectin, and retinol-binding protein 4 (RBP4) in obese and non-obese children with or without asthma and in healthy non-asthmatic Mexican adolescents, and analyze their relationships with lung function.

Method / Design: This study enrolled 195 Mexican adolescents in 4 study groups: non-obese non-asthmatics (n=63), non-obese asthmatics (n=58), obese non-asthmatics (n=46) and obese asthmatics (n=28). All underwent pulmonary function testing. Blood was collected for measurement of serum adipokines.

Results: Obese non-asthmatics and obese asthmatics had significantly higher levels of leptin and lower levels of HMW adiponectin compared to non-obese asthmatics and non-obese non asthmatics. Subjects with asthma had higher levels of RBP4 compared to the adolescents without asthma independent of the presence or absence of obesity. The level of HMW adiponectin was negatively correlated with forced expiratory lung volume in the first second (FEV1) and forced vital capacity (FVC) in all studied subjects. Obese asthmatics had lower FEV1/FVC (p=0.034) compared to the non-obese non-asthmatics subjects.

Conclusions: Our study suggests that obesity-associated asthma is indeed a distinct entity from asthma in the non-obesity in adolescents. Moreover, the direct association of adipokines with pulmonary function suggests that interventions addressing onset and progression of obesity may have the most substantial impact on decreasing the morbidity occurring with obesity-associated asthma.

Keywords: (maximum 5): obesity; asthma; adipokines; pulmonary function

149/849. Influence of diets with different lipid sources on triglycerides, cholesterol and lipid oxidation

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Introduction: Diet lipid profile is important to prevent chronic diseases and improve the quality of life of individuals.

Objectives: analyze the effect of different sources of dietary lipids with high and normal concentration, on triglycerides (TG), total cholesterol (TC), chol-noHDL cholesterol and oxidative stress parameters of growing rats.

Method / Design: weanling Wistar rats were fed during 40 days with experimental diet containing: 15 o 40 Kcal% of lipids (F%) provided by butter (B15 and B40 groups) and olive oil (O15 and O40 groups). Control group(C) received normocaloric diet (F%=15) according to AIN´93. Serum levels of TG, TC and chol-noHDL were determined by enzymatic-colorimetric method. Liver and heart were removed and lipid peroxidation was obtained by TBARS assay in B40 and O40 groups (Thiobarbituric Acid Reactive Sustances- μg malondialdehyde-MA/g of tissue). Statistical analysis used one-way analysis of variance (ANOVA) and Dunnett/Kruskal-Wallis as post tests (*p<0.01).

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Results: Serum (mean±SD, mg/dL) TG B15=122.9±28.4* B40=96.8±32.6*; O15=94.6±23.7 O40=62.7±18.9; C=62.2±27.3; TC B15=65.7±8.8 B40=87.9±13.2*; O15=69.5±7,0 O40=67.3±7.3; C=62.1±9.6; chol-noHDL B15=33.7±6.7 B40=43.3±18.6; O15=43.4±8.9 O40=37.3±8.9; C=34.6±10.1. TG were statistical higher in B15 and B40, TC levels were higher only in group B40, compared with C. TBARS Liver B40=0,07±0,02 O40=0,05±0,01 C=0,06±0,02 Heart B40=0,08±0,01 O40=0,07±0,01 C=0,08±0,02 . The administration of experimental diets did not show an increase in lipid peroxidation on heart and liver in the experimental groups.

Conclusions: Despite the high lipid content of the experimental diets, only the B group, has high levels of TG and TC serum. This increase would be a consequence of the type of lipid received. The fact that the groups did not show an increase in lipid peroxidation suggest that antioxidants provided by the diet might be playing a protective role. Supported by UBACyT 20020120200068.

Keywords: (maximum 5): LIPIDS- DIETS- OXIDATION

149/851. Improved cognitive performance following single doses of wild green oat extract in healthy older adults

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Introduction: Beneficial effects of wild green oat extract (WGOE) on cognitive function have previously been demonstrated in both animal and human trials. In addition, acute modulatory effects of WGOE on cerebro-electrical activity have been demonstrated, and chronic administration of 1500 mg/d WGOE has been shown to improve peripheral and cerebral vasodilation.

Objectives: The current study aimed to investigate the effects of separate single doses of WGOE on the performance of a wide range of computerised cognitive tasks assessing aspects of attention, memory and executive function.

Method / Design: Forty-two healthy adults aged 40-65 years who self-reported memory decline took part. The study employed a double-blind, placebo-controlled, cross-over design with cognitive performance and mood being assessed at baseline and 1, 2.5, 4 and 6 hours after the consumption of placebo and two separate doses of WGOE (800 mg, 1600 mg). Each treatment was taken on two occasions (i.e. a total of 6 assessments). The assessments were separated by a 7 day wash-out period.

Results: The data indicate that the ingestion of single doses of 800 mg of WGOE was associated with a number of significant benefits to cognitive function. Most notably, 800 mg led to a significant improvement on a global 'Speed of Performance' measure. This dose was also associated with some evidence of improved performance on individual tasks spanning several cognitive domains (e.g. executive function, working memory, episodic memory performance). The pattern for the 1600 mg dose was less pronounced with both improvements and decrements being observed across a small number of tasks.

Conclusions: The lower (800 mg) of two doses of WGOE administered to older adults who self-reported age-associated cognitive decline resulted in broad improvements to cognitive function. The effects of the higher dose (1600 mg) were equivocal.

Keywords: (maximum 5): cognitive performance, wild green oat extract

149/869. Fatty acid patterns during pregnancy, mid-pregnancy weight gain and birth outcomes: the Generation R Study

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Introduction: Dietary fat composition seems associated with gestational weight gain and birth outcomes, but the association of plasma fatty acid patterns remains unclear.

Objectives: To evaluate whether plasma fatty acid patterns are associated with mid-pregnancy weight gain and adequacy, and with pregnancy and birth outcomes that have been associated with gestational weight gain (preeclampsia, pre-term birth and birthweight).

Method / Design: We included 6,567 pregnant women who participated in the Generation R study, a population-based birth cohort in Rotterdam, the Netherlands (enrolment 2002-2006). Three fatty acid patterns were identified out of 22 individual plasma fatty acids (measured at 20 weeks of gestation), using principal component analysis, namely a 'High n-6 poly-unsaturated fatty acid (PUFA)', a 'Mono-unsaturated fatty acids (MUFA) and saturated fatty acids (SFA)' and a 'High n-3 and low n-6 PUFA' pattern. Gestational weight gain was measured between 20 and 30 weeks of gestation. Analyses were adjusted for socio-demographic and lifestyle factors.

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Results: The 'High n-6 PUFA' pattern was associated with a higher prevalence of excessive gestational weight gain (OR 1.11 [95%CI 1.04;1.19] per SD) but not with birthweight. The 'High n-3 and low n-6 PUFA' pattern was associated with slightly lower gestational weight gain (-0.09kg [95%CI -0.17;-0.02]) and birthweight (-11.7g [95%CI -22.8;-0.6]). The 'MUFA and SFA' pattern was not associated with gestational weight gain, but was associated with a higher prevalence of large-for-gestational-age new-born (OR 1.11 [95%CI 1.02;1.21]) and with a lower prevalence of small-for-gestational-age new-born (OR 0.90 [95%CI 0.83;0.98]). No pattern was associated with preeclampsia or pre-term birth.

Conclusions: These results suggest that specific plasma fatty acid patterns are associated with gestational weight gain and birth weight. These results may contribute to potential preventive strategies for tackling adverse pregnancy and birth outcomes.

Keywords: (maximum 5): Fatty acid; pregnancy; gestational weight gain; birth weight; preeclampsia

149/872. Desaturase Activity in to response to enriched diet with polyunsaturated fatty acids in obese subjects

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Introduction: The desaturases are a group of enzymes that convert saturated fatty acids to unsaturated fatty acids, as D-3 desaturase (D3D) that acts on linolenic acid to yield eicosapentaenoic acid, D-5 desaturase (D5D) acts on a-linolenic acids and D-6 desaturase (D6D) acts on linoleic acid, D-9 desaturase (D9D) o stearoyl-CoA desaturase (SDC) that acts on saturated fatty acids to convert in monounsaturated fatty acids. There are few evidences of the effect of increase of dietary intake of polyunsaturated fatty acids (PUFAs) on desaturases activity and inflammatory markers.

Objectives: To evaluate the effect of PUFAs enriched diet on desaturase activity, metabolic, inflammatory parameters in obese subjects.

Method / Design: We included 40 obese subjects (Body Mass Index=30) of 30 to 50 years old, both gender. Subjects were induced to consume daily almonds and walnuts (15g each/one) for 8 weeks. Anthropometric measures were taken and glucose, lipid profile, insulin, Lipocalin-2, adiponectin and fatty acid profile were quantified. With fatty acid profile we calculated the desaturase activities: D3D (20:5n-3/18:3n-3), D5D (20:4n-6/20:3n-6), D6D (18:3n-6/18:2n-6), D9D o stearoyl-CoA desaturase 1 (SCD-1; 16:1n-7/16:0, SCD-16 and 18:1n-9/18:0, SCD-18), de novo lipogenesis (DNL) (16:0/18:2n-6) and fatty acids elongation (18:0/16:0).

Results: To finished intervention, significant decreases on adiposity measures (weight, Waist circumference, Hip circumference, body mass index and fat mass, $p<0.0001$) we observed. A decrease of 12.5% on D6D and SCD-16 activities and an increase on the D3D (8%), D5D (5.5%) activities and DNL (6%). Positive associations of adiponectin levels with D3D ($r=0.357$, $p=0.023$), lipocalin-2 levels with D6D ($r=0.336$, $p=0.033$); triglycerides levels with SCD-16 ($r=0.509$, $p=0.001$), and SCD-18 ($r=0.390$, $p=0.013$), and negative correlations of body mass index with D5D ($r=-0.332$, $p=0.036$) were observed.

Conclusions: A suitable consumption of PUFAs in daily dietary decrease the D6D and SCD-16 activities and increase D3D and D5D activities to improve metabolic status.

Keywords: (maximum 5): obesity: lipocalin-2: adiponectin.

149/874. Can low-carbohydrate diet and resistence exercise decrease cardiometabolic risk factors? An ongoing study.

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Introduction: There are few studies which showed positive effect of low carbohydrate diet on glycaemia, hemoglobin A1c, insulin sensitivity, and also positive effect on cardiometabolic risk factors.

Low carbohydrate diet can possibly affect other hormones and mediators in human body, e.g. leptin, ghrelin or adiponectine and thus have positive effect on levels of other hormones (testosterone, growth hormone, estrogen or hormones of thyroid gland). There are also several publications referencing to high intensity (especially interval training) activity as the best way for lowering fat mass and gaining lean body mass. On the other hand, authors and training specialists now don't recommend steady-state cardio exercise as good method for burning fat mass, because it can cause several hormonal imbalance and loss of lean fat free body mass.

Objectives: We have ongoing interventional clinical study (NCT02325804) focused on fat mass reduction in patients without chronic diseases (endocrine, cardiovascular, etc.). The purpose of our ongoing study is to assess an impact of hypocaloric low-carbohydrate diet on diabetes risk factors.

Method / Design: Subjects are randomly assigned to one of two arms of the study 1) low-carbohydrate hypocaloric diet with intermittent interval training or 2) classic hypocaloric diet with aerobic physical activity. There is equal caloric restriction in both arms (30 percent of weight maintains calories need) and physical activity of 150 minutes per week. Before and after the 8 weeks of intervention subject

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undergo oral glucose tolerance test (to compute indices of insulin sensitivity), measurement of physical fitness, basal metabolic rate (BMR), lipidogram, uric acid concentration and hormonal status.

Results: The first preliminary results of ongoing study we want to present at the FENS 2015 meeting.

Conclusions: Conclusions of ongoing study we want to present at the FENS 2015 meeting.

Keywords: (maximum 5): low carbohydrate diet, resistance exercise, cardiometabolic risk factors, hormonal imbalance

149/875. Long-chain polyunsaturated fatty acids during pregnancy/lactation and children's body composition: 5-year follow-up data (INFAT-study)

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Introduction: Introduction: Fatty acids in maternal diet may have an impact on offspring body composition and obesity risk in later life.

Objectives: Objective: To investigate the effect of reducing the n-6/n-3 long-chain polyunsaturated fatty acid (LCPUFA) ratio in maternal diet during pregnancy and lactation on offspring growth and body composition up to 5 years postpartum (pp).

Method / Design: Method / Design: In an open-label, randomized controlled trial, 208 healthy German pregnant women received a dietary intervention (supplementation of 1.2g n-3 LCPUFAs/day and dietary counseling to reduce arachidonic acid intake) from the 15th week of gestation until 4 months of lactation or followed their habitual diet (control group). We investigated infant fat mass with skinfold thickness (SFT) and abdominal sonographic measurements and child growth. For comparison, multiple linear regression models adjusting for sex, pregnancy duration, ponderal index at birth and breastfeeding status at 4 months were performed.

Results: Results: At 5 years of age, anthropometric data of n=114 infants were available. Results showed no difference between groups, neither for the sum of 4 SFT [intervention: 23.9±4.7mm; control: 24.5±5.0mm; mean difference: -0.7mm (95% CI: -2.5; 1.1mm); p=0.453], nor for other anthropometric measurements. Findings are consistent with results at earlier time-points except for BMI at 4 years pp. Sonographic data indicated significant differences in the adjusted model for the area of subcutaneous fat layers at 2, 4 and 5 years pp, showing slightly higher rates in the control group. Preperitoneal fat did not differ significantly between groups at any time point of investigation.

Conclusions: Conclusion: With the possible exception of sonographic assessment of subcutaneous fat area and BMI at 4 years pp, our data do not provide evidence that a dietary intervention reducing the n-6/n-3 ratio during pregnancy and lactation affects offspring's fat mass.

Keywords: (maximum 5): Keywords: body fat, childhood obesity, dietary intervention, n-3 fatty acids, pregnancy

149/883. Effects of dietary fiber from grains, fruits, vegetables and pulses on bowel function systematically reviewed.

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Introduction: Dietary fibres (DF) can differ substantially in their physio-chemical characteristics. As a consequence these differences between dietary fibres can influence bowel function parameters differently.

Objectives: A systematic review was conducted on the effects of dietary fibre on bowel function parameters in healthy individuals using a relational database enabling comparative and quantitative estimates.

Method / Design: Systematic search strategies for English papers were applied in PUBMED and EMBASE. Statistical analysis focused on dietary fibre from grains, fruits, pulses and vegetables. Weighted regression analysis took into account the number of subjects in each reported study. Analysis of transit time took into account initial transit time ≤ 48 hrs and > 48 hrs.

Results: In total 147 publications were identified. For statistical analysis of the data interventions where categorized according to food origin and fermentability. Table 1 shows the number of observations per category of fibre and per parameter, showing for example that 1 gram non-fermentable cereal DF increases total stool wet weight with 3.39g. When initial transit time is delayed (>48hrs) dietary fiber reduces transit time with approximately 30 min/g DF. Too few results were available for DF from pulses for a proper analysis.

Table 1. Summary of Regression analysis of Δ total stool wet weight (g/g DF) according to food origin and fermentability (slope±SD/ intercept/SD/ (number of observations)) in order of [Cereal] [Fruit] [Vegetable]

Fermentable: [1,29±0,14 / 0,51±3,27 / (n=21)] [0,28±0,39 / 18,59±4,66 / (n=6)] [2,91±0,48 / -10,56±8,16 / (n=14)]

Non fermentable: [3,39±0,08 / 6,22±1,51 / (n=100)] [- / - / (n=1)] [1,91±0,14 / -6,02±2,98 / (n=8)]

Conclusions: Non-fermentable grain-based dietary fibres were most effective in increasing total stool wet weight. Dietary fibres from

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grains and from vegetables are comparably effective in reducing total transit time in individuals with a delayed initial transit time.

Keywords: (maximum 5): systematic review, dietary fibre, stool weight, transit time

149/884. PREVIEW – Design, methods and baseline participant description of an international intervention to prevent type-2 diabetes

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Introduction: Type-2 diabetes mellitus (T2D) is one of the fastest growing chronic diseases worldwide and related to the global increase in the prevalence of obesity. The PREVIEW-project (EU 7th Framework Programme, grant agreement no. 312057) has been initiated to find out the most effective lifestyle-components (diet and physical activity) in prevention of T2D.

Objectives: The aim of PREVIEW is to investigate the effects of two diets and two physical activity programs in children and adults with increased risk for T2D.

Method / Design: The study in adults is a 3-y multicentre, 2x2 factorial, clinical, randomized controlled trial (RCT) with up to 2,500 participants. The impact of a high-protein, low-glycaemic index diet vs. moderate protein, moderate-glycaemic index diet in combination with moderate or high-intensity physical activity on the incidence of T2D and related clinical end-points will be investigated. Interactions with habitual stress, sleeping pattern, behavioural, environmental, cultural, and socioeconomic variables are also studied. The intervention starts with an 8-week weight reduction phase with a low-calorie diet (Cambridge Weight Plan®) followed by a randomized 146-week weight maintenance intervention in 4 arms. Eight intervention centres are involved (Denmark, Finland, UK, the Netherlands, Spain, Bulgaria, Australia, New Zealand). Data are collected at months 0, 2, 6, 12, 18, 24 and 36 by using blood specimen, urine, faeces, questionnaires, diaries, body composition assessments and accelerometers.

Results: More than 2,300 participants were found eligible after pre-screening > 15,600 and screening > 5,400 volunteers with OGTT. This presentation describes the general and centre-specific characteristics of the participants at baseline. Moreover, the 2-mo weight-loss success will be shown.

Conclusions: PREVIEW is hitherto the largest, multinational study to study prevention of T2D in pre-diabetic subjects by diet and exercise. Screening and baseline assessments have been completed.

Abstract prepared on behalf of the PREVIEW consortium.

Keywords: (maximum 5): Diabetes, obesity, diet, exercise, intervention

149/892. Nutritional status assessment in hospitalized patients with chronic malnutrition with and without behavioural psychiatric disorders

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Introduction: Chronic malnutrition in hospitalized patients is a serious problem associated with prolonged disease duration, severe complications and increased mortality rate.

Objectives: Comparative assessment, nutritional status analysis and malnutrition severity in chronic malnutrition /CM/ with and without behavioural psychiatric disorders for applying of personalized nutritional support.

Method / Design: In 87 hospitalized patients with chronic malnutrition aged from 18 to 83 years: group I- 42 without behavioural psychiatric disorders and group II- 45 patients with behavioural psychiatric disorders a complex assessment of the nutrition and nutritional status with special questionnaire, clinical examination, laboratory tests, anthropometry, body impedance analysis, functional tests /dynamometry, MMSE test for cognitive functions/, creatinine-high index and nutritional risk screening /ESPEN, 2002/ for the severity of malnutrition have been conducted.

Results: Severe CM and underweight /76,18 %/, decreased muscle strength /47,62 %/, different degree of cognitive deficiency /76,19 %/ and muscle mass depletion /93,75 %/, lymphocytopenia /69,06 %/, anemia /52,37 %/, hypoalbuminaemia /30,94 %/, hypoproteinaemia / 23,81 %/, low potassium levels /14,29 %/ in group I have been found. Severe CM /42,23 %/, underweight /60 %/, decreased muscle strength and cognitive deficiency /37,79 %/, different degree of muscle mass depletion /87,89 %/, lymphocytopenia /51,10 %/, anemia, hypoalbuminaemia and hypoproteinaemia / 8,89 %/, low potassium levels /6,67 %/ in group II have been established. Usual nutrition is characterized with unbalanced eating regimen, insufficient intake of energy and nutrients in all patients.

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Conclusions: Malnutrition without behavioural psychiatric disorders is associated with greater nutritional disorders in relation to somatic impairments. Chronic malnutrition in hospitalized patients with and without behavioural psychiatric disorders requires a complex nutritional status assessment for applying of personalized nutritional support.

Keywords: (maximum 5): MALNUTRITION, NUTRITIONAL ASSESSMENT, BEHAVIOURAL DISORDERS.

149/893. Functional bread enriched with microencapsulated iron

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Introduction: Iron is an essential element for most forms of life, including humans beings. It is needed for a number of highly complex processes in the body e.g. the transportation of oxygen. Although dietary sources of iron are abundant, nutritional iron deficiency is estimated to affect 1.5-2 billion people worldwide (WHO, 2010) Food fortification in highly available for absorption forms is a strategy for preventing this micronutrient deficiency.

Objectives: The primary objective of this study was to design innovative, health-promoting bakery products based on a new iron microencapsulation technology.

Method / Design: - Iron microencapsulation: spray drying technology,

- Bread preparation: conventional and sourdough fermentation process,

- Iron bioaccessibility: digestions with in vitro Dynamic Gastrointestinal Digester system simulating the stomach and small intestine, which includes peristaltic movenments, secretion of digestive juices, gastric and intestinal emptying, pH adjustment simulated according to physiological data.

- Iron bioavailability: Caco-2 cells exposed to digested sample.

- Total iron content: microvwe digestion assisted by nitric acid and hydrogen peroxide followed by determination using Atomic Absorption Spectrometry (AAS).

- Iron speciation: the absorbance of Fe(II) complexed by 3-(2-Pyridyl)-5,6-di(2-furyl)-1,2,4-triazine-5- ,5-~ -disulfonic measured at 593 nm.

Results: - Among the tested wall materials: hydrogenated palm oil, modified starches, maltodextrins, arabic gum and chitosan the optimal technological parameters of microencapsules were obtained for modified starch.

- 15 varieties of enriched (16.5mgFe/100g) breads were prepared: 5 produced with conventional and 10 with sourdough fermentation.

- Bioaccessibility of iron from bread produced with sourdough fermentation ranged between 53 and 83%.

Conclusions: - Spry drying process can be used for preparation of microcapsules with modified starch carrying ferrous lactate or ferrous sulfate.

- Microencapsulation effectively protects iron(II) against oxidation.

- Iron is released from microcapsules and solubilised at the small intestine for its absorption

Keywords: (maximum 5): IRON DEFICIENCY: FUNCTIONAL FOOD: MICROENCAPSULATION.

149/905. Serum Lipid profile and related factors in Sedentary Turkish adults living in Konya

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Introduction: Obesity related non-communicable diseases, as cardiovascular disease, cancer, type 2 diabetes and hypertension, are the leading causes of mortality and morbidity in the world. Body Mass Index (BMI) and blood lipid level is a good indicator of body fat content and is affected by factors as diet, exercise and smoking.

Objectives: This study was conducted to determine the blood lipid levels and related factors in sedentary adults living in Konya, a province where prevalance of obesity is considerably high.

Method / Design: This study was carried out in 10 family health centres and 3 public health centres chosen randomly in Konya. 1888 participants aged between 18-70 years were randomly selected from individuals who approached these centres for health or check up reasons. Research datas were collected by face to face interview using a questionnaire prepared by the researchers based on literature review. Means, chi- sqare tests, t-tests and Pearson correlations were used for data analyses.

Results: Of the participants, 86.5% were females, mean age was 41.45 ±12.8 years and 85.4% had a BMI of ≥ 25; 70.8% stated that they did not engage in any kind of sports activity, 82.7%were non-smokers. Only total cholesterol levels were found to increase with age ($r=0.627$, $p<0.0001$). Total cholesterol, triglycerides, LDL were significantly higher in males than females. ($p<0.0001$). Exercise lowered cholesterol, triglycerides and LDL level significantly ($p<0.05$). On the other hand, smoking raised cholesterol, triglycerides and LDL ($p<0.05$). Non-smokers' HDL levels were higher than smokers but was not statistically significant.

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Conclusions: Changes in life style must be incorporated into public by means of educational programs.

Keywords: (maximum 5): Obesity, blood lipids, exercise, smoking

149/911. Response of central obesity to vitamin D intake in the subjects with type-2 diabetes

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Introduction: -

Objectives: This study aimed to investigate the effects of daily intake of vitamin D-fortified yogurt drink (doogh) on central obesity indicators in subjects with type 2 diabetes (T2D) and the possible modulation of this effect by vitamin D receptor (VDR)-Cdx-2 genotypes.

Method / Design: Sixty T2D subjects were randomly allocated to two groups to receive either plain doogh (PD; n=29, containing 170 mg calcium and no vitamin D/250 mL) or vitamin D3-fortified doogh (FD; n=31, containing 500 IU/250 mL) twice a day for 12 weeks. 25(OH)D, glycemic as well as adiposity indicators were evaluated before and after the intervention. VDR genotypes in extended number of T2D subjects in the FD group (n=60) were determined.

Results: After 12 weeks, in FD compared to PD, serum 25(OH) D increased (+35.4 nmol/L vs. -4.8 nmol/L, p<0.001) and mean changes of waist circumference (WC; -1.3 vs. +1.6 cm, p=0.02), body fat mass (FM; -5.1 vs. +0.60 %, p<0.001), truncal fat (TF; -1.1 vs. 0.13%, p=0.003) and visceral adipose tissue (VAT; -0.80 vs. +0.37 a.u., p<0.001) decreased significantly. Circulating 25(OH)D was raised only in AA group (34.8 nmo/L in AA group vs. -6.4nmol/L in AG and -1.6nmol/L in GG groups, p<0.001). This difference was accompanied by a significant decrease in changes of WC (p=0.004), FM% (p<0.001) and TF% (p<0.001) in AA genotype.

Conclusions: Daily intake of 1000 vitamin D-fortified doogh for 12 weeks improved the central obesity indices in T2D subjects and the improvement was more pronounced in the carriers of AA genotype of VDR-Cdx-2.

Keywords: (maximum 5): Vitamin D, Type 2 Diabetes, Central obesity

149/913. Longitudinal changes in body mass, body composition and energy expenditure in community-dwelling elderly women

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Introduction: Advanced aging has been associated with significant changes in body mass (BM) and energy expenditure (EE), in which both increases and decreases may occur. The impact of such changes on body composition may be important for the discussion on target values for BMI for older adults.

Objectives: We investigated changes in body composition and EE as a function of changes in BM in community-dwelling senior women in Giessen using biannually obtained data over a course of ten years.

Method / Design: We categorized 179 women (at baseline 60-86 years, BMI: 19-41kg/m^2) according to changes in BM in gainers (G, ≥2kg, n=45), maintainers (M, ±0-2kg, n=60) and losers (L, ≥-2kg, n=74). EE was assessed using indirect calorimetry and multipliers according to WHO (1985) to account for EE of physical activity; fat-free mass (FFM) and fat mass (FM) were measured by bioelectric impedance analysis using the formula of Roubenoff et al. (1997).

Results: There were no significant differences in age, BM, body composition and EE between groups at baseline (Hochberg test). After ten years, there were significant differences in FFM: G>L and FM: G>M>L. Longitudinal results obtained using linear mixed models revealed that in G, FFM and FM were significantly increased by 1kg and 4kg, respectively; in M, FFM and FM significantly decreased each by 1kg; in L, FFM and FM decreased by 2kg and 4kg, respectively. Over ten years, EE significantly decreased in G (309kJ/d)<M (394kJ/d)<L (630kJ/d).

Conclusions: The direction of age-related changes of BM appears to be independent of baseline values for age, BM, body composition and EE. Both, increases and decreases in BM are common in the elderly in which FFM accounts for 20% and 33%, respectively.

Keywords: (maximum 5): Body mass changes, elderly, body composition, energy expenditure, longitudinal data

149/915. Prevalence of lean depletion in COPD using different impedance equations to predict body composition

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Introduction: Bioelectrical impedance analysis (BIA) is a simple method to assess body composition, especially fat free mass (FFM). It is commonly used in Chronic Obstructive Pulmonary Disease (COPD) studies to identify patients with lean depletion. It remains unclear if lean depletion relates to worse clinical outcome, although this might be due to the variety of equations and cut-offs used.

Objectives: We sought to investigate how using different FFM equations would identify different proportions of COPD patients as lean depleted, when using constant FFM index (FFMi) cut-offs for each gender. The scale of the effect was assessed on populations and at individual level.

Method / Design: Body composition was measured in 124/127 moderate to severe stable COPD patients from AERIS study (NCT01360398) at enrolment using Bodystat QuadScan4000. Height, weight and BIA results (resistance,reactance) were used to calculate FFM using 7 different validated equations. The Schols FFMi cut-off (<15kg/m2 women, <16kg/m2 men) was applied to define lean depletion.

Results: FFM calculated by different equations was consistently lower in women than in men, mean and associated SD ranging from 41.0±5.8kg to 45.4±8.3kg (FFMi 15.8±1.8kg/m2 to 17.5±2.7kg/m2) in women and 53.5±5.7kg to 59.6±10.1kg (FFMi17.7±1.4kg/m2 to 19.6±3.6kg/m2) in men.

The difference between the means was greater than 2kg in females in 10/21 pairwise comparisons of the FFM from each equation. This was also observed in 14/21 pairwise comparisons in males.

The width of widest limits of agreement (mean difference+/-1.96SD) was 10.6kg (females) and 19.5kg (males). Prevalence of lean depletion ranged between 15.2%-22.4% (23%-39% women, 4%-18% men) depending on the equation used.

Conclusions: Different equations result in different proportions of patients identified as lean depleted leading to a risk of individuals being misclassified. There is a need to standardise approaches across studies and clinical practice to allow guidance of nutritional care in response to true lean depletion.

Keywords: (maximum 5): Fat Free Mass, BIA, Chronic Obstructive Pulmonary Disease

149/917. Enhancing iron bioavailability from fortified rice: investigations of in situ soluble ferric-pyrophosphate generation in humans.

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Introduction: Rice is a staple food for more than half of the world's population, however, it is a poor source of micronutrients. Iron fortification of rice is technically challenging as rice is consumed as intact grains, and ferric pyrophosphate - the only sensorially acceptable compound - has low bioavailability.

Objectives: Investigating whether the addition of a citrate/trisodiumcitrate mixture (CA/TSC) prior extrusion of iron fortified rice results in an increase in iron solubility and bioavailability in human subjects.

Method / Design: We recruited 20 apparently healthy young women and assessed iron absorption from three different meals containing iron fortified rice fortified by extrusion and one reference meal: 1) extruded FePP fortified rice (EF); 2) extruded FePP fortified rice extruded with CA/TSC (EC); 3) extruded FePP fortified rice, CA/TSC-solution added just before consumption (CS); 4) regular Basmati rice, ferrous sulphate-solution added just before consumption (R). We measured iron absorption by using the incorporation of iron isotopic labels in red blood cells.

In vitro solubility was assessed by enzymatic digestion, incubation, centrifugation of extruded rice samples and subsequent iron measurement in the supernatant.

Results: Fractional iron absorption was significantly higher from meals EC and R compared to meals CS and SC ($P<0.05$). The relative bioavailability from meals EF, EC, SC was 45%, 84%, 46%, respectively, compared to the reference meal R. A trend towards higher iron solubility of the extruded FePP and CA/TSC, compared to rice fortified with FePP was shown in our in vitro studies ($P=0.085$).

Conclusions: Iron absorption from fortified rice is increased when fortification iron and CA/TSC are extruded simultaneously; the mechanism is likely generation of soluble ferric pyrophosphate-citrate moieties with enhanced solubility.

Keywords: (maximum 5): iron deficiency, rice, fortification, bioavailability

149/921. Vitamin B12 Supplementation for Assuaging Mild Cognitive Impairment: an Elders' Interventional Study

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Introduction: There is wide concern regarding burgeoning incidences of neurodegenerative disorders as dementia, Alzheimer's. Intermediately these irreversible conditions being prodromal can be counteracted by prior detection at nascent cognitive impairment stage.

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Objectives: The study was framed to intervene vitamin B12 to geriatrics (60-85 years) with Mild Cognitive Impairment (MCI) from urban Vadodara (district in the state of Gujarat), India.

Method / Design: Geriatric males and females with M.C.I. were purposively enrolled from O.P.D. of university hospital with written consent by cognitive impairment tests namely Addenbrooke's Cognitive Examination (ACE) and Mini Mental State Examination (MMSE, <26 impaired scores), followed by biochemical analysis of serum Vitamin B12 (< 211 pg/ml=deficiency state) profile. 120 willing M.C.I. patients intervened of 1000 mcg vitamin B12 injectable intramuscular doses under prescribed regime for 6 months.

Results: Mean age of geriatrics (n=120) was about 66 years and mean haemoglobin levels fell in mild anaemic range (11.64±1.68 g/dL). Post intervention findings depict that highly significant improvement ($p \leq 0.000$ level) was observed in mean serum vitamin B12 (shooting up to 651.18±366.24 pg/ml), MMSE (advancing to 28.25±1.95) and ACE (approaching to 82.25±6.10) scores resulting towards normal range respectively. ACE scores for males were 82.77±4.76 and likewise MMSE scores resulted to 28.31±1.63. In female patients, ACE scores reached 81.92±7.00 and 28.19±2.2 were MMSE scores respectively.

In continuance, significant positive correlations were analysed between ACE scores with serum Vitamin B12 levels ($p \leq 0.05$), ACE scores with MMSE scores($p \leq 0.01$) as well as amongst MMSE scores and serum Vitamin B12 levels ($p \leq 0.01$) of the patients.

Conclusions: Consequently, supplementation effect brought forth enhanced serum B12 levels and higher performance in neuropsychological geriatric scores. Thus, resort can be early diagnosis of cognitive impairment before its outreach to irreversible disorders like Alzheimer's. Consequently, vitamin B12 may alleviate neuronal loss occurring with impairment.

Keywords: (maximum 5): Mild Cognitive impairment, Vitamin B12, Elderly

149/928. HAZELNUT ENRICHED BREAD; A SUITABLE VEHICLE FOR INCREASING NUT INTAKES AMONG AN ADULT POPULATION. Hazelnut enriched bread; a suitable vehicle for increasing nut intakes among an adult population.

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Introduction: The daily consumption of 30g (grams) of nuts is recommended to reduce cardiovascular disease (CVD). In the 2008/09 New Zealand Adult Nutrition Survey (NZANS) only 6.9% of New Zealanders consumed whole nuts on the day of the 24-hour diet recall, with a mean population intake of 2.8g/d (grams per day). Therefore innovative strategies are required to increase nut consumption. One such strategy is to incorporate nuts into a staple food such as bread.

Objectives: To examine the effects of consuming three nut-enriched breads or a control bread on diet quality, appetite ratings and gastrointestinal symptoms.

Method / Design: In this controlled, crossover study 32 participants were randomly allocated to receive one of four bread types for eight days, each separated by a one-week washout. Three breads containing either 30g sliced hazelnuts, 30g semi-defatted hazelnut flour or 15g of both per 120g bread (the average amount eaten by bread consumers in the NZANS) were compared with a control white bread containing no nuts

Results: Although energy from the nut-enriched breads was higher compared to the white bread, there was no significant difference in total energy intake over the day between bread types ($P=0.102$). Compared to the white bread, the percentage of energy from carbohydrate was significantly lower for the nut breads (all $P \leq 0.039$) and saturated fat was significantly lower for the combined bread ($P=0.003$). The percentage of energy from protein, MUFA, and absolute intakes of dietary fibre, and vitamin E were significantly higher in one or more of the nut breads in comparison to the white bread. There were no significant differences between the breads for appetite ratings (all $P \geq 0.135$), or gastrointestinal symptoms (all $P \geq 0.102$).

Conclusions: The nut-enriched breads improved dietary quality in a way, which could contribute to cardiovascular health

Keywords: (maximum 5): Hazelnut-enriched bread, diet quality, nuts

149/931. Effect of immunomodulating nutrients intake on selected interleukin's concentration during pregnancy

Author(s): (1) Joanna Pieczyńska; (2) Artur Kłósek; (3) Rafał Sozański; (4) Lila Pawlik-Sobecka; (4) Sylwia Płaczkowska; (4) Izabela Kokot; (5) Halina Grajeta.

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Introduction: Proper development of the fetus is dependent on the balance between the processes of immunostimulation and immunosuppression. Moreover, it is suggested that the proper functioning of the immune system is among other things affected by a pregnant woman's adequate intake of selected nutrients.

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Objectives: The aim of the study was to demonstrate the relationship between nutrition and the concentration of IL-8 and IL-18 in the urine and concentration of IL-2, IL-6 and IL-10 in the serum in all trimesters of pregnancy.

Method / Design: Twenty-three pregnant women participated in the study. Dietary assessment was performed using the 24h dietary recall. Measurements of concentrations in the urine IL-8 and IL-18 and serum IL-2, IL-6, IL-10 has been made using ELISA kits.

Results: The advancement of gestational age does not affect the nutrient intake and the concentrations of assayed interleukins in either group of pregnant women, thise with or without pathology of pregnancy. The results showed a positive correlation between the intake of vitamin A in women with complicated pregnancy and the concentration of IL-18, as well as a negative correlation between IL-6 and IL-10 in women with pregnancy pathology of and the covering of energy needs.

Conclusions: Intake of immunomodulating nutrients could affect immune response of woman's organism with complicated pregnancy.

Keywords: (maximum 5): nutrition, interleukins, pregnancy

149/932. Effect of nutrients intake on total antioxidant status during pregnancy

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Introduction: Pregnancy is associated with increased oxidative stress, and the exaggeration of oxidative damage is considered important in pregnancy complications. Moreover, it is suggested that the antioxidant status of pregnant women is affected, among other things, by the adequate intake of selected nutrients.

Objectives: The aim of the study was to demonstrate the relationship between nutrition and serum total antioxidant status of pregnant women in all trimesters of pregnancy.

Method / Design: Twenty-three pregnant women participated in the study. Dietary assessment was performed using the 24h dietary recall. Measurement of serum total antioxidant status has been made using the TAS kit.

Results: The advancement of gestational age does not affect the nutrient intake and the total antioxidant response in either group of pregnant women, these with or these without pathology of pregnancy. The results showed no correlation between the intake of nutrients and total antioxidant status independently of gestational age and the presence or absence of pregnancy pathology.

Conclusions: Intake of nutrients with antioxidant potential does not affect the total antioxidant status of women during pregnancy.

Keywords: (maximum 5): nutrition, total antioxidant status, pregnancy

149/936. Evaluation of bone mineral density of aircraft crews flying in the transport aviation units of the Polish Air Forces

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Introduction: Calcium is the main building component of bones. According to the Polish nutrition standards recommended daily intake of calcium among children and adults amounts to 1,300 mg. Epidemiological studies suggest that statistical Polish men and women meet daily requirement for calcium in just 44% and 41% respectively.

Objectives: The aim of the work was to assess bone mineral density of aircraft crews and technical personnel of transport aviation units of the Polish Air Forces.

Method / Design: Total of 120 men and 9 women serving in the military transport aviation units underwent the examination. The average age of men was 35.4 ± 7.3 years. Average body height of examined men was 178.9± 6.1 cm and average body weight amounted to 85.1 ± 10.5. Average age of examined women was 29.2 ± 3.6 years. Their average body height was 162.9 ± 4.5 cm (156.2-169.3), and average body mass amounted to 56.3 ± 3.5 kg (52.2-63.4).

Examination of the bone mineral density was carried out using the densitometric method, on a forearm bone of non-prevailing arm, using the EXA 3000 apparatus.

Results: Disorders in skeletal mineralization of different degree of severity were found among 21.8% of men and 77.8% of examined women. Changes in bone mineral density typical for osteopenia were found among 18.8% of men and 33.3% of women, while 3% of men and 44.5% of women revealed changes typical for osteoporosis.

Conclusions: Disorders in bone calcification found among aircraft crews and technical personnel of transport aviation units of the Polish Air Forces require undertaking prophylactic actions in scope of health education spread, especially the role of calcium in human nutrition.

Keywords: (maximum 5): diet calcium, bone mineral density, osteoporosis, soldiers,

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149/938. Antinflammatory and antidiabetic effects of a whole grain pasta enriched in prebiotics and probiotics.

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Introduction: Epidemiological studies evidenced a strong correlation between the consumption of whole grain cereals, rich in fibre, micronutrients and antioxidants, and the decrease of chronic diseases (i.e. cardiovascular diseases, type-2 diabetes, etc.). Among the fibres, β-glucans are worth to exert several health properties. Food can also convey probiotics, i.e. the Bacillus coagulans, a microorganism known for its spore-forming nature and its high degree of viability.

Objectives: To evaluate the effect of an innovative whole grain pasta, enriched in barley β-glucans and Bacillus coagulans spores, on blood metabolic and inflammatory markers.

Method / Design: The study design was a parallel randomized controlled trial. Forty one healthy overweight/obese volunteers (53 ± 11 years; 30.9 ± 4.9 kg/m2; mean ± standard deviation) replaced for 12 weeks their habitual daily portion of pasta with the innovative wholegrain pasta or a control wheat pasta. At the beginning and every 4 weeks afterwards, blood samples were collected to quantify several cytokines and markers linked to inflammatory, diabetes and obesity conditions.

Results: No difference at baseline and no variation over the study period were found for anthropometric, inflammation and diabetic markers within and between the two intervention groups. Although not in a significantly manner, data showed positive changes just after 4 weeks consumption in each treatment group, reaching a steady state at the end of the 12 weeks. Over the 12 weeks consumption, decreasing trends were observed within the innovative pasta consumption group for glycaemia and some inflammatory markers.

Conclusions: The daily consumption of a prebiotic- and probiotic-containing whole grain pasta seems to have a positive effect on some metabolic and inflammatory disease markers in sedentary overweight/obese volunteers. Further analyses are in progress to evaluate the spores probiotic effect and the antioxidant activity of fibre-bound polyphenols.

Keywords: (maximum 5): Whole grain cereals, prebiotics, probiotics, inflammatory markers, lipids.

149/954. Preventing double burden of malnutrition for Indonesia

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Introduction: Rapid economic development has led to a significant increase of obesity among adults in many countries. Ironically, obesity often coexists with under-nutrition among members of the same household.

Objectives: The aim of this paper is to demonstrate the occurrence of this double burden of malnutrition as a major health concern in Indonesian families

Method / Design: The analysis uses the 2010 National Basic Health Research data to illustrate the occurrence of stunted children and obese mothers within the same household from 12,914 children aged 0-59 months. Stunted children are children <5 years who have a height-for-age <-2SD of 2005 WHO reference; obese mothers are defined as mothers with BMI ≥ 25 and height <145 cm. All comparison were based on household residences and expenditure levels.

Results: The prevalence of stunted children with obese mothers was 11.3% (urban) compared to 10.1% (rural). Based on household expenditure levels, the prevalence of stunting among children with obese mothers was not significantly different between the various quintiles of household expenditures as follows: 9.9% (Q1), 11.2% (Q2), 11.8% (Q3), 11.2% (Q4), and 8.9% (Q5). Other forms of double burden malnutrition which had a significantly difference include: a) stunted children-stunted mothers in urban compare to rural: 5.0% versus 7.9%; b) normal children-stunted mothers: 4.5% (urban) and 5.6% (rural); c) stunted children – normal mothers: 29.9% (urban) and 35.9% (rural) d) normal children – normal mothers: 60.5% (urban) and 50.6% (rural).

Conclusions: The double burden of obesity and stunting in households malnutrition seen in rural exists in Indonesia at the same level of risk seen in the urban whether they are poor or rich households. Interventions to address the nutritional status should be designed with specific approach for rural versus urban of each households member individually and promote a healthy balance diet.

Keywords: (maximum 5): Double burden of malnutrition, healthy balance diet

149/961. Personalised nutrition in the developing regions: opportunities and challenges

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Introduction: Chronic diseases will account for almost three-quarters of all deaths worldwide by 2020. On a global basis, 60% of the burden of chronic diseases will occur in developing countries. Urbanization, globalization and economic development have led to a paradigm shift in the dietary and lifestyle changes which encourages the consumption of high-value foods. Inclusion of processed foods and consuming foods outside the home have become predominant. This has added to the existing dilemma of reduced energy expenditure, resulting in overweight among the developing countries. Diet is therefore considered as a primary prevention strategy to reduce the risk of chronic disease development. There is good evidence that nutrients and physical activity influence gene expression and have shaped the genome over several million years of human evolution. In view of changing socioeconomic conditions in developing countries, such added stress may result in exposure of underlying genetic predisposition to chronic diseases. Gene--nutrient interactions also involve the environment. Studies have also reported that nutrients play a role in gene expression.

Objectives: The populations approach to dietary practices may not be in line with the national recommendation. Hence, the need of personalized nutrition. The purpose of this paper is to understand if the developing nations are well prepared for personalised nutrition to alleviate the burden of chronic diseases.

Method / Design: Studies have been reviewed to explore the possibility of practicing personalised nutrition in the developing regions.

Results: There has been an emerging interest in the need for targeted diets for individuals and subgroups to prevent chronic diseases as an approach to prevention at the at the population level. But, can this be adopted in the developing regions?

Conclusions: Personalised nutrition will play an important role in understanding the individual needs by considering the genotype and the environment.

Keywords: (maximum 5): Personalised nutrition: Genotype: Developing countries: chronic diseases

149/965. EPA prevents insulin resistance and glucose intolerance in mice fed a high fat-high sucrose diet

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Introduction: Insulin resistance (IR) is a key feature of obesity. IR favors the progression of metabolic syndrome (MetS), increases the risk of type 2 diabetes and cardiovascular diseases. IR results from metabolic dysfunctions caused by ectopic fat depots in the liver and skeletal muscle when adipose tissue storage capacity is exceeded. Nutritional strategies using n-3 PUFA were proposed to prevent IR and MetS associated to obesity by unclear mechanisms.

Objectives: The aim of the present work was to compare the effect of ALA, EPA and DHA on insulin resistance and metabolic dysfunctions during a high fat (HF)-high sucrose (HS) challenge.

Method / Design: C57BL6 and Ob/Ob mice were fed a HF (45% energy)-HS (17% energy) diet for 16 and 6 weeks respectively. IR was evaluated by intraperitoneal injection of insulin followed by monitoring of glycaemia over 2 hours. Glucose tolerance was similarly assessed using glucose injection. Fatty acid composition of tissues was determined by gas chromatography.

Results: All n-3 PUFA were retrieved in plasma, muscle and liver lipids. Supplementations with n-3 PUFA did not affect final body weight nor energy intake compared to control HFHS mice. However, EPA significantly reduced plasma NEFA and total cholesterol. EPA also significantly improved IR at the whole body level and in the liver, as well as glucose tolerance. By contrast, DHA and ALA had no effect.

Conclusions: Long chain omega 3 fatty acids have distinct effects on IR and glucose tolerance. By contrast with ALA and DHA, EPA has interesting protective effect against several key parameters of MetS.

Keywords: (maximum 5): n-3PUFAs, insulin resistance, high fat, high sucrose, eicosapentaenoic acid

149/966. The comparison of effects of canola and soya oils on lipid profile in overweight and obese Iranian diabetic (II) patients

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Introduction: Nutrition therapy is an integral part of diabetes management, playing an essential role in the treatment of the disease.

Objectives: The present study aims for investigating the impact of canola and soybean oils on lipid profile on overweight and obese Iranian diabetic (II) patients.

Method / Design: 72 overweight type 2 diabetes patients were selected and the patients were divided into 3 groups: 1) Canola oil (n=24); 2) Soya oil (n=24); and 3) control group(n=24) for two month. At the beginning of the study and the end of the second month, 10 cc blood was collected from each patient. Lipid profile was measured before and after the study. All data were analyzed by ANOVA.

Results: The mean of TC, TG, and LDL in canola (p=0.0001, p=0.01, and p=0.01, respectively) and soybean (p=0.0001, p=0.002, and p=0.01, respectively) groups at the end of the study significantly decreased. The mean of HDL in canola and soybean groups significantly increased (p=0.01 and p=0.001, respectively). The results of the differences between the values before and after the study indicated

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that soy oil has more decreasing effect on TG, TC and LDL than canola oil while has also stronger effect on increasing HDL level.

Conclusions: The results of the current study showed that both soy and canola oil decreasing lipid profile compared with the control group but the soy oil effect on lipid profile is more clear than the canola one. Hence in diabetic patients with lipid disorders, recommending soy oil could be helpful.

Keywords: (maximum 5): diabetes type 2, canola oil, soya oil, overweight, lipid profile

149/967. Adipose tissue fatty acids and cardiovascular and all-cause mortality in elderly men

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Introduction: For several fatty acids, adipose tissue reflects long-term dietary intake and may provide more objective information than self-reported intake. No prospective studies have examined whether adipose tissue fatty acids predict cardiovascular and all-cause mortality.

Objectives: To investigate associations between adipose tissue fatty acids and cardiovascular and overall mortality in a cohort of elderly men. We hypothesized that polyunsaturated fatty acids (PUFA) could be inversely associated with cardiovascular and all-cause mortality.

Method / Design: In the Swedish community-based cohort study ULSAM, adipose tissue biopsies were taken from the buttocks of 853 men at age 71. Cox regression analyses were performed primarily for four PUFA that were considered to reflect dietary intake (linoleic acid, 18:2n-6, alpha-linolenic acid, 18:3n-3, eicosapentaenoic acid, 20:5n-3, and docosahexaenoic acid, 22:6n-3), and for all other available fatty acids (secondary analyses) analyzed by gas-liquid chromatography.

Results: During 20-year follow-up, 605 individuals died of which 251 were cardiovascular deaths. After adjusting for risk factors, none of the four primary fatty acids were associated with cardiovascular mortality (hazard ratios (HR)=0.92-1.05 for each SD increase, P≥0.27). Linoleic acid was inversely associated with mortality (HR=0.90, 95% confidence interval (CI) 0.82-0.99, P=0.03). In secondary analyses, palmitoleic acid, 16:1n-7, (HR=1.11, 95% CI 1.02-1.21, P=0.01), and arachidonic acid, 20:4n-6, (HR=1.09, 95% CI 1.00-1.19, P=0.05) were associated with increased mortality, whereas heptadecanoic acid, 17:0, was inversely associated with mortality (HR=0.89, 95% CI 0.79-1.00, P=0.05).

Conclusions: Adipose tissue linoleic acid was inversely associated with total mortality, but not cardiovascular mortality in elderly men. The mechanisms behind adipose tissue PUFA and longevity warrant further investigation.

Keywords: (maximum 5): Fatty acids, mortality, adipose tissue, cardiovascular disease, PUFA

149/971. Characterization of Low Density Lipoprotein phenotypes using atherogenicity index as surrogate marker in obese Cameroonians

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Introduction: Obesity is often associated with a high atherogenic risk, mainly caused by the preponderance of small and dense Low Density Lipoprotein (LDL) particles which is known as the phenotype B of LDL and constitute an important cardiovascular risk factor.

Objectives: The objective of the study was to determine the LDL phenotypes and evaluate its relationship with others cardiovascular risk factors in a group of obese Cameroonians.

Method / Design: This cross-sectional study included 295 apparently healthy obese (Body Mass Index (BMI) ≥ 30 kg/m2), aged 20-70 years and selected from Nkongsamba, a semi urban area of Cameroon. Complete anthropometric, biochemical and food habits data about cardiovascular risk factors were available for 295 subjects. In addition to LDL phenotypes (according to the atherogenicity index: Log (Triglyceride/HDL-cholesterol)), data on blood lipids including triglycerides, total cholesterol, HDL-cholesterol and LDL-cholesterol were collected. All statistical analyses were performed with the statistical package for social science software version 16.0.

Results: Analysis of LDL phenotypes has shown that non atherogenic phenotype A (40.32%) and normal phenotype I (41.35%) were mostly represented in obese subjects when compared to atherogenic phenotype B (18.5%). The study of relationship between LDL phenotypes and others cardiovascular risk factors revealed that total hypercholesterolemia was more associated with the occurrence of phenotype I (45%), hypertriglyceridemia with phenotype A (85.5%) and low HDL levels with phenotype B (39.5%). About lifestyle, high fruits and vegetables consumption have been shown to modulate LDL particle size by reducing the frequency of phenotype B.

Conclusions: This study show that LDL phenotype could be associated with cardiovascular risk factors in Cameroonians obese and its variability is influenced by lifestyle.

Keywords: (maximum 5): obese Cameroonians, surrogate marker, LDL phenotype, atherogenicity index

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149/973. mRNA expression of antioxidant enzymes in rats intoxicated with lead or cadmium fed with seabuckthorn

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Introduction: Seabuckthorn fruits are rich source of valuable nutrients and non-nutrients, especially with antioxidant properties.

Objectives: The aim of this study was to determine the effects of cadmium or lead intoxication in presence of seabuckthorn fruits on the mRNA gene expression of selected antioxidant enzymes (heme oxygenase-1, glutathione reductase, superoxide dismutase, glutathione peroxidase).

Method / Design: Wistar rats were divided into 6 groups (n=8) and fed with experimental diets: (I) AIN-93G, (II) AIN-93G with lead (0.025 mg/ kg body weight), (III) AIN-93G with cadmium (0.025 mg/ kg body weight), (IV) AIN-93G with freeze - dried seabuckthorn fruits (5%), (V) AIN-93G with seabuckthorn fruits and lead, (VI) AIN-93G with seabuckthorn fruits and cadmium. After 4 weeks rats were sacrificed and livers were dissected. Total RNA was isolated with using commercial kit (A&A Biotechnology), and then for cDNA synthesis RNA was reverse transcribed (A&A Biotechnology). cDNA was subjected to real time PCR in a reaction of a mixture containing TaqMan Gene Expression Master mix and primers with fluorescent marked starters glutathione reductase (Gsr), glutathione peroxidase (Gpx), heme oxygenase-1 (Hmox1) and superoxide dismutase (Sod).

Results: The statistical analyses did not show any significant differences in the level of relative expression of the tested genes ($p>0.05$).

Conclusions: The intoxication with cadmium or lead did not affect the expression of genes coding antioxidant enzymes, such as: heme oxygenase-1, glutathione reductase, superoxide dismutase, glutathione peroxidase. Hence the protective effect of seabuckthorn fruits on these genes cannot be estimated. Longer and further analyses investigating the favorable effect of the tested fruits should be performed upon the condition of oxidative stress.

This study was supported by the National Science Centre; decision no DEC-2011/01/B/NZ9/07177.

Keywords: (maximum 5): seabuckthorn, lead, cadmium, gene expression

149/990. Social and Economic Correlates of Malnutrition in Polish Elderly Population: the Results of PolSenior Study

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Introduction: In elderly individuals proper nutritional status is one of the major correlates of health, independence and quality of life. In contrast, malnutrition leads to progressive disability, as well as to the increased risk of dependency and institutionalisation. Nevertheless, malnutrition in old age is often not diagnosed and thus not treated. It is therefore important to use screening tools to assess the prevalence of malnutrition in order to increase the possibility of early treatment. Important is too better understanding the factors which contribute to the development of malnutrition in elderly.

Objectives: The aim of this study was to evaluate the epidemiology of malnutrition in Polish elderly population and analyse its socio-economic correlates based on the data from the PolSenior project, the first nation-wide study of a representative group of Polish seniors.

Method / Design: The nutritional status of 4482 participants was assessed through the Mini Nutritional Assessment Short Form (MNA-SF). Out of socio-economic correlates we evaluated such parameters as age, sex, level of education, marital status, place of residence, living conditions and economic status. Economic status of the respondents was determined on the basis of questions on how well they could manage their own budgets. Those who could afford only the cheapest food or clothes were considered the group of self-reported poverty.

Results: Frequency of malnutrition in the PolSenior population accounted for 7.5% (in 5.0%men and 9.0%women; $p<0.001$). Female sex (OR=1.51; $p<0.01$), age (for every 10 years; OR=2.18; $p<0.01$), unmarried status (OR=1.50; $p<0.01$), living in rural area (OR=1.27; $p=0.02$) and self-reported poverty (OR= 1.72; $p<0.01$) were independent correlates of malnutrition.

Conclusions: The data showed high prevalence of malnutrition among the community-dwelling elderly people in Poland. Screening with MNA-SF should focus in particular on unmarried, poorly educated women, especially in late old age, living in rural areas and declaring bad financial situation.

Keywords: (maximum 5): malnutrition, MNA-SF, socio-economic status, elderly

149/992. The effect of a 12-week omega-3 supplementation on body composition in elderly individuals with decreased muscle mass.

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Introduction: Natural consequence of physiological aging is the gradual loss of muscle mass , which in specific conditions may lead to the sarcopenia, which is a threat to the successful aging. Nowadays there is a search for the therapeutic approach for the treatment of low muscle mass in elderly people. The therapeutic approach includes i.a. high quality protein, vitamin D, n-3 polyunsaturated omega - 3 acids (n-3 PUFAs) supplementation. The supplementation of n-3 PUFAs is suggested to have a potential benefits for age-related alterations in the muscles because chronic low-grade inflammation is probably one of the reason for age-related loss of muscle mass.

Objectives: The aim of this study was to assess the effect of n-3 PUFAs supplementation on the parameters of body composition in elderly people with decreased muscle mass.

Method / Design: 50 community-dwelling elderly with ALM index (the ratio of appendicular lean mass to squared height) below either (-2SD) of ALM index for young referral Polish population (low muscle mass -LMM) or between (-1SD and -2SD: the risk of LMM - rLMM) were randomly assigned PUFAs-treated groups (group I: LMM, group II - rLMM) or control groups (group III: LMM, group IV - rLMM). Groups I and II received capsules with 1.3g n-3 PUFAs and 10mg vitamin E, while groups III and IV - 11mg vitamin E daily for 12 weeks. Body composition were assessed by means of Bioelectrical Impedance Analysis (InBody170 analyzer) before and after supplementation.

Results: After the 12-week observation no statistically significant differences were observed either in muscle mass, fat-free mass, total body water or in fat tissue and percent body fat in any group.

Conclusions: 12-week supplementation of PUFAs did not affect the body composition in elderly individuals with decreased muscle mass.

Keywords: (maximum 5): aging, muscle mass, omega-3

149/993. Associations between habitual food group consumption and semen analysis among men attending a fertility clinic

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Introduction: Existing epidemiological studies have illustrated a link between infertility and lifestyle patterns, including dietary habits. Also, recent studies have shown that human nutrition could influence the quality of semen in men undergoing In Vitro Fertilization (IVF) procedures. While many nutritional studies of semen quality have focused on isolated micronutrients such as various antioxidants, very few studies have focused on food groups.

Objectives: To explore any differences in food group consumption between male partners of subfertile couples with abnormal and normal semen analyses.

Method / Design: This is an ongoing cross-sectional cohort study assessing dietary and lifestyle habits in men of subfertile couples undergoing IVF/ICSI at the Embryogenesis Assisted Conception Unit, Athens, Greece. The study was designed to evaluate the influence of habitual dietary intake and lifestyle on fertility and pregnancy outcome. A general questionnaire on lifestyle/demographic factors and a validated food-frequency questionnaire to assess habitual dietary intake were filled out from 113 male participants. Exclusion criteria included pathological conditions of male genital tract.

Results: Eighty-five participants (75.2%) had abnormal semen analysis, defined as those with semen analysis parameters below the WHO 2010 lower reference limits. Compared to men with normal seminogram , men with abnormal semen analysis had lower daily intake of non refined cereals, fruits, vegetables, legumes, fish and poultry and higher intake of full-fat dairy products, red meat, alcohol and potatoes (all $p<0.05$). In logistic regression analyses, consumption of fruits (OR 0.52; 95% CI 0.30-0.83 per 1 serving/day) and vegetables (OR 0.32; 95% CI 0.18-0.60, per 1 serving/day) was associated with lower likelihood of having an abnormal seminogram after adjusting for age, body mass index, anxiety, physical activity level, smoking, energy intake and family infertility history.

Conclusions: A diet poor in fruit and vegetables may be associated with an increased likelihood of having an abnormal semen profile.

Keywords: (maximum 5): infertility, semen analysis, food groups, nutrition

149/996. Diet during pregnancy – does it matter in a well-nourished population?

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Introduction: Monitoring of dietary intake has become an integral part of pregnancy and birth cohort studies. The Norwegian

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Mother and Child Cohort Study (MoBa) has a FFQ covering the average intake of food, beverages and dietary supplements during the first 4 to 5 months of pregnancy. It included questions about 255 foods and dishes and has been thoroughly validated. Dietary data are available for 87,700 pregnancies.

Objectives: To summarize key findings from all studies available of maternal diet and pregnancy outcomes in the MoBa and to evaluate the role of maternal diet in a well-nourished population.

Method / Design: The pregnancy outcomes include birth size measures, infants being small and large for gestational age, pregnancy duration, preterm delivery, preeclampsia, gestational weight gain and postpartum weight retention. At present (April 2015) 21 studies of maternal diet and pregnancy outcomes have been published.

Results: The results from MoBa diet studies provide strong supporting evidence for lower risk of adverse pregnancy outcomes in women who regularly consume vegetables, fruits, berries, whole grain, fish, dairy, and water. A protective effect of probiotic and antimicrobial foods points to the importance of diet composition for a healthy gut flora and the body's immune response. The results showing negative impact of even low levels of environmental contaminants support the precautionary advice to avoid or reduce consumption of foods with moderate to high content. Our results corroborate that the current dietary recommendations to pregnant women are sound.

Conclusions: Results from MoBa indicate that maternal diet is an important modifiable lifestyle factor and that healthy eating, defined as following the official recommendations, is particularly important in pregnancy. Medical antenatal care practitioners should be encouraged to pay more attention to dietary counselling.

Keywords: (maximum 5): Diet, pregancy, Environmental epidemiology

149/997. The effect of a 12-week omega-3 supplementation on serum level of CRP, Il-6, TNF-α in elderly individuals with decreased muscle mass.

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Introduction: Chronic low-grade inflammation is probably one of the reason for age related loss of muscle mass. The polyunsaturated omega - 3 acids (n-3 PUFAs) have anti-inflammatory properties and, therefore, might be useful in the preventing for age-related loss of muscle mass.

Objectives: The aim of this study was to assess the effect of n-3 PUFAs supplementation on the markers of inflammation concentration in serum such as CRP (C-reactive protein), Il-6 (interleukin-6), TNF-α (tumor necrosis factor α) in elderly people with decreased muscle mass.

Method / Design: 50 community-dwelling elderly with ALM index (the ratio of appendicular lean mass to squared height) below either (-2SD) of ALM index for young referral Polish population (low muscle mass -LMM) or between (-1SD and -2SD: the risk of LMM - rLMM) were randomly assigned PUFAs-treated groups (group I: LMM, group II - rLMM) or control groups (group III: LMM, group IV - rLMM). Groups I and II received capsules with: 660 mg EPA, 440mg DHA, 200mg other omega-3 fatty acids, 10 mg vitamin E, while groups III and IV - 11 mg vitamin E daily for 12 weeks. Body composition was assesed with Bioelectrical Impedance Analysis. CRP, Il-6 and TNF-α were assessed with the high sensitivity ELISA method before and after supplementation.

Results: After the 12-week observation no statistically significant differences were observed in CRP, Il-6 and TNF-α serum concentration in any group.

Conclusions: In our study, 12 weeks supplementation of PUFAs did not affect the CRP, Il-6 and TNF-α serum concentration in elderly individuals with decreased muscle mass.

This research project was supported by a Grant no. RG 5/2012 obtained from NUTRICIA Foundation.

Keywords: (maximum 5): aging, muscle mass, pro-inflammatory cytokines, omega-3

149/1003. Nutritional status of school adolescents in Algiers, Algeria: Prevalence of overweight and obesity

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Introduction: One of the most important issues of human nutrition is the assessment of nutritional status of children and adolescents. Available statistics indicate that an alarming proportion of people in most Arab countries suffer from obesity.

Objectives: To assess the frequency of different grades of nutritional status (obesity, overweight and thinness) in Algerian children using four current definitions based on body mass index (BMI). Algeria is located on the southern Mediterranean rim in Northern Africa, between Morocco and Tunisia.

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Method / Design: We conducted a cross-sectional study of pupils from secondary schools of Algiers. A sample of 344 pupils from 11 to 13 years old was randomly selected. All anthropometric measurements were performed by personnel trained according to standard procedures: Weight: One suitable weight balance measuring to nearest 100 g was used. Students were weighed while wearing light school uniform. Height: Suitable metallic meter scale measuring to the nearest millimetre, fixed on the scale was used. Anthropometric parameters of adolescents were assessed with WHO AnthroPlus software.

Results: There were 199 girls (58%) and 145 boys (42%) whose average age was 142.94 ± 7.8months. The average weight was 42.21 kg ± 10.45 (range 20 to 80 kg), and the average size was 149.11cm ± 11.86 (range 120 to 177 cm). The Body Mass Index (BMI) was 18.9kg/m2 ± 3.7 (range 12.73–31.25).The prevalence of obesity was of 9.6 % (95 % IC [6.3%; 12.9%]). In addition, 30.2 % (95 % IC [25.2%; 35.2%]) of the pupils were overweight. Obesity was more common in boys (15.2%) than girls (5.5%).

Conclusions: The absence of a national database on the nutritional status of children needs the establishment of a monitoring program of their nutritional status to avoid any complications in the adult age.

Keywords: (maximum 5): Prevalence; teenager; overweight; obesity; Cardiovascular diseases.

149/1010. Energy expenditure and body composition after kidney transplantation.

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Introduction: Changes in nutritional status are common in the post-transplant period and can generate risks for cardiovascular mortality. Monitoring these changes can be a valuable tool in improving survival for these patients.

Objectives: To evaluate changes in energy expenditure and body composition in kidney transplant recipients at hospital discharge and three months after.

Method / Design: Thirty-five patients older than 18 years old, who had undergone kidney transplantation, were evaluated at the time of hospital discharge and 3 months later the transplant. Body composition was measured by bioelectrical impedance (BIA) and resting energy expenditure (REE) by indirect calorimetry, comparing with estimates of the Harris & Bennedict equation. The statistical difference was defined with p-value less than 5%.

Results: Three months after the discharge, there was a statistically significant increase in weight (average 5,0 ± 0,5%) and body fat (average 18 ± 2.9%). REE significantly decreased (7,0 ± 2.2%) from 24 to 21 kcal/kg of body weight, which matches with the significant drop of 6 ± 2.5% on lean mass, discounted the total body water. No difference was found in the ratio REE measured/estimated between periods (from 1.06 ± 0.19 to 0.99 ± 0.2). There was a positive association between dry weight before transplantation and fat mass (kg) post-transplant ($\rho = 0.34$; $p = 0.04$).

Conclusions: The use of immunosuppressive drugs and changes in dietary habits can contribute to post-transplant weigth gain, mainly of body fat. These modifications in body composition may be important focus of effective dietary interventions to ensure greater survival in this group.

Keywords: (maximum 5): Energy expenditure, Body composition, Kidney transplantation.

149/1013. Physiological doses of omega-3 to improve inflammation and nutritional status in hemodialysis patients.

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Introduction: Omega-3 polyunsaturated fatty acids (n-3) appear to have cardioprotective function and American Heart Association recommends a daily intake of 1.0 g of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) for patients at high cardiovascular risk. To date, no guidelines has established a recommendation of n-3 to dialysis patients.

Objectives: To investigate whether supplementation of Omega-3 polyunsaturated fatty acids, in physiological dose, can improve inflammation markers and nutritional status of hemodialysis (HD) patients.

Method / Design: Experimental randomized double-blind trial compared the effect of omega-3 and placebo supplementation in HD patients, aged ≥18 years and without inflammatory diseases. Forty-four patients were supplemented with 1.2 g of EPA+DHA (42% EPA ; 22% DHA) and 46 received placebo capsules containing soybean oil, for 12 weeks. Serum concentrations of C-reactive protein (CRP), tumor necrosis factor-α (TNF- α), body Mass Index (BMI), abdominal circumference, and body fat were determined before (T0) and after supplementation (T1). The comparison between control and placebo changes (T1-T0) was performed using a linear regression model considering $p<0.05$.

Results: There was an increase in serum levels of n-3 and improvement in n-6 / n-3 balance (10.1 ± 4.1 to 5.2 ± 2.7) in the supplemented group, however there were no differences between groups for changes in nutritional status and inflammation parameters (CRP 0,1±1,3 and 0,2±1,0; TNF- α 3,4±23,0 and 2,3±19,4) control and placebo, respectively.

Conclusions: Supplementation with omega-3 fatty acids at physiological doses seems not to be able to improve the inflammatory parameters and nutritional status in HD patients. This suggests that

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higher doses may be needed to achieve a cardioprotective effect in this group.

Keywords: (maximum 5): Inflammation, Hemodialysis, Nutritional status.

149/1014. Joint parent-children nutritional activities may improve BMI in children who are overweight or obese

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Introduction: A novel educational approach through a controlled school-based trial.

Objectives: To achieve an improvement in eating habits and reduced obesity.

Method / Design: A cluster randomized controlled trial allocated 4 elementary schools to intervention or control groups. This allocation was switched with the next cohort of children. Recruitment was in first grade, randomization at the beginning of second grade, and evaluation of results at the end of the second grade and beginning of the third grade.

Intervention: 5 joint parent-children classroom activities on conventional nutritional topics integrating Alfred Adler›s concepts (setting limits, family communication, imitation, belonging, etc.)

Results: Of 743 children in 23 second grade classes, parental consent was given for 68%, and third grade follow-up reached 58%.

At the end of 2nd grade and the beginning of 3rd grade, the intervention group compared with the control group reported significantly increased intake of fruits and vegetables, a more varied diet, and reduced sweets and munched snacks. The average daily increase in BMI in the control group during the 2nd grade was almost double that of the intervention group (0.0015 kg/m2/day vs 0.0008 kg/m2/day, p=0.014). During the summer vacation, both groups exhibited identical average daily increase in BMI (0.0019 kg/m2/day, p=0.82). With regard to children who were overweight or obese at baseline, the intervention group showed a lower daily increase in BMI during the 2nd grade (p=0.048) and during the summer (p=0.013) than the controls. This finding was supported by a significant interaction between BMI percentile at baseline (overweight vs not), trial group, and the times of measurements (end 2nd and beginning 3rd grades) for BMI (p<0.0001), weight (p<0.0001) and height (p=0.005).

Conclusions: There were encouraging changes in eating habits and in anthropometric measures using the model.

These initial findings require replication.

Keywords: (maximum 5): Daily-BMI, Children-overweight, Nutritional-activities, Alfred Adler.

149/1016. Spread of alcoholic beverages consumption among students of the University of Physical Education in Warsaw

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Introduction: Many epidemiological studies suggest that the age from 18 to 21 years of age is the period of most intense consumption of alcohol . Within this age group binge drinking is more common in the group of college students than among other people.

Objectives: The aim of the work was to assess frequency of consumption and type of alcohol consumed by students of the University of Physical Education (UPE) in Warsaw and its branch located in small town Biała Podlaska.

Method / Design: 65 men - students from Warsaw and 63 male and 60 female students studying in Biała Podlaska underwent examination. The research was conducted by responded method using a specially prepared questionnaire.

Results: Alcoholic beverages were drunk by 83.1% of students from UPE in Warsaw and by 88.7% of men and 80.3% of female students in Biala Podlaska. Beer was drunk by 55.9% of students from Warsaw and by 57.3% of man and 46.6% of examined women from Biała Podlaska. Male students in both universities drank wine - 10.3% and 13.6% respectively, and 31% of female preferred wine. Strong alcoholic beverages were drunk by 30.5% of examined students in Warsaw and by 32.4% of men and by 22.4% of women in Biała Podlaska. Among men studying in Warsaw 35.8% drank alcoholic beverages several times a month and 34.0% - once a month. Among students in Biała Podlaska 32.1% of men and 29.8% women drunk alcohol mostly once a week and 30.2% men and 29.8% women few times a week.

Conclusions: Students of both sexes preferred beer and one-third of male students drink strong alcohol, while female students drink mostly beer and wine.

Keywords: (maximum 5): students, alcohol consumption

149/1018. Identification of the link between consumption of food group and infertility in Polish men – pilot study

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Introduction: Man nutrition and nutritional status are two of the factors which signify the biological quality of semen. Oxidative stress may cause disadvantage to male fertility by damaging spermatozoon

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whereas high antioxidant intake may retain or increase the quality of semen.

Objectives: The aim of the research was to evaluate the interdependence between nutritive and non-nutritive conditioning of infertility among men

Method / Design: The semen and anthropometric measurements of 71 males, aged 24-42, were tested. All the subjects were patients to a medical centre of infertility treatment. The semen analysis was performed via the Sperm Class Analyser method. The semen classification was done according to WHO referential values. Nutrition habits were defined with the use of the FFQ6 validated questionnaire and physical activity with the IPAQ questionnaire.

Results: The semen analysis proved its proper concentration with 61,9% of the test subjects. 57,7% of the test subjects showed the appropriate translational motion. The semen morphology was in accordance with all the norms with 81,7% of the test subjects. Those who boasted the proper value of adipose tissue constituted 92,3% of the population. 76,9% of the test subjects displayed moderate-intensity physical activity. What was observed amongst the population was a high intake of chocolate (3,02±4,67), sugar (2,28±2,89), cheeses (4,11±3,64), eggs (4,51±3,44), sausages (3,40±2,21), cured meats (4,13±3,44) as well as meat and poultry (4,26±0,82) along with a low intake of thick groats (1,65±1,72), leafy vegetables (0,00±0,00) legumes (0,63±0,40), nuts (1,47±1,97), fish (0,96±0,35) and vegetable juices (0,17±0,22).

Conclusions: The research revealed anomalous semen parameters in the tested population. Unbalanced food consumption and low-intensity physical activity may foster obesity and amplify the danger of infertility.

Keywords: (maximum 5): semen quality, male fertility, diet, food groups

149/1022. Effects of a gluten-free diet on gastrointestinal symptoms and fatigue within a healthy cohort

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Introduction: There is growing interest in gluten-free (GF) diets as a lifestyle choice and continued debate on any biological basis for non-coeliac gluten sensitivity (NCGS).

Objectives: To assess the impact of a GF dietary intervention on subjective feelings of fatigue and objective markers of digestive health in healthy volunteers.

Method / Design: This study followed a traditional exclusion protocol in free-living subjects, where a 7d habitual dietary intake period was followed by a 3wk gluten-free diet and a 3wk re-introduction of gluten-containing (G) nutrition. Participants were provided with dietary advice and GF foods. Ninety-five subjects completed the study, with (mean±SD) age (yrs) 38.3±15.2 and BMI (kg/m2) 24.8±3.8. Breath test was performed using a breath hydrogen/methane gas analyser at three occasions relating to the last day of each dietary period (week 0, 3, 6). Breath samples were collected after overnight fasting, and then at 3, 4, 15, 24 hrs after breakfast. Validated questionnaires assessing the severity of the gastrointestinal (GI) symptoms (Storey et al. 2007) and the fatigue score (FS) (Chalder et al.1993) were completed.

Results: GI symptoms improved during GF diet: bloating (0.53±0.81 vs 0.23±0.55 vs 0.49±0.72, $p<0.001$), rumbles (0.45±0.71 vs 0.25±0.51 vs 0.37±0.66, $p<0.001$), flatulence (0.63±0.76 vs 0.40±0.64 vs 0.63±0.78, $p<0.001$) and cramps (0.25±0.62 vs 0.17±0.52 vs 0.26±0.64, $p=0.016$) for habitual, GF and G diets respectively. There was no difference for nausea and number of bowel movements. The fatigue score was significantly lower during GF (27.62±6.32, $p<0.001$) vs habitual (29.46±3.01) and G diets (29.55±6.04). The breath analysis showed that both the detection of hydrogen and methane was decreased during the GF phase at each of the time points ($p<0.001$).

Conclusions: Initial data indicated that GF diet reduced fatigue and improved several gastrointestinal symptoms. Potential mechanisms relating to changes in bacterial metabolism, will be examined further.

Keywords: (maximum 5): gluten-free, fatigue, gastrointestinal, breath, microbiota

149/1031. Development of revenue pre and post - workout for practitioners of strength training

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Introduction: There is a trend towards heavy training seeking muscular hypertrophy. Corporal esthetics, symmetry and muscular strength maximizing are some of the motivations of this population group. This group has special nutritional needs, compromising increased energetic intake, focused at muscular build up, concomitantly with controlled nutrient intake to minimize fluid and fat retention. Specific recipes for this group must be elaborated seeking optimal energy balance, offering adequate amounts of macro and micronutrients, keeping in mind the sensorial aspects that will stimulate sufficient daily ingestion.

Objectives: To develop pre recipes and post workout for strength training practitioners, developing fact sheets for all preparations.

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Method / Design: It were developed 7 recipes and the technical file with the identification of preparation time, difficulty in preparation , cost, color and chemical composition of food.

Results: Obtained four pre-workout and no revenues reached the value for carbohydrate, protein for only two recipes were between the percentage recommended in literature, to the macronutrient lipid only one was in the expected value. For the post-training were prepared three recipes, just a revenue reached a value for carbohydrate, protein for all revenues reached the recommended percentage in literature, and the lipid two were in the expected value.

Conclusions: Sheets preparation techniques have proven useful tool in identifying the prepared product. Revenues presented unique qualitative aspects of pre and post workout meals . May be made other revenue making nice meals of force practitioners.

Keywords: (maximum 5): Data Sheet preparation ; Physical activity ; Food

149/1037. Public views and knowledge on gmos in Poland

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Introduction: Genetically modified food are an area of different opinions especially in Europe. The consumers may be concerned about safety of GM food and health.

Objectives: Study of consumer's knowledge and opinions about organisms and genetically modified food.

Method / Design: The study was conducted using the questionnaire method among 1002 adult Poles from the whole country in 2010-2012. Authors used a set of 21 questions/comments. Data were collected through the website of the National Food and Nutrition Institute. Results were analyzed using Statistica version 6.

Results: More then 80% of respondents did not agree with the opinion that GM food is as safe as conventional. Nearly 41% believe that the risks from the use of GMOs is greater than the benefits, 1/3 are dangerous to humans, and 2/3 is more allergenic. Almost 62% said that GM: organisms disturb the natural balance of nature, and 40.6% are a threat to the environment. About 50% said that organisms GM are always larger than the traditional, and 43.1% that the conventional soybeans do not contains genes. Almost everyone surveyed expects information about the genetic modification on product labels.

Conclusions: Studies have shown that majority of respondents are aware of GMO and the knowledge on GM organisms is insufficient in Polish society. Therefore education is needed in this area.

Keywords: (maximum 5): GMO, food, consumers opinion

149/1038. Consuming an onion solution inhibits glucose uptake more in lactose-intolerant people than in lactose-tolerant people

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Introduction: Quercetin glucosides that are present in onions have been shown to reduce glucose uptake in cell culture models. Studies suggest that this inhibition is lost when the quercetin glucosides are hydrolysed by β-glycosidases to free quercetin. Lactase is a β-galactosidase expressed by people who are lactose tolerant. Hence, lactose tolerant people who express lactase may metabolise quercetin glucosides differently to people who do not express lactase (lactose intolerant people), and this could potentially influence glucose uptake.

Objectives: To investigate if there are differences in glucose uptake between lactose tolerant people and lactose intolerant people when they consume an onion solution.

Method / Design: Effects of quercetin glucosides on glucose uptake were studied in Caco-2 human colon cell culture models using 3H-glucose under Na-dependent and Na-independent conditions. For the clinical study, lactose tolerance was identified by the hydrogen breath test, and blood glucose levels were measured using an EKF glucose analyser.

Results: Quercetin 4-glucoside (100 μM) (a major glucoside in onions) and onion extract (25% w/v) decreased uptake of glucose in Caco-2 cells by 48.2% ($p<0.01$) and 62.3% ($p<0.01$) respectively under Na-dependent conditions. However, neither quercetin 4-glucoside nor onion extract caused a statistically significant reduction of glucose uptake after pre-incubation with β-galactosidase. In the clinical trial, there was a statistically significant reduction in blood glucose levels after 30 min ($p = 0.0005$) and 60 min ($p = 0.006$) when glucose was consumed together with an onion solution by lactose intolerant people (n=9), compared to when only glucose was consumed. There was a smaller and statistically non-significant decrease in blood glucose levels after consumption of onion solution in lactose tolerant people (n=9).

Conclusions: Glucose uptake is reduced by an onion solution to a greater extent in lactose intolerant people than in lactose tolerant people.

Keywords: (maximum 5): Glucose uptake, lactose tolerance, quercetin glucosides, onion

149/1042. The survey of general and central obesity indices in women nurses at Zahedan, Iran

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Introduction: Nowadays, obesity is not only one of the major health concerns in western societies but also it has turned into one of the most important causes of life-threatening diseases in developing countries.

Objectives: To determine body mass index(BMI), waist circumference (WC), waist to hip ratio(WHpR) and waist to height ratio (WHtR) in women nurses.

Method / Design: This clinical cross-sectional study took place on 138 Iranian nursing women between 20 till 60 years old at 3 educational hospitals in Zahedan, southeastern Iran. In this study BMI was considered as general obesity index and WC, WHpR and WHtR were considered as central obesity indices. Following criteria were used as cut off (threshold) for anthropometric indices ≥30 kg/m2 , ≥88cm, ≥0.8 and ≥0.49 for BMI, WC, WHpR and WHtR respectively.The protocol of the study was approved by research committee of Zahedan University of Medical Sciences.

Results: The prevalence of overweight and obesity (BMI≥25.0 Kg/m2) was 44.2% in female nurses. Central obesity in terms of high WHpR (76.1% with WHpR≥0.8) and high WHtR (61.6% with WHtR≥0.49) was almost prevalent among the subjects, But only 28.3% had WC≥88cm.

Conclusions: The results of current study has shown that the rate of overweight female nurses is higher and obesity is lower than global estimations. The results also shows that female nurses in Iran suffer from higher WC ,WHpR & WHtR respectively that is health concern between Iranian nursing.

Keywords: (maximum 5): general obesity, central obesity , women nurses

149/1043. Interactions between adipocyte secretions and breast cells: impact on tumor progression and resistance to therapy

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Introduction: In menopausal women, obesity is a breast cancer risk factor. Overweight is associated with an increased risk of metastasis and a decreased therapeutic response.

Objectives: This study wants to highlight cellular interaction impact between mature adipocytes (MA) and mammary neoplasic cells on the angiogenic process and the exhaust to hormonal therapy (tamoxifen).

Method / Design: For that, adipose progenitor cells, extracted from thin (BMI=20) or obese (BMI=30) women and differentiated into MA (MA20 or MA30 respectively) were used and kept their metabolic memory (Leptin, Aromatase, Adiponectin…). Supernatants effects (Sn) from the culture of either MA20 or MA30 or from co-culture between «neoplasic mammary cells (MCF-7) and MA20 or MA30» were evaluated on angiogenesis (proliferation, migration, tube formation by endothelial cells HUVEC). To assess the influence of MA on cell proliferation and tamoxifen efficiency, co-cultures between MCF-7 cells and MA20 or MA30, and three-dimensional (3D) cultures (MA / MCF-7 / fibroblasts) were also performed.

Results: The angiogenic process seemed to be stimulated under the influence of Sn from the co-culture with MA30, which is associated with an increase of Il-6. In addition, MA30 stimulated MCF-7 proliferation cells and diminished tamoxifen effectiveness which was more pronounced when they came from obese women. The 3D culture allowed to study gene expression pattern using a principal component analysis and to discriminate two groups of cases according to the adipocyte microenvironment and hormone treatment, and to highlight a positive correlation between TNFα and Il-6.

Conclusions: These results suggested that the increased risk of metastases and lower therapeutic responses found in obese patients could, in part, involve adipocyte secretions, including Il-6. A thorough Sn composition analysis would highlight biomarkers to consider a treatment strategy based on the BMI of patients.

Keywords: (maximum 5): adipokines, angiogenesis, therapy.

149/1044. Depression and nutrition in Sub-Saharan African postpartum women - an investigation into behavioural nutriomics

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Introduction: Emerging evidence suggests that women's mental health (MH) is associated with nutritional behaviour and status and that, vice versa, diet may affect MH. But research into the interplay of MH and dietary patterns is still developing. Also, societal, environmental, and economic conditions may particularly influence nutrition of women.

Objectives: We hypothesized that depressed mothers may yield different nutritional status and dietary intake patterns as compared to non-depressed mothers.

Method / Design: In this cross-sectional nutritional study 75 mothers in Kumasi, Ghana took part in a structured interview (24h dietary recall, food frequency questionnaire and dietary habits questionnaire) at 112d±52d postpartum. Anthropometric measurements were taken. Dietary diversity score (DDS) was determined. Socioeconomic status (SES) and depression data were extracted from the Child Development Study (CDS) database.

Results: Mean DDS was 7·2 (SD 1·4). Mean physical activity was moderate. There was no difference in SES between depressed and non-depressed women. Women with depression presented significantly lower DDS, less total energy and carbohydrate intake than non-depressed women. Depression was also associated with lower and less frequent fruit and vegetable intake. These results were robust to other postnatal confounders such as SES and total energy intake.

Conclusions: Hence, postnatal maternal depression was associated with an unhealthier diet. Knowledge about the interplay of mental health and nutrition is needed as, e.g., postnatal maternal depression may result in adverse effects not only for the mother but also for their family, especially their children's nutrition and health.

Keywords: (maximum 5): postpartum women, dietary intake, fruits and vegetables, depression, public health

149/1048. An estimation of daily polyamine intake in patients with cancer

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Introduction: The polyamines putrescine, spermidine and spermine are naturally present in all cells and play an essential role in regulation of gene expression, translation, cell proliferation and differentiation. The body pool of polyamines is supplied by de novo biosynthesis, intestinal microorganisms, and exogenous sources through the diet.

Objectives: Reducing polyamine dietary intake has beneficial effects on the quality of life in cancer patients. The aim of the study was to establish the daily polyamine intake and to evaluate the low polyamine diet conscious in patients with cancer.

Method / Design: In this cross-sectional study, the estimation of daily polyamine intake of 53 cancer patients (17.0% of male; 83.0% of female) was examined between October 2014 and April 2015. The mean age and the mean body mass index were 47.19 ±9.8 and 27.14±4.9 respectively. Daily intake of foods was calculated as g/person/day based on data obtained from literature search. Average daily intakes of putrescine, spermidine and spermine were calculated. Statistical analyses were performed by using the Statistical Package for Social Sciences (SPSS) version 18.0.

Results: The estimation of daily intake was defined as 29.11 mg/day putrescine, 10.31 mg/day spermidine, 14.02 mg/day spermine. The contribution of foods to daily intake came from fruits (59.1%), dairy products (24.0%) and vegetables (10.6%) for putrescine; vegetables (45.2%), grains (17.5%) and fruits (13.4%) for spermidine and vegetables (39.2%), dairy products (27.4%) and meat products (18.9%) for spermine. Data from our survey exposed the most frequently consumed foods among cancer patients were apple (10.7%), yoghurt (8.6%) and white bread (6.9%).

Conclusions: This study gives an estimation of polyamine intake and the main food contributors of dietary polyamines in the population of patients with cancer. None of them was aware of the benefits of low polyamine diet.

Keywords: (maximum 5): Polyamine intake, cancer patients, nutrition

149/1050. EGCG and Equol effect on methylation of TERT and telomere length in Caco 2 cancer cells and human fibroblasts

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Introduction: In many complex diseases such as metabolic diseases, CNS based diseases e.g. depression or ageing linked health problems a low grade inflammation, oxidative damage of DNA, epigenetic misregulation are known. Especially changes in the epigenetic regulation of gene expression and telomere length have been identified as central mechanisms in ageing and development of age-related diseases. Physiologically active plant components have attracted interest in this regard due to their antioxidative capacities and influence on epigenetic regulation.

Objectives: Objective was to determine underlying mechanisms of action on a molecular level of defined phytochemicals including Epigallocatchingallate (EGCG), S-equol and tocotrienols in cancer versus primary cells.

Method / Design: In this study a human adenocarcinoma cell line (Caco-2) and primary human skin fibroblasts (ES-1) were incubated with EGCG, mixed tocotrienols and S-Equol for 36h, 72h and 120h and 144h.Telomere length was measured using quantitative real-time polymerase chain reaction (qPCR) and a single copy control gene, telomerase activity was determined by trap assay. Methylation status in telomerase reverse transcriptase (TERT)-gene was assessed by sodium bisulfite methylation sequencing

Results: After incubation with EGCG we observed a reduction of telomere length and decreased telomerase activity in Caco 2 cells but

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an increased length and methylation of 3 CpGs in the promoter region of TERT in fibroblasts. A hypermethylation of the hTERT gene has been reported to be positively correlated with telomerase activity. In fibroblasts, 36h treatment with S-equol lead to a significant increase of methylation in all CpGs in the hTERT gene. There were no significant changes following incubation with tocotrienols.

Conclusions: These results suggest a specific modulation of telomeres by EGCG in cancer versus primary cells.

Keywords: (maximum 5): Telomeres, Methylation, Ageing, EGCG, hTERT

149/1051. Role of mothers as the primary caretakers for preventing child malnutrition in Batken province in Kyrgyz Republic

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Introduction: Women's status in the society plays an important role in maintaining proper nutritional status of children. Mother's education has an important impact on child nutritional status. It is believed that women who have higher education have a less likelihood that their children will suffer from malnutrition. Three reasons are - formal education provides with health knowledge; literacy and numerical skills increase the ability to diagnose and treat certain basic sickness; increase awareness of modern society, namely, modern medicine.

Objectives: To analyze how women with different levels of education behave in terms of improving nutritional status of children under five.

Method / Design: Field research was conducted in Shybran village, Batken province (August and October 2014). The Batken province has the highest percentage of stunted children (23%) in the Kyrgyz Republic. The study employs the embedded design in the mixed methods research, as both qualitative and quantitative data is collected and analyzed. Women (N=20) in low-income families with at least one child under five participated in the survey followed by short informal talk. The questionnaire included questions on socioeconomic conditions, breastfeeding and complementary food introduction practices and health-related issues. Snowball sampling was used for choosing respondents.

Results: Majority of women participated in the survey come from low-income families. Although breastfeeding is a common practice (N=19; 95%), exclusive breastfeeding during the first 6 months. Mothers with low education tend to hold poor care practices than mothers with high education. This was observed through response rates on common child diseases, breastfeeding and complementary food introduction practices.

Conclusions: Low socio-economic status, poor childcare practices and lack of health services in the community exacerbate existing child nutritional status. Educating local women about WHO breastfeeding standards suggestions, improving hygienic environment, proper care during sicknesses are crucial steps for preventing deterioration of child nutrition.

Keywords: (maximum 5): Child malnutrition, breastfeeding, female education

149/1056. Preference and perceived useability of portion size tools in migrant South Asian women

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Introduction: South Asian people living in the UK have a higher risk of diet related mortality and morbidity than the general population. A major challenge is the accurate estimation of portion sizes for traditionally consumed foods when there are few specific validated dietary instruments for this population. Adequate portion size estimation is necessary to achieve portion control during weight management.

Objectives: We investigated the preference and perceived useability of commercial portion size tools by South Asian women in the North West of England, as an aid to weight management. .

Method / Design: Focus group methodology was used to establish which of three commercial portion size tool sets (sets of: measured serving utensils; portion marked crockery; and pre-cook measurers) would be acceptable for a weight loss intervention focusing on energy intake reduction. South Asian women were asked their opinions and quantitative questionnaires in the native languages were used to assess participants' preference for each set.

Results: The women (n=24) liked the appearance of the marked crockery set and suggested it would 'fit in' with their own crockery plus serve as a useful visual prompt for portion control. A marked serving utensil (ladle) was considered functional for Asian food and a cereal and a cheese server were perceived as useful to train/control portion sizes in children. The marked crockery set was ranked the most preferred set by 69% of participants, the serving utensils were most preferred by 15% and the pre-cook measurers by 15%. Sixty-two percent chose the marked serving utensils as second choice; 23% the marked crockery and 8% the pre-cook measures.

Conclusions: These tools may help overcome problems with accurate estimation of portion sizes for traditionally consumed foods and dishes in this community in future studies. Further research is examining this.

Keywords: (maximum 5): South Asian, Portion size tools

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149/1060. Long-term obesity is stronger associated with elevated serum uric acid level than current obesity

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Introduction: Elevated levels of serum uric acid have consistently been observed in obese subjects. However, the potential additive effect of being overweight or obese from childhood has been minimally explored.

Objectives: To examine associations between overweight and obesity and serum uric acid levels in a life course perspective.

Method / Design: 1029 males and 906 females born 1921-1935 and recruited in 1967-1991 into a longitudinal study at the Icelandic Heart Association. Growth measures at school age were extracted from archived health records.

Results: At follow-up mean age of participants was 51y. Mean serum uric acid levels were 337 µmol/L and 262 µmol/ L for males and females, respectively. Males who were normal weight at 12y but were obese (body mass index≥30kg/m2) at follow-up had on average 38 µmol/ L (95% confidence interval (CI): 26, 60) higher serum uric acid levels compared to males who were normal weight at 12y and not obese at follow-up. This difference was increased to 72 µmol/ L (95% CI: 45, 60) among males who were both overweight or obese at 12y and obese at follow-up. Corresponding estimates for females were 48 µmol/ L (95% CI: 36, 51) and 80 µmol/ L (95% CI: 55, 104), respectively.

Conclusions: Being overweight or obese over life-course appears to increase serum uric acid levels substantially at adult age compared to gaining excessive weight later in life. The findings further support the need to implement action plans for prevention of childhood obesity.

Keywords: (maximum 5): CHILDHOOD GROWTH, OBESITY, URIC ADID, LIFE COURSE EPIDEMIOLOGY

149/1067. Impact of the vegetable pea protein NUTRALYS® on Satiety, Food intake and Gut Hormones in humans

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Introduction: Lifestyle related diseases are major health issues. Enhancing satiety is one good support to weight management. Proteins incorporated in the diets might be good candidates in this context, and substituting plant for animal protein add environmental benefits.

Objectives: We aimed at assessing and comparing the satiating effects of 4 isocaloric vegetable soups with added proteins, and evaluating if NUTRALYS® pea protein was a good alternative to whey proteins for promoting satiety.

Method / Design: 33 healthy volunteers randomly consumed the following soups as preloads at separate occasions: no added protein (control), supplemented with either 15g (15gNS), or 30g (30gNS) NUTRALYS®, or 30g whey protein (WPS). Satiety and hunger were assessed for three hours post consumption with visual analogue scales. The caloric intake at the next ad libitum test meal was quantified, and a subset of participants (n=9) provided blood samples for quantifying satiety hormone (GLP-1, PYY and CCK), glucose and insulin.

Results: Compared to control, all soups resulted in significantly lower energy intake at the subsequent meal, with no differences between groups. The 30gNS soup induced a significantly lower perception of feeling hungry than all the other test products. AUC (Area Under the Curve) values for GLP-1, and PYY responses did not significantly differ between soups, though a trend for higher AUC values for CCK following 30gNS compared to control was observed.

Conclusions: In this study, NUTRALYS® pea protein added to a preload soup aided a reduced caloric intake compared to the control, although no significant statistical difference was detected between the test products. The NUTRALYS® soups were perceived and rated as modulating the feeling of fullness, in line with the detected induced modulation of gut hormones in the subjects. These results suggests that the 30g NUTRALYS® soup led to increased perceived levels of satiety.

Keywords: (maximum 5): PEA PROTEIN : SATIETY : GASTROINTESTINAL PEPTIDES :

149/1075. Health and nutrition-related use of the Internet in a large population of French adults: results of the NutriNet-Santé study

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Introduction: Internet has become a major source of health and nutrition information. Little is known about the type of consulted websites (institutional versus non-institutional), and the tendency of subjects to discuss with a HCP about the information found on the Internet.

Objectives: The aim of this study was to investigate health and nutrition-related Internet use (overall and specific usages) in a large French population study.

Method / Design: Data were collected in 2013 by self-administered web-based questionnaires among 42 113 participants to the NutriNet-santé study. Unconditional multivariate logistic regression analyses and Chi-square tests were used for comparisons.

Results: 85.1% of the subjects used the Internet to search for health and/or nutrition information and 23.6% to read or post messages on health/nutrition forums. Only 16.0% discussed with a HCP about the information found. This proportion was lower in subjects with lower educational level and lower computer skills (P<0.0001). 8038 health/nutrition websites were cited. Institutional websites only represented 12.9% of the answers. Only 1 institutional website was present in the Top 10 (1.4% of the answers). Older subjects (P<0.0001), those with lower educational level (P<0.0001), lower computer skills (P=0.001) and lower nutritional knowledge (0.0002) were more likely to cite non-institutional websites.

Conclusions: This large population-based study showed that institutional websites were poorly frequented and that few participants discussed the information found with their HCP, especially individuals who were more vulnerable regarding misleading information. This supports the need for public health stakeholders to foster the development of high-quality websites to broadcast reliable health/nutrition information.

Keywords: (maximum 5): Health, Information search, Internet, Nutrition, Websites

149/1076. Household food insecurity trends during in times of a financial assistance program in Portugal (2011-2014)

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Introduction: Food insecurity (FI) has received much attention in recent years due to the increasing of poverty and social inequalities indicators, as a result of the economic crisis. The guarantee of food security, as a situation that exists "when all people at all times have access to sufficient, safe and nutritious food to maintain a healthy and active life", becomes a priority action for nutrition policies.

Objectives: To evaluate FI trends during the period that Portugal was under the International Monetary Fund financial assistance program.

Method / Design: Data derived from the national FI survey in Portugal – INFOFAMÍLIA Survey – conducted by the Directorate-General of Health. Data analysed includes data from four surveys, conducted between 2011-2014. FI was evaluated using a scale adapted from the Brazilian Food Insecurity Scale and data were collected by face-to-face interviews. Descriptive analyses were undertaken to determine FI prevalence. Logistic regression models adjusted for socioeconomic/demographic variables were undertaken to evaluate time trends in household FI.

Results: From 2011 to 2014 the percentage of FI ranged between 45.8% in 2014 to 50.7% in 2013. Higher percentages of FI were found during 2013. After adjusting for socioeconomic/demographic variables, the risk of FI increased significantly by 19.1% in 2013, in comparison to 2011. When we analysed time trends according to the different levels of household FI, it was found a higher risk of lower level of FI in 2013 (OR=1.215; 95%CI 1.017-1.451).

Conclusions: Our findings showed that 2013 was the year with higher levels of household FI, regarding to the overall level of FI as well as for its less severe level, suggesting that Portuguese households could have a higher perception of risk of FI this year. A decreasing trend in household FI seems to be present between 2013 and 2014, however no significantly differences were found.

Keywords: (maximum 5): FI, Portugal, economic crisis

149/1087. Efficacy of calcium and vitamin D doses in relation to bone health of elderly people

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Introduction: Increased requirements, but poor calcium intake leads to calcium deficiency osteoporosis; one of the most common nutritional deficiencies globally.

Objectives: To evaluate the impact of supplementation of different doses of Calcium and Vitamin D on bone health of the elderly

Method / Design: 122 elderly male and females (mean age: 66.23±5.53 years) with poor Bone Mass Density (BMD) and vitamin D deficiency or insufficiency were randomly selected and divided into group A (n=63) and group B (n=59). Weekly, 60,000 International Units (IU) of vitamin D were supplemented for two months to both the groups. Along with that, daily 1000 milligrams (mg) calcium with 500 IU vitamin D were supplemented to group A and 1000 mg calcium with 2000 IU vitamin D to group B, for a period of 6 months. Serum calcium and vitamin D, BMD were assessed at the baseline (BL) and after the intervention (PI).

Results: Older age was not a risk factor for poor BMD among our study population. 31.24% younger elderly were osteoporotic compared to 8.2% of old elderly (Spearman R: 0.025). In group A, significant improvement (P≤0.001) in BMD (BL: -2.4±0.6, PI: -1.2±0.71), serum calcium (BL: 9.3±0.7, PI: 10.1±0.54) and vitamin D (BL: 16.9±6.3, PI: 35.9±8.9) was observed. In group B, significant increase (P≤0.001) in

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BMD (BL: -2.4±0.7, PI: -0.9±0.44), serum calcium (BL: 9.5±0.6, PI: 10.5±0.52) and vitamin D (BL: 17.63±4.9, PI: 42.72±8.9) was observed. Locomotor problems were reduced among 44.06% subjects in group B compared to 11.11% in group A. Post interventional BMD (t: -2.16, P≤0.05), serum calcium (t: -4.05, P≤0.001) and vitamin D (t: -4.20, P≤0.001) of group B was significantly higher compared to group A.

Conclusions: Higher doses of vitamin D and calcium (daily) supplementation is more effective in optimizing BMD, serum calcium and vitamin D levels among elderly people.

Keywords: (maximum 5): Calcium, vitamin D, BMD

149/1092. Evaluating whole-community interventions and their impact in childhood overweight prevalence: evidence from decreasing prevalence in low SES

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Introduction: The implementation of strategies to reduce social gaps in obesity is at the frontline of international health policy agendas. EPODE, a childhood obesity prevention methodology, has been implemented, since 2004, across different communities around the world. The previous evaluation of the two original, pilot EPODE towns in northern France, already showed success at reducing the overall overweight prevalence among children and across all socioeconomic levels.

Objectives: To analyse trends in childhood overweight and obesity prevalence, between school years 2007/2008 and 2012/2013, in 7 EPODE communities of varying socioeconomic status (SES) in France in the historical area of EPODE where the methodology is applied since 1992.

Method / Design: Cross-sectional, school-based survey conducted in interventions communities under the EPODE program. For the two school years, anthropometric measures (weight and height) were evaluated of all 5-to 12-years-old children attending school from 7 different towns in Flandre-Lys region (France). In 2007/2008 and 2012/2013, respectively 3094 and 2849 were included in this survey. SES was measured according to the value of median household income in each town. Chi-square test was used to examine overweight and obesity prevalence according to town SES.

Results: There were no significant differences in overweight and obesity prevalence between years 2007/2008 and 2012/2013, although there was a decreasing trend in the overall prevalence from 15.1% to 14.3%. The prevalence of overweight and obesity in low SES towns decreased from 17.4% in 2007/2008 to 14.4% in 2012/2013. The same trends were observed for both boys and girls separately, although statistical significance was not reached among boys.

Conclusions: Our findings suggest that community-based interventions have different impacts in childhood overweight and obesity prevalence according SES towns after 20 years of implementation. Community-based interventions evaluated shown to be still effective in children from low SES towns, whereas less in high SES towns.

Keywords: (maximum 5): obesity, community-based, SES, EPODE

149/1097. Vegetarian and vegan diets in children – pre-study with preliminary data

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Introduction: Vegetarian (VG) and vegan (VN) diets are becoming more and more popular. In addition many VG and VN parents raise their children without meat or even any foods of animal origin. To date only few studies have been conducted with VG and almost none with VN children. Thus, there is an urgent need to investigate the nutritional and health status of VG and VN children

Objectives: The aim of this pre-study was to collect preliminary data of VG and VN children in Germany, in order to prepare a cross-sectional study.

Method / Design: Data were collected via an online survey, contacting parents of VG and VN children.

Results: Data were obtained from 384 VG and 331 VN children (53.7% female, age range 0-13 y, median age 3.0 [±3.5] y). Self-administered body weights and heights were mostly within the normal range, but approximately one quarter of the children <2 y had a low body weight (<P10: VG 21.2%, VN 17.4%) and height (<P10: VG 24.2%, VN 29.5%) and one sixth of the children ≥2 y had a low BMI (<P10: VG 16.7%, VN 17.6%). The vitamin B12 supply of VN children was mainly by breast milk, enriched foods and supplements. A high percentage of the children (92.4%) had been at least partially breast fed. The major motives of the parents for a VG or VN diet were ethical (72.2%) and health (21.4%) reasons.

Conclusions: There are a considerable number of VG and VN children in Germany. Self-administered weights and heights indicate a normal growth. However, a substantial proportion of VG and VN children are thinner and smaller than omnivorous children in the German reference population. Further research is necessary to assess the impact of VG and VG nutrition on child development.

Keywords: (maximum 5): Vegetarian, vegan, children, growth, motives

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149/1102. Iodine fortified milk: possible solution for iodine deficiency among Moroccan schoolchildren in rural area

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Introduction: Worldwide, iodine deficiency is considered as an important health problem affecting more than 2 billion persons. Its elimination is considered as a global health priority.

Objectives: Our study aims to evaluate the effect of consumption of fortified milk on reducing iodine deficiency among Moroccan schoolchildren as well as their dietary habits and frequency of consumption of foods that are considered as good sources of dietary iodine, including iodized salt.

Method / Design: In a double-blind placebo controlled trial conducted in primary schools, 360 children (aged 7–9 years) were divided in two groups to receive either micronutrient fortified milk or non-fortified milk (200ml). For 9mo, children of the intervention group were fed everyday with 30% of RDI for iodine. Answers to an adapted food frequency questionnaire were obtained at the beginning of the survey. Urinary iodine was collected at base-mid and end line and determined spectrophotometrically using the Sandell-Kolthoff reaction. All statistical analyses were performed using Statistical Package for the Social Sciences (version 20.0)

Results: Analysis of dietary habits of children relative to consumption of foods rich in iodine showed that 95% of families did not use fortified salt, 30% of school children did not consume dairy products, 100% did not eat shellfish and 10% did not eat fish. However 59.16% were consuming fish at least once a week. Data analysis on the distribution of iodine deficient children clearly demonstrated the amelioration of iodine status in both groups. Severe and mild iodine deficiencies were reduced for both groups. Moreover, there's complete disappearance of severe deficient cases in the Fortified group after 4 months of intervention.

Conclusions: Adequate and sustainable iodine fortification of milk is very beneficial for health and will be of great interest for maintaining adequate reserves of body iodine for schoolchildren.

Keywords: (maximum 5): Iodine deficiency; Morocco; Schoolchildren.

149/1106. Gender Differential among patients with Comorbidities of Type-2 Diabetes Mellitus in a Nigerian Tertiary Hospital

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Introduction: Diabetes mellitus (T2DM) is a chronic metabolic illness, which many patients become aware only when they develop one or more of its severe comorbidities, which include retinopathy, chronic kidney disease, hypertension, obesity, cardiovascular disease among others; capable of causing disabling long-term complications when managed inappropriately. Its increasing prevalence imposes substantial economic consequences on individuals, communities and health systems. Gender, age and obesity have been associated with the manifestation of T2DM and its comorbidities

Objectives: This study therefore investigates the gender differential in the incidence of the T2DM comorbidities in a Nigerian tertiary hospital

Method / Design: This study involved the use of index cards of diabetics who were referred to the Outpatient Department of the University College Hospital, Ibadan between 2009 and 2011. The data of 277 patients was obtained by random sampling. Data collected was analyzed using descriptive statistics such as mean, standard deviation and percentages while chi square at level of significance $p<0.05$ was used to infer association between variables

Results: The mean age of the patients was 57.37± 11.41 years. Majority of the patients (57%) were female and 43%, male. The patients were more of traders (37%), civil servants (21%) and retired civil servants (19.5%). According to BMI, 7 out of 10 patients were either overweight with females being the majority at 65%. The comorbidities of T2DM was higher in females with 55% in T2DM+Hypertension, 79% in T2DM+Obesity, 50% in T2DM+Hypertension+Obesity while 56% had T2DM alone. There is no significant relationship between T2DM comorbidities based on gender ($P<0.05$) however, a significant relationship was found between the BMI of the patients based on gender.

Conclusions: The incidence of T2DM comorbidities among females is higher than in males. Diabetes prevention and control programs are needed to reduce the burden of T2DM comorbidities among women in Nigeria.

Keywords: (maximum 5): Gender, Comorbidities, Diabetes Mellitus, hospital, Nigeria

149/1107. The role of red deer meat in the Healthy Nutrition

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Introduction: National surveys have shown that the nutrition of Hungarian population is not consistent with the dietary recommendations. It's contain too much fat and cholesterol, and n-3 / n-6 fatty acid ratio is unfavorable. The succeeding of this is the increase of diet-related diseases. This research project examined the possibilities of the use of red deer meat in the healthy diet.

Objectives: The main goal of this study was the development of red deer meat-based recipes. Further effort was the definition of a recommendation, which shows the possibilities of the insertion of the venison into a healthy nutrition.

Method / Design: Modernization of the traditional recipes and organoleptic assessment of the prepared dishes.

Results: The comparison of the red deer meats prepared by traditional and modern recipes showed that the latter had lower fat content and its fatty acid composition was more favorable. The red deer meat has advantageous n-3 / n-6 fatty acid ratio, low cholesterol content, which made it suitable for the use in the recipes.

Conclusions: Based on the results it was established that venison dishes with modernization recipes had reduction of fat and salt content. It contributes to the health of consumers and the red deer meat is well insertable in the healthy diet. Its favorable nutritional composition, varied preparation method and high culinary quality justify its greater role in the diet of the population.

Keywords: (maximum 5): incorrect dietary patterns, deer meat, healthy recipes, organoleptic assesment, healthy diet

149/1109. Can hazelnut intake modulate oxidative stress and lipid-related markers in children with primary dyslipidemia?

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Introduction: Regular intake of nuts is suggested to reduce risk factors for cardiovascular disease (CVD) and to improve lipid profile. Dyslipidemic patients seem to be more susceptible to oxidative stress and CVD risk thus, they may benefit from nuts and their bioactives.

Objectives: The aim of this study was to investigate the effect of hazelnuts consumed as snack on oxidative stress markers, erythrocytes fatty acid composition and serum lipids, in children with primary dyslipidemia.

Method / Design: Sixty children (11.5 ± 2.5 years) with primary dyslipidemia were enrolled into an 8-week controlled, parallel, dietary intervention study with hazelnuts (0.43 g/kg body weight per day). Subjects received dietary guidelines and were randomized in 3 groups: 1- hazelnuts with skin; 2- hazelnut without skin; 3- control (without hazelnuts). Before and after the interventions, lipid profile, endogenous and H2O2-induced DNA damage and erythrocyte membrane phospholipids were evaluated.

Results: Preliminary results (n=15 subjects) show that, compared with baseline concentrations, a significant reduction in serum LDL-C level was observed only after hazelnut with skin treatment for 8 weeks (-11.2%; p= 0.01). No difference in triglycerides, total and HDL-cholesterol levels were demonstrated. At baseline, H2O2-induced DNA damage was 41.7 ± 10.0%. DNA damage decreased after hazelnut with skin (from 44.4 ± 3.1% to 35.7 ± 7.6%; n=5) as well as following hazelnut without-skin treatments (from 42.4 ± 16.0% to 33.3 ± 4.0%; n=5). No difference was observed in the control group. Moreover, data seem to suggest only a slight modulation of hazelnut treatment on erythrocyte membrane phospholipids composition.

Conclusions: Results on the subsample analysed show a tendency towards a decrease in the levels of H2O2-induced DNA damage and serum LDL-C after 8-week of hazelnuts. Further data on the whole group of subjects will help understanding the effect of hazelnut consumption in dyslipidemic children.

Keywords: (maximum 5): Hazelnuts, dietary intervention, oxidative stress, lipid profile, dyslipidemic children

149/1114. Insulin, estrogen levels and related life style factors in breast cancer - A case control study

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Introduction: Nutrition is an important part in cancer care; metabolic health problems can increase risk for breast cancer

Objectives: To investigate insulin, estradiol, estriol levels and related factors in breast cancer as risk factors at diagnosis.

Method / Design: Eighty Sudanese breast cancer women compared to eighty control subjects matching in age, sex and body mass index (BMI). Factors include diet behavior, BMI, physical activity, pills and smoking were determined by using a questionnaire. Serum hormones levels were measured by using radio-immunoassay

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Results: Among premenopausal breast cancer, there was no significant difference in insulin levels compared to control premenopausal women (P.value 0.08). However, the overall insulin level in the study subjects was found to be high compared to the normal reference values except in the group of low weight. There is significant increase in estradiol levels in the premenopausal breast cancer women compared to the premenopausal control women (P.value< 0.001), but both lies in the normal range, while the estriol levels decreased significantly (P.value>0.001). In postmenopausal breast cancer, there was no significant difference in insulin levels compared to control (p.value 0.2). Insulin was increased in both patients and control obese women and those with normal weight . Estradiol and estriol levels were increased significantly (P.value> 0.001 and P.value> 0.001 respectively) compared to control post-menopausal women. Four patients used pills and five patients suffered passive smoking. All study population were lack physical activity, while rich nutrients were taken occasionally rather than daily or weekly except vegetables. Red meat intake was higher than other types of meats.

Conclusions: Poor metabolic health is a risk factor for breast cancer in obese, overweight and normal-weight women. Good nutrition and physical activity may reduce breast cancer risk.

Keywords: (maximum 5): Breast cancer, insulin, estrogen, menopausal, nutrition

149/1120. Jucara acai and its potential of reduce body fat

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Introduction: Obesity is a chronic disease of multiple etiology characterized by excessive accumulation of body fat. It is noteworthy in its therapeutic the functional foods, especially those containing anthocyanins, such as the acai.

Objectives: The objective of this study was to evaluate the ability of reduce body fat by a diet preparation done with juçara açaí (Euterpe edulis Martius) in obese adolescents.

Method / Design: This was a prospective clinical trial, parallel, randomized, single-blind, case-control. The control group received a calorie restricted diet during eight weeks and nutrition guidelines, and for the intervention group a dietary supplementation with acai diet preparation was add. The analysis of acai management effects on body composition was based on the determination of waist circumference and the index BMI/Age before, during and after the intervention. The Shapiro-Wilk test was applied. In case of normal distribution we used the paired t-test and t test for independent samples, and in case of asymmetric distribution, Mann Whitney test. We adopted the 5% significance level.

Results: Both, waist circumference and BMI/A, had no significant reduction over the intervention period. In addition, even considering that some volunteers in the intervention group abstained in many school days, there was no significant influence of the amount of days of consumption of acai on the evaluated parameters.

Conclusions: It is concluded that the daily intake of jucara acai was not effective in reducing body fat of obese adolescents evaluated, and that probably anthocyanins present in this food does not carry positive role in obesity therapy.

Keywords: (maximum 5): ADOLESCENTS: OBESITY: JUCARA ACAI: ANTHOCYANINS

149/1121. Jucara acai and lipidic profile of obese adolescents

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Introduction: Obesity generates a low-grade inflammatory status associated with several complications, among them cardiovascular disease. Acai is claim as functional food because of its high content of anthocyanins and its positive effect on inflammatory chain.

Objectives: This study was a prospective clinical trial, parallel, randomized, single-blind, case-control, which aimed to investigate the effect of administration of jucara acai (Euterpe edulis Martius) in the lipid profile of obese adolescents.

Method / Design: The study included 26 adolescents with a mean age of 13.1 years, divided into two experimental groups: control (n = 13) and intervention (n = 13). Both groups received for eight weeks nutrition guidelines and dietary planning with caloric restriction. The intervention group, additionally, received 200g of acai, for supply of 164 mg of anthocyanins /day. The analysis of acai management effects on the lipid profile was made by measuring total cholesterol, HDL, LDL, VLDL and triglycerides before, during and after the intervention. The Shapiro-Wilk test was applied. In case of normal distribution we used the paired t-test and t test for independent samples, and in case of asymmetric distribution, Mann Whitney test. We adopted the 5% significance level.

Results: The incidence of abnormal results of total cholesterol, HDL, LDL, VLDL and triglyceride levels in the two groups was 24%, 19%, 15%, 46% and 46% before the start of the intervention, respectively, and 42%, 42%, 15%, 38% and 38% after eight weeks, respectively. Therefore, there was no significant change in the parameters analyzed

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over the intervention period. Additionally, were not found satisfactory effects on the lipid profile modification between groups.

Conclusions: Thus, it is concluded that anthocyanins present in jucara acai does not exercise effective participation in reversing the lipid imbalances and also in the treatment of obesity.

Keywords: (maximum 5): CARDIOVASCULAR DISEASE: OBESITY: JUCARA ACAI: ANTHOCYANINS

149/1123. Cake and cookie consumption and risk factors of cardiometabolic diseases in EPIC-Potsdam

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Introduction: Recent analyses of cohort studies observed an inverse association of cake and cookie (CC) intake and risk of chronic diseases.

Objectives: This study aims to elucidate the role of CC intake in metabolic status as preclinical condition of chronic diseases.

Method / Design: In a cross-sectional EPIC-Potsdam sub-study (667 participants, 51.1% men, mean age 65.4 years) dietary intake was assessed by three 24 h dietary recalls and one food frequency questionnaire. Individual usual total and afternoon CC intake were estimated using the National Cancer Institute method. Metabolic status was represented by clinical blood parameters, blood pressure, physical activity and fitness as well as anthropometry. Associations of CC consumption (sex-stratified quartiles) were analyzed using ANCOVA.

Results: Total and afternoon CC intake were inversely related to anthropometric parameters when adjusted for age and education alone or in addition with lifestyle parameters. However, additional adjustment for energy misreporting, which was highly correlated with CC consumption, reversed the associations to direct relations. In men, total and afternoon CC consumption exhibited direct associations with total (cross-quartile difference (ΔQ4-Q1) up to 12.4 mg/dl) and LDL cholesterol (ΔQ4-Q1 up to 17.6 mg/dl). Initial unsubstantial relations between total CC intake and HDL cholesterol became direct after accounting for energy misreporting (men: ΔQ4-Q1=-1.5 mg/dl; women: ΔQ4-Q1=-3.5 mg/dl). Relevant systolic blood pressure reductions (-5.5 mmHg) were only observed for females.

Conclusions: The high correlation between CC intake and energy misreporting has considerable impact on the size and direction of the relation between CC intake and metabolic status. Thus, the previously observed favorable relations with chronic disease risk might be confounded.

Keywords: (maximum 5): cake and cookies, cardiometabolic disease risk factors, energy misreporting

149/1125. Dietary total antioxidant capacity and polyphenols intake in Serbian university students

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Introduction: Epidemiological studies have shown an inverse association between intake of polyphenols and other dietary antioxidants and the risk of numerous chronic diseases. Good eating habits established during the University years play an essential part of a healthy lifestyle.

Objectives: The aim of this study was to estimate total dietary antioxidant capacity (TDAC) and polyphenols intake among students of the Faculty of Pharmacy in Serbia.

Method / Design: A total of 223 students with the mean aged of 21,2 ± 2,7 participated in this study. Food intakes were measured with the 3-day dietary record method. A self-developed database was used to calculate TDAC and dietary total polyphenolic content.

Results: Polyphenols intake and TDAC was 748 mg/person per day and 9,51 mmol Trolox equivalents/person per day, respectively. The food group that contributed the most to the TDAC was beverages (about 31,2%), followed by fruits and vegetables (28,2%), chocolates (21,1%) and cereals (15,2%). Fruits and vegetables provide a daily intake of 130-425 mg of polyphenols/person/diet.

Conclusions: The mean daily intake of dietary polyphenols in the Serbian student population is 1g lower than recommended polyphenols daily intake. There is a need to promote the fruit and vegetable intake consumption as a source of polyphenols and dietary antioxidants among the student population.

Keywords: (maximum 5): Antioxidant Capacity, Polyphenols Intake, Students

149/1126. Depression and unhealthy lifestyle – Associations with diet, physical activity, body mass index, and smoking

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Introduction: Depression may lead to the development of an unfavorable lifestyle, including poor diet, physical inactivity, weight gain, or smoking. This in turn may promote the onset or progression of somatic comorbidities such as cardiovascular diseases.

Objectives: The aim of this study was to examine associations of depression, individual lifestyle factors, and a combined lifestyle index (including diet, physical activity, body mass index, and smoking).

Method / Design: This cross-sectional analysis included 1537 participants (910 patients with clinically diagnosed depression, 627 population-based controls) from the BiDirect Study, an ongoing prospective study that investigates the bidirectional relationship between depression and subclinical arteriosclerosis, conducted in Münster, Germany. Body mass index was calculated from measured body weight and height. Self-reported data on diet, physical activity, and smoking status were assessed during a computer-guided interview. An overall lifestyle index was calculated on the basis of these four lifestyle factors (range: 0-8 points, higher scores reflect healthier lifestyle) and subsequently divided into tertiles (unfavorable/moderate/favorable lifestyle). The associations between the lifestyle index, each lifestyle factor, and depression were examined using multinomial regression models, controlling for age, sex, education, income, marital status, and comorbidities.

Results: Compared to controls, patients with depression had a higher likelihood to have an unfavorable lifestyle after adjustment for important covariates (unfavorable lifestyle: OR=1.70, 95%-CI: 1.16-2.49; moderate lifestyle: OR=1.45, 95%-CI: 1.00-2.09; favorable lifestyle=reference). In terms of individual lifestyle factors, patients with depression were more likely to be current smokers, physically inactive, and obese in the age- and sex-adjusted models. After additional adjustment, only the association with smoking remained significant.

Conclusions: Patients with clinically diagnosed depression had a higher likelihood to have an unhealthy lifestyle compared to non-depressed controls. Since an unfavorable lifestyle might increase the risk of somatic comorbidities, patients with depression should be carefully monitored in terms of their lifestyle habits.

Keywords: (maximum 5): Depression, lifestyle, diet, physical activity, smoking

149/1127. Diet and physical activity: moderators in psychosocial effects on adiposity in children

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Introduction: Low psychosocial health and adiposity are important public health threats that have been associated with each other. Longitudinal studies are needed to reveal the directionality and underlying behavioral factors. In young children, literature is scarce.

Objectives: Test psychosocial parameters as predictor for adiposity in children and examine the role of diet and physical activity

Method / Design: One-year longitudinal data from 291 preschoolers (4-7y) in the Swiss Ballabeina study: parental-reported psychosocial quality-of-life by PedsQL as psychosocial parameter. Two-year longitudinal data from 312 children (5-12y) in the Belgian ChiBS study: negative events, negative emotions and problem behavior as psychosocial parameter. In both studies, dietary intake by food-frequency questionnaire (groups of interest: sweets, fatty food, soft drinks, fruit & vegetables), physical activity by accelerometers and adiposity by BMI, waist and fat% were measured. Analyses were adjusted for age, sex and socio-economic status.

Results: Low psychosocial reports were associated with an unhealthier diet intake and changed activity patterns. Longitudinal psychosocial-adiposity relations appeared only after moderation by lifestyle. Both BMI, waist and fat% were influenced. Low psychosocial parameters increased adiposity in children with unhealthy food intake or high sedentary time (enhancing moderators). Low psychosocial parameters relatively decreased adiposity in children with high physical activity (protective moderator).

Conclusions: An unhealthy diet can be a vulnerability factor and high physical activity a protective factor in psychosocial induced adiposity. Consequently, psychosocial well-being and lifestyle should be targeted concurrently in multi-factorial obesity prevention. Concerning lifestyle, the environment should be an 'activity encouraging, healthy food zone' that minimizes opportunities for stress-induced eating. In addition, appropriate stress coping skills should be acquired.

Keywords: (maximum 5): stress, quality-of-life, obesity, children, diet

149/1128. Consumption behaviors of unhealthy food in university students

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Introduction: Unhealthy diet is a leading cause of non communicable diseases.

Objectives: This survey research was aimed to describe and compare consumption behaviors of unhealthy food among university students in Bangkok, Thailand.

Method / Design: Through stratified random sampling, sample included 400 undergraduate students. Data were collected by self reported questionnaire. Data were then analyzed using descriptive

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statistics and inferential statistics including Independent t-test, and ANOVA.

Results: Results revealed that most of the sample were women (67%), enrolling in social related programs (74%). Approximately half of them (45.5%) stayed in dormitory. Majority of them (83%) had ready-to-eat food.

Almost half (43.5%) of the sample had knowledge of unhealthy food at a fair level, while 39.25% had consumption behavior of unhealthy food. Consumption behavior of unhealthy food were significantly different in years in the program ($F = 3.168$, $p = .024$), daily food expenditure ($F = 8.950$, $p <.001$), and knowledge on unhealthy food ($F = 37.856$, $p <.001$). While no significant difference in consumption behavior of unhealthy food was found in those with a difference in gender, program of study, living place, and monthly income.

Conclusions: Results indicate the importance of providing knowledge on unhealthy food for students in order to promote appropriate food consumption behavior among them.

Keywords: (maximum 5): Unhealthy food; Consumption behavior; University students

149/1130. Obtaining and study of chemical, physical and sensory gluten free carrot cakes characteristics with sucrose addition and diet

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Introduction: The celiac disease has been object of frequent technological and clinical research on food alternatives to persons having the disease.

Objectives: Microbiological, chemical and physical evaluation of gluten-free carrot's cake whit saccharose and diet for the purpose of to obtain new products for the celiac community.

Method / Design: To the chemical and physical evaluation the protein was checked by the Kjeldalh's Method, lipid by Soxlet, carbohydrates by difference, ashes by dry way's method and humidity on kiln. The caloric value obtained by the conversion factors for the carbohydrates, protein and lipids. The shelf-life was established by the analysis of the molds and yeasts by the sowing surface and mesophilic bacteria's analysis by the Petrifilm's Method. The Specific volume was obtained by the displacement of millet seeds and the consumers preference's test sensorial were statistically analyzed by ANOVA and the Tukey's test.

Results: It was obtained proteic value between 4,95g and 2,94g; lipids from 11g to 11,75g. Carbohydrates between 48,65g and 45,06g. Shelf-life was established three days and, the diet gluten-free formulations was obtained the best specific volume, from 2,14cm^3/g to 1,95cm^3/g, without significant difference to standard formulation. The sample unless accepted by consumers was F4 sample.

Conclusions: The diet cakes were obtained highest Specific Volume, proving that gluten-free cakes can to develop of the same way. The self-life was established three days, samples more accepted by consumers were without cornmeal, with values very close to the standard sample, becoming the new one product for the celiac's feeding without loss the quality.

Keywords: (maximum 5): gluten-free; celiac diseases; cakes; sensorial analyses.

149/1135. Factors associated with not using folic acid supplements in the first trimester of pregnancy

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Introduction: Since the 70s, studies have found a strong relationship between decreased blood folate levels and neural tube defects in fetus. Then, folic acid daily supplementation in preconception period and in the first trimester of pregnancy was stablished as protocol in various countries.

Objectives: Establish the prevalence and factors associated with inadequate pregnancy-related use of folic acid supplements (FAS) during the first trimester of pregnancy in the ProcriAr Study.

Method / Design: The ProcriAr Study is a cohort of pregnant women from West region of São Paulo-Brazil. The recruitment occurred between March/2011 and December/2013 in three primary health care units. Of the total selected, 456 participants completed a questionnaire covering items on sociodemographic and lifestyle factors, including folic acid intake.

Results: The median age was 25.7 years (95%CI:24.8-26.5), 52.9% had more than 7 years of education and 47.2% had self-declared their race as parda. In relation to pre-pregnancy body mass index (BMI), 7.5% was underweight, 53.5% eutrophic, 18.2% overweight and 20.8% obese. In the first trimester of pregnancy 28.3% (129/456) was not taking folic acid supplements. The multivariable logistic regression analysis demonstrated that pregnant women with underweight pre-pregnancy BMI (OR=2.41; 95%CI:1.17-4.98), who had self-declared as parda race (OR=1.66; 95%CI:1.09-2.53) and with high education

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level (≥8 years of study) (OR=0.59; 95%CI:0.39-0.90) were associated with no use of FAS in the first trimester of pregnancy.

Conclusions: Although FAS supplementation is a well stablished protocol in the National Health System (SUS), the prevalence of inadequate use of FAS was suboptimal in the first trimester of pregnancy. Especially for those groups of women who are unlikely to respond to health promotion messages, different strategies should be considered to improve the adherence to treatment thus ensuring the nutritional adequacy of pregnant women and promoting the healthy development of the fetus.

Keywords: (maximum 5): Pregnancy, Folic acid, Public health, Neural tube defects

149/1136. Analysis of the anti-proliferative effect of Rosmarinus officinalis on human melanoma cancer cells

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Introduction: Rosemary has been used in traditional medicine, while nowadays various rosemary formulations are exploited by the alternative medicine, to cure or prevent a wide range of health disorders. Information about rosemary anticancer properties, such as chemoprotective or anti-proliferative effects is very poor, especially concerning the mechanism of action. Melanoma is a skin tumor whose diffusion is increasing in the world and whose malignancy is reinforced by its resistance to cytotoxic agents; hence the availability of new cytotoxic drugs would be very helpful to improve melanoma prognosis.

Objectives: Cytotoxic effects of a rosemary hydrohalcolic extract on human melanoma A375 cell line.

Method / Design: Mass spectrometry (LC/ESI-MS/MS); Cell viability assays (MTT, Trypan); Flow cytometry analysis of cell cycle and of ROS levels; Protein carbonylation analysis; 2D-E proteomic analysis.

Results: Main components of rosemary extract were identified by LC/ESI-MS/MS; the effect of the crude extract or of pure components on the proliferation of cancer cells was tested by MTT and Trypan blue assays. The effect on cell cycle was investigated by flow cytometry and the alteration of the cellular redox state evaluated by intracellular ROS levels and protein carbonylation analysis. In order to get information about the molecular mechanisms of cytotoxicity, a comparative proteomic investigation was performed.

Conclusions: Cellular and proteomic evidence indicate that of plant extracts have the potentiality to integrate chemotherapy and prompt further studies to confirm in vivo efficacy and to unravel the molecular basis of their polyvalent action.

Keywords: (maximum 5): Rosmarinus officinalis, melanoma, food supplement, proteomics

149/1137. Vitamin D intake and serum level in children with pneumonia

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Introduction: The majority of evidence suggests that vitamin D plays a role in the body's immunity and immunomodulation. Due to geographical location, the main sources of vitamin D in Poland between the months of September and April are intake from diet, and supplements. A seasonal increase of pneumonia incidences in children has been observed at mid-latitudes in winter.

Objectives: The aim of this study was to investigate the serum level of vitamin D and its intake from diet and supplements in children with pneumonia.

Method / Design: Fifty one patients with pneumonia and 51 healthy children were recruited from January to March in 2014 and 2015. The median age of the patients in the pneumonia group was 26 months (range 2 months – 15years, 1 month) and 28 months (range 2 months – 15 years) in the control group. Determination of serum 25-OH vitamin D was performed using a competitive enzyme-linked immunoassay. Vitamin D intake was assessed using the computer program Dieta 5.0.

Results: Serum vitamin D level was significantly lower in children with pneumonia (median 17.6, range 4.7 – 69.3 ng/ml) compared to the control group (median 25.5, range 7.7 – 73.6 ng/ml, p=0.0002). Vitamin D deficiency (serum level <20 ng/ml) was found in 58.8% of cases in the pneumonia group, and in 29.4% of subjects in the control group. The differences in vitamin D intake in the pneumonia and control groups were not statistically significant (median 9.6, range 5.1 – 23.2 μg/day vs 12.3, range 3.0 – 35.6 μg/day). A statistically significant correlation between vitamin D intake from diet and supplements and its serum level was found only in the control group (r = 0.54, p=0.002).

Conclusions: The results of study show that vitamin D deficiency may play a role in the incidence of pneumonia in children.

Keywords: (maximum 5): Vitamin D, Pneumonia, Children

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149/1139. Antioxidant intake and status in patients with rheumatoid arthritis

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Introduction: A direct contribution towards destructive, proliferative synovitis in rheumatoid arthritis (RA) has been attributed to reactive oxygen species. Dietary antioxidants are considered to be capable of improving oxidative status in RA.

Objectives: The aim of this study was to assess the antioxidant intake, frequency of antioxidant-rich food consumption and serum total antioxidant capacity (TAC) in patients with RA and in healthy subjects.

Method / Design: One hundred fifteen patients with RA (median age 54, range 18 - 79) and 77 healthy controls (median age 53, range 24 - 77) were recruited for the study. Dietary assessment was performed using a 3-day record and a questionnaire developed by the Department of Nutrition and Dietetics, Wroclaw Medical University. The computer program Dieta 5.0 was used for the assessment of dietary antioxidant intake. Serum TAC was determined spectrophotometrically using DPPH reagent.

Results: An insufficient intake of vitamin E was found in both groups. Chocolate, nuts, seeds, dried fruits and tea were eaten significantly more frequently, and citrus fruits less frequently, in the RA group. Significantly lower TAC values were observed in patients with RA (median 174.3, range 61.0 - 352.3 μM Trolox) than in the control group (median 197.4, range 85.1 - 617.9 μM Trolox, p=0.027). In both groups the consumption of whole grain bread, peas, beans and soy correlated positively with TAC. In the RA group a positive correlation with TAC was obtained for the frequency of tea consumption and in the control group for the frequency of apple consumption.

Conclusions: The results indicate the need to monitor the intake of vitamins and other nutrients involved in antioxidant defense in patients with RA.

Keywords: (maximum 5): Antioxidants; Rheumatoid arthritis

149/1142. Molecular analysis of the insulin-IGF axis in malignant cell transformation:

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Introduction: Recent research shows that diabetes type 2 is associated with an increased risk of some cancer types and that changes in energy metabolism can contribute to malignant cell transformation. In this context, a dysregulation of the insulin-IGF axis can cause alterations in metabolism as well as cancer-related processes like proliferation and apoptosis.

Objectives: Elucidation of the underlying mechanisms of the diabetes-cancer link will improve further developments in cancer prevention and therapy. The BALB/c cell transformation assay is a validated system as an alternative to in vivo carcinogenicity testing and allows the use of modulators of the insulin IGF network in a multistage cancer model.

Method / Design: A BALB/c cell transformation assay was performed to test the carcinogenic or protective potential of several modulators of proteins in the insulin-IGF axis (insulin-/IGF-receptor, PI3K, Akt, mTOR, AMPK, GSK3, p53). Malignant cell transformation was evaluated by substance administration (alone or in combination) in initiation, promotion and post-promotion phase. Effects on target proteins was further analysed by immunoblot or confocal immunofluorescence.

Results: The application of modulators like linsitinib, rapamycin and metformin among others to the cell transformation assay enables us to increase or decrease the colony forming potential of BALB/c cells. Furthermore it is possible to identify the most effective phase for an intervention in the foci developmental process. Immunoblot and confocal immunofluorescence analysis display regulations of downstream targets for protein synthesis (4E BP1, rS6), apoptosis (Caspase 3, PARP) and cell proliferation (GSK-3, p44/p42 MAPK).

Conclusions: The presented results reveal insights into molecular mechanisms of the insulin-IGF signaling during tumor development and helps to better understand the diabetes-cancer link and its causes.

Keywords: (maximum 5): Insulin signalling; malignant cell transformation; inhibitors

149/1143. Comparative study of TSH, T3 and T4 levels of mother With low birth weight deliveries

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Introduction: In Sudan One-third of infants are born with a low birth weight most of the irreversible damage due to malnutrition in Sudan happens during gestation and in the first 24 months of life, and over 1million infants remain unprotected from iodine deficiency disorders.

Objectives: The aim of this study is to determine whether there is any differences between vinous and cord blood TSH, TT3 and TT4 levels depending on neonate's birth weight.

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Method / Design: This study was conducted out at Medani Hospital in central Sudan. Twenty four cord blood samples and Twenty four venous blood samples were collected from women who delivered babies with low birth weight< 2500 g all mothers does not suffering from any chronic health problems. And the same from women who delivered a babies weighting ≥ 2500 g acted as control. Measurements of TT3 and TT4 levels were performed using radioimmunoassay, and immunoradiometric assay used for the measurement of TSH.

Results: There was significant difference of neonates body weight when the target (2289±326) compared with control subjects (3278±296) (p-value = 0.001). There was no significant difference between the target (38.4167 ±1.4) and control (38.1200 ±0.9) in neonates gestational age (p-value = 0.589) and. The results of this study showed that; in control groups; Cord blood TT4, TSH were high in comparison with vinous TT4, TSH (p-value = 0.004, 0.001) respectively, Cord TT3 level was low in comparison with vinous TT3 (p-value = 0.001). In Case groups; Cord TT4, TT3 level significantly were high in comparison with vinous TT4, TT3 (p-value = 0.007, 0.001) respectively. There is no significant differences between Cord and vinous TSH levels (p-value = 0.283).

Conclusions: fetal thyroid hormones were affected by neonatal birth weight TT3was elevated (4.4125±3.5554).

Keywords: (maximum 5): low birth weight, cord blood,

149/1147. Relationship between in vitro and in vivo approaches on slow appearance rate of starch: a meta-analysis

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Introduction: High slowly digestible starch (SDS) products ingestion has been shown to reduce glycaemic response, through the slow appearance rate of its carbohydrates.

Objectives: A meta-analysis of 3 intervention studies evaluates the strength between SDS content and appearance rate of exogenous carbohydrates (RaE) from cereal foods.

Method / Design: The three selected randomised clinical trials included 66 non-diseased subjects testing eight cereal products with different SDS contents (1 to 16g/portion). A Partial Least Square (PLS) analysis was performed on RaE, in relation to SDS content, time and their interaction.

Results: For each study, the higher the SDS content was, the higher its contribution to the RaE at the late phase of the postprandial period was. Based on the PLS analysis, a multivariate model was built to link SDS content in the products, sample time and RaE. The percentage of explanation of the RaE was 61% for the model including jointly SDS content and time, their interaction (time x SDS) and quadratic term of time ($time^2$). The predictor profiler illustrated this link and showed that for SDS content close to 0, the greatest SDS contribution to RaE was observed during the first 180 minutes of the postprandial period. On the opposite, for high SDS content, the SDS contribution to RaE was more moderate during the first phase and more sustained after 180 minutes compared to low SDS content.

Conclusions: The ingestion of cereal products with a high SDS content modulates dramatically the appearance rate of carbohydrates. This reduces the challenge to plasma glucose and insulin demand. Thus, this meta-analysis reinforces the interest of SDS to impact on carbohydrate metabolism in order to prevent the risk of metabolic disease genesis.

Keywords: (maximum 5): cereal foods, carbohydrates, glycaemic response, slowly digestible starch, isotope study

149/1150. Food intake, metabolic profile and oxidative stress in pacients with Psoriatic Arthritis

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Introduction: Psoriatic arthritis (PsA) is associated with increased risk of metabolic syndrome (MetS) and cardiovascular disease, due to its pro-inflammatory state

Objectives: To evaluate the dietary intake, metabolic profile, oxidative stress and body composition in patients with PsA.

Method / Design: : A total of 97 PsA patients were enrolled in this cross-sectional study. All of them performed an evaluation regarding anthropometric data (weigh, height, body mass index, abdominal circumference), risk factors for MetS and food intake (three-day food record), with nutrients adjusted by energy as Willet and Stamper´s method, as well as body composition measurements using DXA (GE-Lunar) and biochemical analysis, including markers of lipid and glucose metabolism and oxidative stress. Statistical analysis included mean and standard deviation, Kolmogorov-Smirnov test, t-Student test, Chi-square and Fisher›s exact test, Tukey, Pearson correlation and ANOVA, and multivariate regression models. P was set as below 0.05.

Results: PsA patients had high prevalence of overweight/obesity (83,5%), excess of body fat mass (90,7%) and MetS (54,6%). Dietary intake was considered inadequate in 90% of patients, with pro-inflammatory pattern. Joint disease activity was positively correlated with body fat mass (r= 0,4, p<0.001 and r=0,27, p <0.008) and waist circumference (r= 0,27, p<0.009) and negatively with lean mass (r=-0,38, p<0.001). Severe joint activity of PsA was found in patients with MetS, whereas skin activity was more severe in patients with higher intake of trans fat, sodium and less of omega-6.

Conclusions: PsA patients had inadequate dietary intake (specially pro-inflammatory pattern), peripheral insulin resistance, increased oxidative stress, and excessive body fat, which are associated with worse PsA prognosis.

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Keywords: (maximum 5): psoriatic arthritis, food intake, metabolic syndrome, oxidative stress

149/1152. Effects of Avocado incorporation in meals on satiety and gastro intestinal peptides release in humans.

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Introduction: Food ingestion is a complex process involving various biological and psychological determinants. Avocados are nutrient dense foods, with characteristics that may favorably impact energy balance.

Objectives: Evaluate if incorporating one half Hass avocado by addition or inclusion into lunch meal influences post-ingestive satiety and hormones response in overweight adults

Method / Design: In a cross-over fashion, 26 healthy subjects (mean BMI of 28.1) consumed 3 lunch test meals: Control (C); Avocado Inclusive (AI) a meal containing avocado matched with C for energy; and Avocado Added (AA) the C meal plus avocado. Blood samples obtained before and at 0.5, 1, 2 and 3h following lunch were assayed for insulin, ghrelin, leptin, GIP, glucagon-like peptide-1, and PYY. Visual analog scales (VAS) were administered at the same previous times to assess subjective feeling related to satiety. The area under the curve was computed for VAS and biological measures.

Results: We found significant differences in self-reported feelings of satisfaction and lesser desire to eat in the mixed model analysis. Compared to the C lunch, the AI and AA lunches increased satisfaction by 22% and 26% respectively, and decreased the desire to eat by 24% and 40% respectively. Compared to the AI lunch, blood insulin was higher after the C and AA lunches, leptin was also different for the AI and AA compared to control

Conclusions: The inclusion or addition of one half avocado to a lunch meal favorably increased satisfaction, and reduced the desire to eat over a subsequent 3 hour period in overweight adults. The biological changes in insulin and leptin related to avocado intake deserves further study, since may provide clues for energy balance and weight control.

Keywords: (maximum 5): Avocado; Satiety; blood insulin, energy balance, Visual analog scales

149/1157. Dietary patterns, obesity and microstructure of the hippocampus in healthy elderly people

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Introduction: Dietary habits and obesity have been shown to influence human brain structure and function. It is, however, unclear if diet or obesity, measured using body-mass-index (BMI) and waist-hip ratio (WHR), affects the microstructure of the hippocampus, a key area involved in memory functions.

Objectives: This study explored whether dietary patterns are associated with BMI, WHR or hippocampal microstructure, measured by diffusion tensor imaging (DTI) in non-demented elderlies.

Method / Design: Dietary patterns were identified using exploratory factor analysis on a food frequency questionnaire in 498 participants aged ≥ 60 years in the ongoing LIFE-study (Leipzig, Germany). Individual hippocampal subfields were segmented on high-resolution 3T-magnetic resonance images in a subgroup (n = 190), using FreeSurfer (www.freesurfer.net). Hippocampal mean diffusivity (MD) of each subfield was extracted on co-registered MD maps derived by DTI, using FSL (www.fmrib.ox.ac.uk/fsl/). Dietary patterns, BMI, WHR and MD were correlated using partial correlations adjusted for important confounders.

Results: Factor analysis revealed a ‹red meat and high-sugar› and a ‹fish, fruit and vegetable› pattern. The first pattern correlated to WHR ($r=0.30$, $p<0.01$), whereas the second one negatively correlated to WHR ($r=-0.37$ $p<0.01$). A higher WHR, but not BMI or dietary patterns, correlated to higher MD, indicative of lower microstructural integrity, on the CA2/3 region of the hippocampus (bilateral, $r>0.17$, $p<0.05$).

Conclusions: We showed here that an unhealthy diet correlates with central obesity, reflected in a higher WHR, which in turn is associated with lower microstructural integrity within specific areas of the hippocampus, independent of confounders. Therefore, an unhealthy diet might indirectly lead to hippocampal microstructural changes via its negative contribution to central obesity. Upcoming analyses now need to clarify if the microstructural changes in hippocampus translate into changes in memory performance, and if dietary interventions could potentially reverse these effects. This might help to develop novel strategies for maintaining brain health.

Keywords: (maximum 5): waist-hip ratio, mean diffusivity

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149/1158. Comparison of two techniques (skinfold thickness and bioelectrical impedance) to measure body composition in Algerian young adults

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Introduction: The nutritional status of population is often assessed by body mass index (BMI).

Objectives: The aim of our study was to evaluate the interchangeability of the skinfold thickness measurement technique and BIA in the determination of body fat mass in Algerian young adults.

Method / Design: The study was carried out on 396 girls and 193 boys voluntary healthy students aged 20–25 years recruited from Constantine in 2012/14. Body measurements were height (SECA 220), skinfold thickness (mm) : bicipital, tricipital, subscapular, suprailiac (Holtain Ltd), weight (kg) and Body fat mass (%) by bioelectrical impedance (Tanita BC-418). Predicted percentage body fat by the 4 skinfolds was calculated (Durnin and Womersley, 1974). Body fat mass (kg) calculate as : [Body fat mass (%) x Weight (kg)]/100.

Results: According to WHO (1995) definition, 7.1% vs 4.1% were underweight, 17.7% vs 18.6% overweight and 2.5% vs 2.1% excluding obese in girls and boys respectively (no significant gender differences). Mean±SD for age, height, weight and BMI were (girls vs. boys): 22.3±1.0 vs. 22.7±1.3 y, 161.7±5.5 vs. 175.2±5.9 cm, 59.4±9.3 vs.70.1±9.5 kg and 22.7±3.2 vs. 22.8±3.0 kg/m2, respectively. According to Skinfolds and BIA, mean body fat mass (%) was respectively 26.6±5.0 vs 28.8±6.3 for girls and 12.5±4.2 vs 14.5±5.0 for boys (all $p>0.05$). Body fat mass (kg) was respectively 18.6±2.7 vs 17.6±6.3, for girls and 10.6±3.1 vs 10.5±4.7 for boys. Simple correlation coefficients between Skinfold and BIA methods for % body fat mass were : $r= 0.710$ for girls and $r=0.638$ for boys (all $p<0.001$). They all appear to be strongly correlated for evaluating body composition.

Conclusions: For healthy Algerian young adults the skinfold thickness measurements and bioelectrical impedance analysis (BIA) can be used interchangeably to measure body fat mass.

Keywords: (maximum 5): skinfold thickness ; bioelectrical impedance; BMI; Young adult; Algeria

149/1159. Malnutrition of the cancer patients under chemotherapy and influence of learned food aversions

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Introduction: Malnutrition is a very common problem for hospitalized patients in general but it happens most to those who have a chronic disease such as cancer.

Learned food aversions are defined as aversions wich form toward foods after their ingestion has been temporally paired with illness (nausea or emesis)

Learned food aversion may exert a negative impact on nutritional status and quality of life.

Objectives: The goal of this work is to inform the nurses and dieticians because they play a vital role in the daily assessment of the patient's nutritional status. Being aware of all the causes of malnutrition may help to suggest solutions to improve the health condition of the patient and avoid severe malnutrition.

Method / Design: The present review evaluates the literature derived both from laboratory animals and humans. Also a questionnaire has been filled by patients under chemotherapy to assess the level of food aversions.

Results: The data are compelling enough to warrant further research and, some indications and recommendations are suggested.

Conclusions: There are a great many different types of food aversions, continuing research will help to maximize the positive effects of these aversions, and minimize their negative effects. Research on taste aversion learning can help us to understand, and possibly modify, many food aversions and preferences.

Keywords: (maximum 5): conditioned; food; aversion; nutrition, cancer

149/1161. Supplementation with calcium or vitamin D does not affect weight loss in overweight women

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Introduction: Obesity is one of the most significant public health problems in the world and there is some evidence indicating calcium or vitamin D supplementation may lead to weight loss.

Objectives: we aimed to assess effects of Calcium, vitamin D or Calcium plus vitamin D supplementation on weight, body mass index (BMI) and waist circumference (WC) of overweight or obese women.

Method / Design: one hundred healthy overweight or obese premenopausal women were randomly allocated to one of the following dietary regimen for 8 weeks: 1) a calcium- supplemented diet containing 800mg/d calcium carbonate 2) a vitamin D supplemented diet containing 400IU/d vitamin D 3) a calcium plus vitamin D supplemented diet containing 800mg/d calcium carbonate and 400IU/d vitamin D 4) a control diet containing placebo (all of them providing a

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500kcal/day deficit). At baseline and after 8 weeks, weight, height and WC were measured and BMI was calculated. Also to assess dietary intakes 3 24-hour records were filled. Data was analyzed using SPSS # 19.

Results: Of 100 participants, 80 persons completed the study. There were no significant differences among the age, weight, BMI, WC, calcium intake and serum vitamin D of participants in 4 groups. After 8 weeks of intervention weight, BMI and WC decreased significantly in all groups ($p<0.001$ for all), but there were no significant differences in anthropometric indices changes among the groups.

Conclusions: Results of our study indicated that compared to energy deficit diet, supplementation with neither of calcium, vitamin D or calcium plus vitamin D have any extra effects on weight, WC and BMI reductions in overweight or obese women.

Keywords: (maximum 5): overweight, obese, calcium, vitamin D

149/1162. Consumers knowledge and opinion about the functional foods

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Introduction: Today's consumers expect from manufacturers to produce food which has not only nutritional, but also health benefits. But the most important questions are 'what do consumers really expect?' and 'what do they know about such products?'

Objectives: The aim of this study was to assess the knowledge of consumers and their opinion regarding to functional food products.

Method / Design: The studies were carried out in a group of 302 Polish people between 30-49 year old consumers by using the questionnaire. Most of them with university degree. The knowledge level and opinion about functional foods were assessed by using questionnaire which contained 20 questions. The results were verified by using the ndependence $\chi 2$ test. The degree of compliance of multiple measurements of the same variable (reproducibility and reliability) was calculated by using Cohen's Kappa coefficient.

Results: The consumers showed a positive or neutral attitude towards functional foods. The significant of the respondents declared lack of knowledge about the concept of prohealthy food. On the other hand, most of the respondents showed that the functional foods is having a positive impact on their health. More than 70% of respondents indicated the functional foods as products enriched with vitamins and mineral substances, or having other bioactive compounds. One third of respondents erroneously compared prohealthy food with organic food. The validation of the questionnaire showed very good reproducibility of responses.

Conclusions: The consumers should be educated continously about functional foods. First of all, for these purposes the authority of doctors as well as the mass media must be used.

Keywords: (maximum 5): functional foods, knowledge, consumption, expectations

149/1163. Selection factors and expectations against functional foods

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Introduction: Functional foods is going to be the most developing branch of food industry and food technology. Due to widening variety of prohealthy food products nutritionists and manufacturers should know factors and expectations creating this consumption in modern communities.

Objectives: The aim of the study was to select important choice factors in relation to functional foods, measure frequency of consumption and expectations against functional foods.

Method / Design: The studies were carried out in a group of 302 Polish people between 30-49 year old consumers by using the questionnaire. Most of them with university degree. The knowledge level and opinion about functional foods were assessed by using questionnaire which contained 20 questions. The results were verified by using the ndependence $\chi 2$ test. Food frequency in questionnaire contained a seven point scale.

Results: The main factor to purchase functional food products was willingness to try something new and medical doctor recommendation. However, the primary factors of selection such food were the quality (54% of men, 42% of women), freshness (50% of women, 42% of men) and taste of the product (43% of men, 35% of women). Moreover, respondents declared possibility to pay up 10-30% more for functional foods. Significantly more women than men had eaten the products with health promoting properties.

Conclusions: Functional foods should exhibit sensory quality comparable to that of the traditional foods.

Respondents expect to functional foods increases resistance to infection and stress, strengthen the brain and the ability to concentration, and decreased risk of lifestyle diseases.

Keywords: (maximum 5): selection factors, functional foods, frequency of consumption

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149/1168. Prevalence and lifestyle determinants of hypertension amongst primary and secondary school teachers in yaounde city. prevalence and lifestyle determinants of hypertension amongst primary and secondary school teachers in yaounde city

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Introduction: Hypertension is a major modifiable risk factor of cardiovascular diseases. It has progressively become a public health problem with time and some professionals groups are more susceptible.

Objectives: This transversal study which is one of the first in Cameroon was aimed at evaluating the situation of hypertension and some environmental risk factors amongst government primary and secondary school teachers in Yaoundé.

Method / Design: Within the period from the 10th to 30th October 20011, 359 Cameroonian teachers of the primary and secondary were recruited in 10 government schools in the town of Yaoundé. The study consisted of questioning the teachers on socio-professionals data, their feeding habits and life style. Their anthropometric parameters and arterial blood pressure were measured and their BMI were calculated. The criteria of N.C.E.P ATPIII (2001) (SBP≥130 mm Hg and/or DBP≥85mm Hg) enabled us to diagnose hypertension and its subtypes. We evaluated common risks factors (age, gender, obesity, alcohol, tobacco, nutritional habits and sedentary life). Data were analyzed using the 10.1 version of SPSS for windows software.

Results: From this study, it was seen that the prevalence of SHBP stands at about 25.8% and 25.8% in primary school teachers and secondary school teachers respectively with NCEP references. That of DHBP was 41.3% and 33.1% in primary school teachers and secondary school teachers respectively. Prevalence was higher in teachers who are overweight and obese; those who consume alcohol and tobacco. Sedentary lifestyles, age (≥50 years) as well as female gender were highly associated with hypertension.

Conclusions: The prevalence of hypertension was higher in primary than in secondary school teachers, as well as in women than in men.

Keywords: (maximum 5): hypertension, risk factors, teachers, prevalence.

149/1170. Long term fortified bread consumption and Oxidative stress biomarkers

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Introduction: Flour fortification program with Iron and Folic acid received high priority in the Iran's Ministry of Health and Medical Education many years ago. However, one of the major concerns regarding its implication was the potential adverse effects of increased iron intake in individuals without iron deficiency. Our research was the first community-based study that evaluated the effects of iron administration on oxidative stress biomarkers in healthy individuals in Iran.

Objectives: This community-based study was conducted to evaluate the fortified bread consumption on certain biomarkers of oxidative stress in an apparently healthy population of adults from Semnan, central north of Iran.

Method / Design: 202 apparently healthy (non-anemic) 40-65-year-old inhabitants of Semnan based on a random sampling were evaluated. Evaluation of food intake, anthropometric and laboratory variables was performed in the beginning and after the 8-month intervention for all participants.

Results: There was no significant change in oxidative stress biomarkers in women following 8 months intervention. However, in men, final values of TAC, compared to the initial ones, showed a significant decrease in (p=0.01) which was accompanied by a significant increase in SOD (p=0.002). Mean of the activities of SOD and TAC showed a significant increase in the highest levels of serum Iron and ferritin in Iranian men, most other oxidative stress indices increased insignificantly.

Conclusions: It could be concluded that although the short-term period (8 months) of extra iron intake did not show severe effects of lipid per oxidation, significant changes of serum iron and some oxidative stress indices suggested that fortification of flour with iron among non anemic adults in the long term was not without adverse effects

Keywords: (maximum 5): Flour Fortification, Oxidative stress, Iron

149/1185. Epigenetic regulation in obesity and inflammation and consequences of intervention with EGCG and equol

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Introduction: Gene environment interactions and epigenetic misregulation are acknowledged as central mechanisms in the development of many complex diseases. Antioxidative and epigenetic active plant ingredients are known to interfere in mechanisms associated with inflammation, DNA repair and ageing.

Objectives: Epigenetic effects of various plant ingredients especially EGCG and equol were analysed for epigenetic regulation of CpG promotor methylation and histone methylation of genes involved in inflammation, DNA repair and ageing in cell lines as well as obese humans and in mice under a high fat diet.

Method / Design: High resolution melting curve analysis, qPCR, DGGE, bisulfit pyrosequencing and 454 sequencing were used for the analysis of gene expression, epigenetic regulation and microbiota structure, Comet assay for DNA damage

Results: With EGCG we see effects on the promotor methylation of IL6, acetylation of histones H3k4 and H3k9, DNA mismatch repair protein MLH1 as well as a reduction of telomere length and decreased telomerase activity in Caco 2 cells. In contrast we observed an increased telomere length and methylation of 3 CpGs in the promoter region of TERT in fibroblasts. In obese patients promotor methylation of IL6, FFAR3 and TLR2 as well as MLH1 is significantly impaired and strongly correlated with BMI. Antioxidant rich diet increased MLH1 promoter DNA methylation in obese subjects. DNA damage and DNA repair in obese mice will be discussed.

Conclusions: Intervention with plant ingredients and diets on the epigenetic regulation is a promising approach to interfere in numerous complex diseases and epigenetic methylation provides valid markers in personalised nutrition, prevention and disease control.

Keywords: (maximum 5): epigenetic, EGCG, equol, inflammation, ageing, DNA repair

149/1193. HYDRIA: The Greek national nutrition and health survey

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Introduction: The HYDRIA (HYgeia, Diet, Research In All) survey was undertaken in 2013-2014 aiming to evaluate the health and nutritional status of population in Greece.

Objectives: To describe the methods used for the collection of dietary and related data in a nationally representative sample of adult permanent residents of Greece and to provide preliminary results on dietary intakes.

Method / Design: The methodology used was formulated and tested through two EU supported studies (European Health Examination Survey-Pilot Joint action and Pilot PANEU project). The study sample of 4011 individuals was selected through random, two-stage sampling procedures based on the 2011 census. Data collection included online completion of interviewer-administered two 24-hour recalls using a specifically developed application (HHF Nutrition Tool), a non-quantitative food frequency questionnaire, and questionnaires on eating out, health status, lifestyle choices and other personal characteristics. Blood samples, somatometry and blood pressure measurements were additionally collected. The currently running data controls and cleaning are expected to be completed in June 2015.

Results: Plant foods and olive oil provide about 56% of daily intakes. Animal foods supply 28% and 16% is provided by alcoholic and soft drinks. Cereals and products are the predominant source of plant protein and vegetables of vitamins and minerals. Milk and products provide about two thirds of animal foods while fish and poultry lags behind (7%) Wine and beer are equally important in the daily consumption of alcoholic drinks.

Conclusions: Diet in Greece remains plant-based, but the daily intakes of plant foods which lie in the heart of the traditional Mediterranean diet have reduced in comparison to the past. HYDRIA is implemented by Hellenic Health Foundation (HHF) in collaboration with Hellenic Center for Disease Control & Prevention (HCDCP) of Greek Health Ministry and is co-financed by European Union (European Social Fund) and national resources.

Keywords: (maximum 5): Greek national study, health, diet

149/1195. Clinical and ambulatory blood pressure in a group of adults with pre-diabetes in relation to vitamin D status

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Introduction: Cross-sectional studies have demonstrated an inverse relationship between vitamin D status and insulin resistance. Insulin resistance is thought to be a risk factor for the development of hypertension. Furthermore, there is evidence to suggest that people with low vitamin D status may be more likely to develop hypertension.

Objectives: To examine clinical and ambulatory BP in a group of adults with pre-diabetes in relation to vitamin D status.

Method / Design: Adults were identified as pre-diabetic using an oral glucose tolerance test. Clinical BP measurements were taken and an ambulatory BP monitor was worn for 24 hours in each participant. Hypertension was defined as systolic ≥140mmHg and/or diastolic ≥90mmHg using clinical BP criteria and systolic ≥135mmHg and/or diastolic ≥85mmHg using ambulatory BP.

Results: In this group of adults with pre-diabetes, there was a moderate correlation between blood pressure measured clinically compa-

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red to mean 24-hr ambulatory blood pressure (Pearson's correlation coefficient = 0.593 p value= 0.000 and 0.704 p value= 0.000 for systolic and diastolic BP respectively). However, there was a difference in the clinical classification of BP between the two methods; 39 individuals (81%) were considered hypertensive from clinical blood pressure readings whereas only 14 (29%) were classified as hypertensive from ambulatory blood pressure results.

The prevalence of hypertension versus normotension was not significantly different in individuals who had sub-optimal vitamin D status compared to those who were vitamin D deficient (p value=0.265 and 0.870 for clinical BP and ambulatory BP respectively, chi-squared test).

Conclusions: In-line with other evidence, this study provides evidence for white-coat hypertension associated with clinical blood pressure readings when compared with 24-hour ambulatory blood pressure. Based on this limited sample size, prevalence of hypertension was not significantly different between individuals with sub-optimal vitamins D status versus those with vitamin D deficiency.

Keywords: (maximum 5): Pre-diabetes, ambulatory blood pressure, clinical blood pressure, vitamin D status

149/1197. Impact of one year supplementation of vitamin C and E on serum γ-tocopherol in elderly

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Introduction: Elderly patients with MCI (Mild Cognitive Impairment) show different levels of vitamin E status. Under condition of supplementing α-tocopherol its level in the blood is dose dependent increased. Only insufficient data are available about the influence of long term supplementation with antioxidants on the status γ-tocopherol.

Objectives: In this study the impact of one year intervention with vitamin E and C on the content of serum γ-tocopherol in MCI-patients was assessed.

Method / Design: A 12-month, double-blinded, placebo-controlled trail was conducted in 220 elderly Iranian individuals with MCI aged between 60-75 years. Divided into two main groups, the intervention group included 110 persons who were given a daily dose of 300 mg α-tocopherol acetate and 400 mg ascorbic acid, and the other 110 persons (Control group) received specially for this study designed placebo. All patients were not taking any drugs that might interfere with the supplements. After adjusting for potential confounding factors, serum γ-tocopherol contents were assessed in all patients at base line, 6 and 12 months of intervention using HPLC.

Results: Serum γ-tocopherol levels were throughout the observation time significantly lower in the supplemented group. The differences found between the control and supplemented groups were significant after 6 months (control and supplemented: 1.54±0.086 and 1.25±0.062 μmol/L, respectively, P<0.006), and also after 12 months of intervention (control and supplemented: 1.76±0.079 and 1.1±0.059 μmol/L, respectively, P<0.001).

Conclusions: One year of antioxidants supplementation with vitamin E and C in elderly subjects with MCI lead to significant decrease in the serum γ-tocopherol levels, indicating that this additional moderate dose of α-tocopherol in combination with ascorbic acid reduced the bioavailability (transport, storage) of γ-tocopherol.

Keywords: (maximum 5): γ-tocopherol, Antioxidants, MCI, elderly

149/1200. The relationship between overweight orbesity and dietary habits among children in a cohort in Kenitra city

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Introduction: Morocco is undergoing nutrition transition and rapid urbanization. Childhood obesity is an important issue in the context of food habits and globalization especially in urban areas

Objectives: The aim of this study is to investigate the relationship between body mass index and dietary habits amog preschool children in Kenitra city.

Method / Design: A cross-sectional study in a small sample of 247 of children with 5.38±0.44 year-old , including (48.6%) boys and (51.4%) girls Children's height, weight and body mass index (BMI) were measured using a standardized protocol. Data were collected using the diet made a 24-hour recall questionnaire completed by the family at home.

Results: The logictic regression analysis showed that the children who do not eat olives or olive oil (odds ratio = 3.80, 95% confidence interval (CI) = 1.27, 11.35) have a risk to developing an overweight or obesity 4 times more higher than children who consume at least once a day.

Conclusions: The findings of the current study indicate that BMI is not associated with unhealthy dietary habits. However ,This study should be completed by the inclusion of additional daily calories and macronutrient distribution with overweight / obesity. because further anthropometric and biochemical parameters need to be evaluated to get a wider assessment of children overweight and obesity.

Keywords: (maximum 5): Nutritional status, Risk factors, Overweight, Obesity, Morocco

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149/1203. Vitamin D and calcium supplementation and its influence on muscle strength and mobility in community-dwelling elderly: a systematic review and meta-analysis

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Introduction: Muscle strength decline and reduced mobility are frequent even in healthy elderly. There is no established treatment to prevent or reduce these, but numerous studies have investigated the effect of vitamin D and/or calcium supplements on muscle strength and mobility in the elderly, with mixed results.

Objectives: We aimed to summarize the available studies on vitamin D supplementation on muscle strength in a systematic way, including only studies in community-dwelling elderly.

Method / Design: A systematic search of the literature was performed. The systematic review included studies that used vitamin D with or without Calcium supplementation as the exposure variable and various measurements of muscle strength and mobility, while the meta-analysis was limited to studies using hand grip strength and timed up and go test as outcome variables

Results: A total of 12 studies out of 687 articles from the literature search were included in the systematic review providing 2515 participants with an age above 65 years. The majority of studies did not observe an improvement of muscle strength and mobility by giving vitamin D with or without calcium supplements. In the meta-analysis we observed both a non-significant change in hand grip strength (-0.2 kg (95% CI -0.8 to 0.3 kg, 6 studies)) and in timed up and go test (-0.7 seconds (95% CI -1.4 to -0.1 seconds, 4 studies) in favor of vitamin D supplementation. The meta-analyses showed a high degree of heterogeneity among studi

Conclusions: Due to the lack of clinical meaningful improvements of muscle strength and mobility by vitamin D supplementation, other treatments or combinations of treatment should be investigated in the elderly.

Keywords: (maximum 5): randomized controlled trials, vitamin D, older people, supplementation

149/1217. The addition of β-hydroxy-β-methylbutyrate to diet improves recovery from exercise induced muscle damage

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Introduction: β-Hydroxy-β-Methylbutyrate (HMB) supplementation has been reported to stimulate muscle protein synthesis and may also be an anticatabolic agent in active population.

Objectives: The purpose of this study was to determine the effect of HMB supplementation after an exercise induced muscle damage (EIMD), such as Loughborough Intermittent Shuttle Test (LIST) on blood markers of muscle damage as creatine kinase (CK) and lactate dehydrogenase (LDH), delayed onset muscle soreness (DOMS) and countermovement jump performance (CMJ) to design a new practical prescription for maintaining healthy status in active population.

Method / Design: Eight active male subjects were assigned randomly to one of two experimental groups. In the first supplementation period, 4 of the 8 subjects were supplemented with 3 grams of HMB per day for 7 days; the other 4 received a placebo (PBO) followed by two weeks washout period and then a second supplementation period in a randomized double-blind crossover, PBO design.

Results: There were positive changes ($P<0.01$) in CMJ 24h after test (mean dif. HMB vs PBO= 2.3); fatigue index (FI) during the LIST (PBO vs HMB=-2.1 VS -0.7; $P<0.7$); Pre-Base CK level (HMB vs PBO; $P<0.1$); Post-Pre and 24h-Post LDH level (HMB vs PBO; $P<0.05$, $P<0.1$, respectively); and, DOMS 24h after the LIST in calf and quadriceps muscles (HMB vs PBO; $P<0.09$, $P<0.04$, respectively).

Conclusions: HMB supplementation could be effective as signalling molecule in the management of neuromuscular impairment and reduction of muscle damage following a single bout of high intensity exercise in active male subjects. With this in mind, synergy between HMB supplementation, evaluation of neuromuscular function and registration of perceived recovery status could provide protection against (EIMD) and improve recovery.

Keywords: (maximum 5): β-Hydroxy-β-Methylbutyrate, creatine kinase, DOMS, recovery, health.

149/1222. Vitamin D and diabetic nephropathy: a systematic review and meta-analysis

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Introduction: There has been a long history documenting the usage of different vitamin D derivatives as therapy for renal diseases.

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However, there is no comprehensive assessment of the relation between vitamin D deficiency and risk of diabetic nephropathy (DN). In addition, the effect of vitamin D supplementation on DN is still unclear.

Objectives: The aim of this meta-analysis was to assess these issues by pooling together the results from cross sectional studies and clinical trials.

Method / Design: A systematic literature search of PubMed, Scopus, and Google Scholar was conducted up to September 2014. For cross-sectional studies, odds ratio (OR) was used as a measure of the association between vitamin D status and risk of DN, and for clinical trials mean and standard deviation (SD) of the main outcome (urine albumin/creatinine ratio (UACR)) in intervention and placebo groups were considered for analysis.

Results: The final selected articles were published between 2009 and 2014. A total of 3700 and 219 patients were enrolled in observational and interventional studies, respectively. The pooled ORs from 6 cross-sectional studies was 1.80 (95% CI, 1.25 to 2.59; p=0.002) indicating a significant inverse association between serum vitamin D status and risk of nephropathy in diabetic patients. However, the pooled data of UACR levels in clinical trials suggested no significant change following vitamin D supplementation (17.98; 95% CI, -35.35 to 71.32, p=0.51).

Conclusions: This meta-analysis showed the higher risk of nephropathy in vitamin D deficient diabetic patients. Causality in this association was not supported by pooling together the results of available clinical trials following vitamin D supplementation.

Keywords: (maximum 5): Cholecalciferol; Calcitriol; Diabetes mellitus; Nephropathy

149/1223. Body composition and nutritional status among adults in northern Serbia

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Introduction: Overweight and obesity are a well-known public health problem associated with chronical diseases such as heart disease, stroke and type 2 diabetes. Body composition and nutritional status monitoring are very important for planning preventive measures towards health promotion.

Objectives: The aim of this study was to evaluate nutritional status and body composition among a sample of adults in Vojvodina, a northern region in Serbia.

Method / Design: 287 female and 105 male adults, aged between 18 to 65 years participated in the study. Nutritional status was defined using body mass index (BMI), according to World Health Organization (WHO) criteria. Body composition was measured by InBody 720 body analyzer device, using the bioelectrical impedance method.

Results: A prevalence of overweight of 31,6% and of obesity by 58,6% were found. Additionally, 16,9% of subjects met criteria for class 2 obesity and 9,4% met criteria for extreme obesity. Women showed higher percentage of overweight (33,4%) than men (26,7%) but levels of obesity were higher in men (69,5%) than in women (54,7%). Mean of % body fat within BMI groups: in normal BMI (22,57%), overweight (32,74%) and obese (43,86%). The average values of the fitness score and % skeletal muscle mass decrease with increasing age.

Conclusions: High prevalence of overweight and obesity requires public health action. Healthy lifestyle, balanced diet with low caloric intake and increased physical activity must be promoted within prevention strategy and control of obesity in adults in northern Serbia.

Keywords: (maximum 5): overweight, obesity, body composition, body fat percentage

149/1224. Evaluation of vitamin D status in newly diagnosed pemphigus vulgaris patients

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Introduction: Pemphigus vulgaris (PV) is an autoimmune blistering disorder of the skin or mucosa and low vitamin D status has been linked to many immune disorders.

Objectives: This study was designed to compare the vitamin D status in PV patients with healthy controls.

Method / Design: In this case-control study, vitamin D status of 32 newly diagnosed PV patients was compared with 36 healthy control subjects. All patients were selected from the specialized dermatology departments of Razi Hospital, Tehran University of Medical Sciences in a 2-year period of time. The severity of the disease was estimated according to Harman's scores. Serum concentration of 25(OH)D was measured by Roche Elecsys System. Data were analyzed by independent t-test.

Results: Both groups were similar based on sex, age and body mass index. The mean duration of disease was 5.57±0.93 months. The mean oral and skin severities were 1.81±0.20 and 2.31±0.17 respectively, based on Harman's scores. Serum 25(OH)D was significantly lower in PV patients compared to controls (-8.90; 95% CI, 2.29-15.51

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and P = 0.009). There was a negative correlation between vitamin D level and the oral severity of disease (r = -0.39 and P = 0.02).

Conclusions: PV patients have significantly lower serum level of 25(OH)D compared to healthy subjects which might contribute to worsen the disease. These data indicate the importance of improving vitamin D level in pemphigus patients.

Keywords: (maximum 5): Pemphigus vulgaris, Vitamin D, Calcitriol

149/1226. Food reformulation and reducing sodium consumption in Europe

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Introduction: Excessive sodium salt consumption has been associated with negative health effects. The World Health Organization (WHO) and European Commission (EC) have encouraged sodium intake reductions among European populations with reformulation of high-sodium food products thought to play a major role in reducing daily intakes.

Objectives: The objective of this project was to assess and review sodium intake in the European Union, determine the progress toward reducing sodium in foods via food reformulation and review the factors motivating salt reduction in the food industry.

Method / Design: As part of the EU Salux project, a review was conducted of scientific publications as well as government and non-government organization publications and websites.

Results: To date, research on food reformulation strategies to reduce sodium in bread, meat, dairy and convenience foods is promising and some advancement has been made in other product categories. Many strategies are cost effective and do not affect consumer acceptance. However, industry response is difficult to track and significant reformulation efforts have not been confirmed internationally. Average sodium and salt intake among Europeans continues to exceed the WHO recommendation of <5 g/day of dietary salt, the internationally recognized intake goal for public health measures. The EC has approved five salt-related health claims. Approximately half of the EU member states have legislated change in the form of taxation and/or mandatory nutrition labeling. While legislation may effectively promote reformulation, little is known about the impact of these measures on dietary intake.

Conclusions: Food reformulation to reduce the sodium content of foods has been widely researched, however its effectiveness to reduce sodium intake throughout Europe has not been verified. Limited motivation among food manufacturers, food safety issues, consumer acceptance concerns, cost concerns and complications arising from the use of sodium alternatives remain limitations to use.

Keywords: (maximum 5): food reformulation, sodium intake, cardiovascular diseases, blood pressure, EU Salux project

149/1229. Urolithin A, a walnut polyphenol metabolite, modifies cell cycle progression and induces apoptosis in breast and prostate cancer cell models.

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Introduction: Introduction: The identification of new agents that may modulate the progression of cancer cell growth is of great interest. In this regard, dietary agents can be utilized to identify molecular targets to be used as part of a chemo-preventive strategy. Walnuts contain several bioactive compounds, including pedunculagin, a polyphenol metabolized by microbiota to form urolithins, namely urolithin A (UA).

Objectives: We performed a genomic analysis to study the effect of UA on LNCaP prostate and MCF-7 breast adenocarcinoma cells.

Method / Design: Cells were incubated with 40μM UA for 24 hours. Then, RNA was extracted, labeled and hybridized to Affymetrix Human Gene 2.1 ST Array, representing the whole human genome. Microarray results were analyzed using the GeneSpring 12.0 software. Differentially expressed genes ($p < 0.05$, FC >2) were selected.

Results: Among the differentially expressed genes in both LNCaP and MCF-7 cells, we identified a decreased expression of PDK1 and an up-regulation of CDKN1A, genes linked to cancer progression. In MCF-7 cells we also observed an up-regulation of PTEN. The previously mentioned changes in gene expression were validated by RT-real time PCR. Cell cycle distribution and apoptosis were measured by flow cytometry after 24h incubation with UA. An increase in the apoptotic cell population and cell cycle arrest were observed in both LNCaP and MCF-7 cells.

Conclusions: Our results indicate a potential role of walnuts as a chemo-preventive agent for prostate and breast cancer

Keywords: (maximum 5): Walnuts, cancer prevention, ellagitannins.

149/1237. Increasing protein intakes in older adults: Predictors of high meat, fish, egg and dairy consumption

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Introduction: Protein-specific under-nutrition is considered to affect 10-40% of older adults in Europe and the US, with potential detriments to health and wellbeing. This under-nutrition is considered to result, at least in part, from low protein intakes, and various reasons for the low consumption of protein-rich foods have been identified.

Objectives: This work investigated the importance of various reasons for the consumption of four types of protein-rich foods in relation to protein intakes, in a sample of UK older adults.

Method / Design: One thousand questionnaires were administered to an older adult sample. Questionnaires assessed: usual frequency of consumption of meat, fish, eggs, and dairy products; agreement or disagreement with 30 statements assessing 15 previously identified reasons for protein consumption in this population; and various demographic and lifestyle characteristics of relevance to food intake.

Results: A total of 348 respondents (149 male, 199 female, aged 65-94 years from across the UK) were included in analyses. Meat was consumed 0-3 times/day, fish from 0-2/day, eggs from 0-1/day and dairy products from 0-3.6 times/day. Higher intakes of all foods were associated with higher liking (smallest β=0.15, p=0.03), a greater importance of freshness (fish: β=0.16, p=0.03), higher perceptions of convenience (meat, eggs: smallest β=0.13, p=0.03) or low effort to prepare and cook (fish: β=-0.13, p=0.05), and higher affordability or value for money (meat, eggs: smallest β=0.12, p=0.04).

Conclusions: These findings suggest specific reasons for the consumption of protein-rich foods in older adults, focusing around liking, convenience/ease of preparation, and value for money, while other previously identified reasons were less important. Strategies to increase intakes of protein-rich foods should focus on these particular reasons, for increased success.

Keywords: (maximum 5): protein; liking; convenience, value for money, questionnaires

149/1238. Open access nutrition test shows similar nutrition competences within food services and education

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Introduction: In Finland, more than 2 million meals are eaten out daily. Nutrition competence in food services is important for ensuring the nutritional quality of those meals. The open access nutrition competence test with an e-learning material was created to increase the nutrition competence within food services and to help nutrition education of catering students.

Objectives: The aim of the study was to assess differences in nutrition competency between food service professionals and education (student and teacher) in open access nutrition test.

Method / Design: The data from accepted tests (limit 112/120) from October 2012 to April 2015 were analyzed (n=8054). The working status was classified to students (n=3495), kitchen staff (n=2789), managers (n=858), service personnel (n=287), teachers (n=142), nutritionists (n=60) and others (n=423). Age groups are <20 yrs, 20-45 yrs, >45 yrs. The data on not passed tests is unavailable.

Results: The average score reached was 113.9±2.2. Students got on average 113.9±1.9, teachers 114.1±1.7, kitchen staff 113.8±1.8, food service managers 113.9±1.9, service personnel 113.8±1.7, nutritionists 114.5±2.0, and others 114±1.9 points. The differences between groups are minor because of the high passing score limit. The nutritionists and teachers got the best results, but statistically significant (p=0.05) difference was found only between nutritionists and kitchen staff.

Conclusions: Public health can be improved by increasing the nutrition competence within food services. For that purpose open access nutrition educational material with competency test is a new innovation. Differences in reached scores between food service personnel, teachers and students are minor which is a good signal when thinking of the nutrition quality of food services.

Keywords: (maximum 5): Nutrition competency, Food services

149/1239. Dietary Fatty Acids from a local Nigerian Spice (Clerodendrum volubile) Suppresses Tumor Cell Migration and Invasion, Attenuates Oxidative Stress, and Regulates Cell Cycle Progression in Human Neuronal Glioblastoma Cells

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Introduction: The medicinal properties of spices in the treatment and management of various ailments are well documented. Malignant gliomas have been shown to represent some of the greatest challenges in the management of cancer patients worldwide. Over the years, a large number of different treatments were tested but displayed very limited efficacy. This has led to paradigm shift to the use of medicinal plants.

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Objectives: In this study, the antiproliferative effect of the fatty acid components of Clerodendrum volubile an indigenous Nigerian spice as well as its antioxidant effect on U-87 MG (Human Neuronal Glioblastoma) cell lines was investigated.

Method / Design: Fatty acids extracted from C. volubile leaf oil were subjected to GCMS analysis. U-87 MG cells were cultured and treated with the fatty acids for 48 hrs, after which the antiproliferation effect was ascertained via MTT assay and cell viability analysis using BD FACS Calibur. Cell cycle was analyzed by flow cytometry on FACS Calibur. Western blotting was used in determining expression of proteins in the cell lines. Cell migration and invasion were analyzed using the migration and invasion transwell assay protocol. The treated cell lines were assessed for reduced glutathione (GSH) level, catalase, superoxide dismutase (SOD) and lipid peroxidation.

Results: The fatty acids significantly inhibited cell proliferation, arrested S phase, modulated expression of MMP – 9 and VEGF, attenuated oxidative stress, and suppressed migration and invasion in U-87 MG cell lines

Conclusions: The fatty acids significantly inhibited cell proliferation, arrested S phase, modulated expression of MMP – 9 and VEGF, attenuated oxidative stress, and suppressed migration and invasion in U-87 MG cell lines. These results indicate the therapeutic potential of the fatty acids components of the leaves of Clerodendrum volubile on human neuronal glioblastoma cells.

Keywords: (maximum 5): Spices; Unsaturated fatty acids; Cancer; Tumor migration; and Oxidative stress

149/1246. Changes of body composition during weight reduction program in obese women

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Introduction: Weight loss with preferential effect on the body fat, especially visceral fat, could have important clinical benefits.

Objectives: The objective of this study was to evaluate the effect of 8-week personalized Chrono Nutrition weight management program on body weight and body composition in obese women.

Method / Design: 157 obese women (aged 44,1 ± 12,7 years, BMI= 35,5 ± 5,3 kg/m2, % body fat= 43,4 ± 4,9 %) participated in the investigation. Participants were advised to have meals that contained on certain well tolerated foods at a proper day time. Anthropometric measurements and body composition by using a bio-impedance analyzer Inbody 720 were assessed at the baseline, and after 4 and 8 weeks. Friedman test was used to compare anthropometric measurements during follow up, and post hoc comparisons with a Wilcoxon signed-rank test was conducted with the applied Bonferroni correction method.

Results: Participants lost significant weight during the intervention (-5.1 kg at week 4 ($p<0.001$) and -3.5 kg at week 8 ($p<0.001$)). The mean visceral fat area, mean total fat mass, and mean percent body fat showed a trend of reduction during the whole period of the study and the difference between each measurement remained statistically significant ($p<0,001$). The mean skeletal muscle mass was reduced by around 0,7 kg at the 4 weeks of program; the difference was statistically significant ($p <0,001$). Afterwards, towards week 8 of the program, the mean value of the skeletal muscle mass showed no trend of further reduction.

Conclusions: Chrono nutrition could be an effective and appropriate weight management program.

Keywords: (maximum 5): chrono nutrition, weight loss, body composition, body fat, skeletal muscle mass

149/1251. Beneficial Effects of Teucrium polium on Hepatocellular Carcinoma in Animal Model

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Introduction: Hepatocellular carcinoma (HCC), is the sixth most common cancer and the third most frequent cause of cancer-related death. Nutrition has an important rule in cause, prevention and treatment of cancer, and many of herbs have long been used as an alternative remedy in various diseases including cancer.

Objectives: The present study investigated the capability of the decoction of Teucrium polium to protect liver cells against HCC in carcinogenesis-induced animal model.

Method / Design: 40 male rats, 8±1weeks old, with average weight 243.1±6.7g have been used. Hepatocarcinoma was induced in 30 of the rats by single intraperitoneal injection of 200mg/kg diethyl nitrosamine (DEN) and then followed by a cancer promotion period of 2 weeks on food, which was mixed with 2-acetylaminofluorene (0.02% AAF) as a promoter of hepatocarcinogenesis. After the cancer initiation period, the leftover rats were weighed again and divided randomly into two groups with no significant differences in their

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weight. The treatment group was force-fed 0.7 mL/100 g body weight/day of Teucrium polium decoction. At the end of the study, serum blood cancer markers, and histology of liver cells and their glucocorticoid receptors has been done using Fluorescent in situ hybridization (FISH) method.

Results: After 28 weeks treatment with decoction of Teucrium polium, serum biochemical markers including ALT, AST, AFP, GGT, ALP, HCY, TNF-α, α2MG, and CBG have been regulated auspiciously. Total antioxidant status also has been increased intensely. Liver lesion score as well as mortality rate in treated group was lessened significantly. The decoction also has intensified the number of glucocorticoid activity and it receptors in liver cell.

Conclusions: Teucrium polium decoction positively improved cancer markers by increasing glucocorticoid activity and its receptors in liver cell. This decoction might be considered as a way to inhibit or suppress liver cancer development.

Keywords: (maximum 5): Hepatocellular carcinoma, Teucrium polium, receptors

149/1254. Factors Associated With Body Weight Status of Iranian Postgraduate Students in Universiti Putra Malaysia 2010

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Introduction: Good nutrition, a balanced diet and regular physical activity are foundations of good health. Research has found that dietary patterns change dramatically following the arrival of students in a foreign country. However, nutritional status of Iranian students studying oversea has never been investigated.

Objectives: The objective was to determine factors associated with body weight status of Iranian postgraduate students in Universiti Putra Malaysia (UPM).

Method / Design: A cross-sectional study was conducted to determine the body weight status of 210 Iranian postgraduate students aged between 22 and 55 years in 2010 in UPM. The associations between body weight status, socio-demographic factors and lifestyle factors (smoking and physical activity) were assessed. Anthropometric factors (height, weight, BMI and waist and hip circumferences) were measured. Chi-square, Spearman Rho and Pearson tests were used for data analysis.

Results: From a total of 210 postgraduate students 110 were females, and 100 males. No significant correlation was observed between smoking and BMI (P=0.4). However, statistically significant correlations were observed between gender (P=0.007), physical activity (P=0.02), using protein (P=0.005), carbohydrate (P=0.002), fat (P=0.001), fiber (P=0.003), vitamin C (P=0.04), calcium (P=0.005), waist circumference (P=0.02), hip circumference (P=0.001), Waist to Hip Ratio (P=0.002) and BMI.

Conclusions: The nutritional behavior of university students was poor. Therefore, it is essential to encourage young people, including university students to enrich their diets with milk, beans, fruit and vegetables to decrease the risks of nutrition related disorders.

Keywords: (maximum 5): Obesity; Life Style; Diet Records; Malaysia; Students

149/1256. Prevalence of Overweight and Obesity in North-West of Iran: Importance of Economic Situation

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Introduction: The prevalence of obesity in children and adolescents has become one of the major worldwide health problems. Changes in life style and easy access to caloric dense foods, plus inactivity due to new technologies have been blamed as cause of obesity in many countries including Iran.

Objectives: The present study, investigated the prevalence of overweight and obesity among preschool and school aged children in North West area of Iran.

Method / Design: In this cross-sectional study, BMI Z-Score of 7278 children were analyzed by using Anthro and Anthro plus software.

Results: Based on the findings, 1.7%, 3.8%, 75.1%, 13.9%, and 5.5% of children were severe malnourished, malnourished, Normal, overweight, and obese respectively. Boys had significantly higher BMI than girls (15.61±1.94 vs 15.32±1.83 kg/m2; p<0.001, t=8.384, df=7276). Based on the economic situation of different cities in this part of Iran, the prevalence of overweight and obesity fluctuated between 4 to 20.3%.

Conclusions: Good economic situation of North-West of Iran due to industries and in agriculture can lead to high caloric intake, which has increased prevalence of overweight and obesity. Nutritional intervention and education is necessary to prevent this problematic issue.

Keywords: (maximum 5): Overweight, Obesity, Malnutrition

149/1258. Overweight and Obesity among Iranian Adolescents in Malysia: Socio-demographic vs Physical activity

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Introduction: In recent decades, the prevalence of obesity among adolescent has risen sharply worldwide. High prevalence of overweight and obesity among adolescent has been reported in developing countries undergoing nutritional transition. Adolescents overweight and obesity usually lead to adulthood overweight and obesity and it is an important risk factor of adulthood chronic diseases such as cardiovascular diseases.

Objectives: The aim of this study was to investigate the prevalence of overweight and obesity and its associated factors amongst Iranian adolescents residing overseas, namely in Malaysia.

Method / Design: Cross sectional study was conducted among 161 adolescents (84 males and 77 females) age 14 to 18 years old attending Iranian Schools in Malaysia. Validated self-administered questionnaires were employed in this study.

Results: The study found prevalence of overweight and obesity was 49.7% (male: 52.4%, female: 46.8%). The study also revealed that there were significant association between overweight and obesity with grade of study (χ^2=19.17, p=0.02) and level of physical activity (χ^2=16.15, p=0.001). Among male adolescents there were significant association with parents education (mothers' education: χ^2=4.77, p=0.029, fathers' education: χ^2=7.5, p=0.006), but there were no association between overweight and obesity among female adolescent with parent education (mothers': χ^2=1.4, p>0.23, fathers' education: χ^2=1.45, p>0.24). The study also revealed there were no significant association between overweight and obesity with family income in both genders (χ^2=0.02, p>0.99).

Conclusions: These finding showed high prevalence of overweight and obesity among Iranian adolescents residing overseas as compared to adolescents at their homeland. Due to important rule of youth obesity on chronic diseases, proper food policy making in order to decrease overweight and obesity among students is highly required.

Keywords: (maximum 5): Overweight, Obesity, Chronic disease, Youth obesity

149/1271. Prevalence of cardio-metabolic risk factors in the Zanzibari Population: a cross-sectional study

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Introduction: Data on nutrition and lifestyle factors and related determinants in association with health outcomes from epidemiological studies are scarce for entire family in sub-Saharan Africa.

Objectives: To investigate the prevalence of cardio-metabolic risk factors in all members of randomly selected households in Unguja Island.

Method / Design: A baseline survey conducted in 2013, 235 households and 1443 individuals were examined. In polygamous families all wives and their children were included.

Determinants for nutrition and lifestyle were assessed on household level using partly validated instruments, e.g. socio-economic variables, water and sanitation as well as nutrition and food insecurity. On individual level dietary intake and objectively measured physical activity were assessed. Core survey modules included anthropometric and physiological measurements including height, weight, circumferences, bioelectric impedance, blood pressure and collection of venous blood and urine from eligible participants (≥5years of age).

Results: Overall individual response rate was 93.6%; in total, 85.3% (n=1314) participants from 235 households fulfilled the inclusion criteria (weight, height/length, age and gender). According to WHO and IOTF cut-offs, majority of the participants were normal weight. The overall prevalence of underweight, overweight and obesity was 36.5%, 13.1% and 8.2% respectively. Underweight was more prevalent among children and adolescents (0-5y, 6-15y), normal weight among 12-59y olds and obesity among participants ≥60y. Hypertension prevalence was 20.4% (n=251), about 12.9% individuals were at risk according to WHO and NIH references. Metabolic parameters were analysed in venous blood (n= 845, 64.3%). There were gender and regional differences in the prevalence of cholesterol, HbA1c, blood glucose, triglycerides, low density lipo-protein and microalbumin.

Conclusions: Prevalence of cardio-metabolic risk factors was generally lower in rural than in urban areas. Health prevention strategies should consider double burden of under- and overweight within one family.

Keywords: (maximum 5): Cardio-metabolic risk, obesity, double burden of disease, household, Zanzibar.

149/1277. Anthropometric assessment and vitamin D status among school children in a rural region of Morocco

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Introduction: Vitamin D deficiency is a major health problem among children as it can result in rickets in children. Vitamin D is essential for growth and development of children.

Objectives: The aim of this study is to determine the anthropometric measurement and vitamin D status of schoolchildren in a rural region of Morocco

Method / Design: In an observational study 191 children (aged 7-9years) were selected from 3 primary schools and participated in the study. Weight and height were measured; fasting blood samples were taken to assess vitamin D as [25(OH) D] concentration. Height-for-age and body mass index for age (BMI-for-age) of the children were computed.

Results: Our results showed that the prevalence of malnutrition was high, with a mean height-for-age and weight-for-age less than -2SD. Vitamin D deficiency was prevalent in schoolchildren 65.8% of subjects had a 25 OHD<75 nmol/l and the median 25 OHD was found to be 73.3nmol/l, no significant difference was observed between boys and girls (p>0.05).

Conclusions: This study showed the presence of a high prevalence of vitamin D deficiency among the school children. These results need appropriate interventions to address the problems of poor vitamin D status in children.

Keywords: (maximum 5): Vitamin, Deficiency, Anthropometric, Malnutrition

149/1279. Effects of Combined Conjugated Linoleic Acid and L-Carnitine on Weight Gain in Diet Induced Obese Rats: An Experimental Study

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Introduction: Obesity has become one of the most challenging public health problems that severely impairs the health and quality of life. It motivates pharmaceutical industry to produce anti-obesity drugs. However efficacy and mechanisms of actions of many anti-obesity drugs are remained unclear.

Objectives: The aim of this experimental study was to investigate the synergist anti-obesity effects of Conjugated Linoleic Acid (CLA) and L-Carnitine (LC) in diet induced obese rats.

Method / Design: Forty eight male Wistar rats weighing 150-200 g were randomly divided into 3 groups: 1) Chow diet (n=8), 2) Normal fat diet (n=8), and 3) High fat diet (HFD) (n=32). After 8 weeks, the HFD group was subdivided into 4 categories: control HFD+Corn Oil group, HFD+500 mg/kg CLA as a 50:50 isomer blend of c-9, t-11 and t-10, c-12 CLA (n=8), HFD+200 mg/kg LC and HFD+500mg/kg CLA+200mg LC (n=8), which was administered by oral gavage. The treatment period was four weeks. Body weights were measured and recorded weekly by means of a digital scale.

Results: At the end of eighth week, a significant difference in weight was observed between HFD group and the other groups. After four weeks LC significantly reduced weight gain by 4.2%. Trend of weight gain in CLA and LC + CLA groups were decelerated in comparison with HFD group (3.5% and 3.1% respectively), however they were not statistically significant

Conclusions: Findings of this experimental study showed that a high fat diet which contained 200 gr fat/kg diet led to obesity and on the other hand LC and CLA could decelerate weight gain to some extent.

Keywords: (maximum 5): Obesity, Conjugated Linoleic Acid, L-Carnitine, Weight gain

149/1290. Dietary patterns and breast or lung cancer in adults from Warmia and Mazury

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Introduction: Breast cancer in women and lung cancer in men are the most prevalent cancers in Poland and worldwide. Results of studies on food consumption and breast or lung cancer are limited.

Objectives: The aim of this study was to assess the association between dietary patterns (DPs) and occurrence of breast or lung cancer in adults.

Method / Design: It was a case-control study on 217 subjects aged 23-80 years from Warmia and Mazury in Poland, including 122 woman and 95 man. Breast cancer cases in 17 women and lung cancer cases in 54 men were diagnosed. The food frequency consumption for selected 21 foods was collected using the Questionnaire of Eating

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Behaviors (QEB). Three DPs were identified in Principal Component Analysis: 'Dairy&fruit&vegetables', 'Processed&fast-food' and 'Traditional Polish', characterized by higher consumption of meat, fried foods and potatoes. Multiple logistic regression analysis was used, and the odds ratios (ORs) were calculated.

Results: The ORs of both cancers in comparison to the absence of cancers (OR=1.00) were: from 0.40 (95%CI:0.19-0.82;p<0.05 without adjustment) to 0.37 (95%CI:0.16-0.83;p<0.05 with adjustment for age and type of cancer) in subjects in the upper tertile of the 'Dairy&fruit&vegetables' DP and from 0.40 (95%CI:0.17-0.90;p<0.05 with age-adjustment) to 0.39 (95%CI:0.17-0.89;p<0.05 with adjustment for age and type of cancer) in subjects in the middle tertile of the 'Dairy&fruit&vegetables' DP. The ORs of both cancers were: from 2.50 (95%CI:1.21-5.15;p<0.05 without adjustment) to 6.83 (95%CI:2.69-17.32;p<0.0001 with adjustment for age and type of cancer) in subjects in the upper tertile of the 'Processed&fast-food' DP. The cancer ORs for the 'Traditional Polish' DP weren›t significant.

Conclusions: The occurrence of both cancers was positively associated with non-healthy pattern characterized by processed and fast-food consumption but inversely related to the pro-healthy pattern characterized by dairy, fruit and vegetables consumption in Polish adults from Warmia and Mazury.

Keywords: (maximum 5): dietary patterns, breast cancer, lung cancer

149/1297. Reported cheese consumption is not associated with dietary sodium intake, as measured by urinary excretion

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Introduction: Cheese is an important source of vitamins and minerals, including calcium. However, cheese has recently come under scrutiny for containing high levels of salt, and has been highlighted for salt reduction strategies.

Objectives: To determine whether cheese intake was associated with dietary sodium intake, as measured via urinary sodium excretion, in a nationally representative sample of Irish adults (n=1500). Urinary excretion data were available for n=1069.

Method / Design: Dietary intake data were collected as part of the National Adult Nutrition Survey (NANS). Data was collected from 2008-2010 from healthy, free-living Irish adults. Mean daily intakes of cheese were calculated from all sources, including recipes and composite foods. Urinary sodium levels (mmol l-1) were calculated from a first-void urine sample. Analysis was conducted via a Randox RX Daytona, using an ion-selective electrode (ISE). The population was divided into tertiles (low, medium and high) of cheese consumption, based on mean daily intakes, and the urinary sodium levels were compared using the univariate GLM procedure in SPSS, v20 for Mac, controlling for age, gender and energy intake.

Results: There was no difference in urinary sodium excretion across non-consumers of cheese and low, medium and high cheese consumers (96.3 mmol l-1, v.s 96.3, 98.4 and 97.1 mmol l-1, respectively, p=0.936).

Conclusions: Cheese consumption does not appear to significantly contribute to dietary sodium intake in this cohort.

Keywords: (maximum 5): Cheese, salt, sodium, dietary intake, urinary excretion

149/1298. Assessment of Eating Habit with Anthrometrical Regards among Adolescents in Iranian Secondary School in Kuala Lumpur

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Introduction: Childhood and adolescents obesity is now a public health issue, both in developed as well as developing countries.

Objectives: To assess BMI-for-age of adolescents as well as determine the quality of their daily diets and collect information on some nutritional habits

Method / Design: Analyses were based on 296 adolescents (150 boys and 146 girls) aged from 12 to 17 years studying at the Iranian secondary school in Kuala Lumpur. Weights and heights were measured and BMI-for-age was calculated based on WHO, 2007. A two-day dietary intake recall was conducted by the investigator.

Results: The analysis of body weight status with dietary intake showed that there is a positive relationship with protein, vitamin A, C, B1, B2 and niacin, calcium and iron with body weight status (p<0.05). Also across all the average intakes of fat, carbohydrate, vitamin B12, iron, magnesium in male were higher than female. In both groups the energy, carbohydrate and protein intakes were lower than DRIs. All micro-nutrient intakes among respondents in both ages and sex were found to be higher than DRI, except vitamins B1, B2, C and D, zinc, folate, calcium and phosphorus. Iron intake was deficient among the females in age 14 to 17 groups. Generally their diets were also deficient in vegetables and fruits but excessive in sweets and soft drinks. With regards to BMI, 23.6% of adolescents were thinness, while 14.5% obese

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respectively. Distribution of BMI by gender was significantly different ($p<0.05$) with more girls (16.4%) being overweight than boys (12.7%).

Conclusions: Nutrition education is necessary for adolescents not just at this time of growth spurt but in forming good nutritional habits which will benefit them throughout life. Better intervention on adolescent can help us to give them better education and understand the needs of that impaired groups.

Keywords: (maximum 5): obesity,adolescent,

149/1300. Survey Among Elderly People In Nursing Homes Related To their Fluid intake

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Introduction: Appropriate hydration is requirement for health. Although EFSA's recommendation for daily water intake does not change with aging but the risk of dehydration increases considerably in elderlybecause of reduced thirst and deteriorating physical abilities.

Objectives: The aim of this study is to evaluate total fluid intake provided by different types of beverages and food in a sample of Hungarian elderly people living in nursing homes in order to assess the percentage of individuals complying with the EFSA recommendations for total fluid intake.

Method / Design: Interviews with a questionnaire among elderly people. The interviews were done by dietitians and dietician students. The study was carried out between April and June, 2014. Statistical analysis was performed using the SPSS 17.0. Percentages were used to describe all the qualitative variables. Comparisons were done using Chi-squared test.

Results: A total of 140 interviews were completed. Mean total water intake was 1,8 L for men and 1,7 L for women, far away from the «adequate Intake» set by the EFSA, 2.5 L (for adults men) and 2 L (for adult women), respectively. Water and other beverages contributed 75% of total fluid intake (1,3 L for men, 1,32 L for women), with 25% provided by water in foods (0,46 L for men, 0,43 L for women). Older adults (≥71y) consumed much less water and beverages than younger adults (1,35 L vs 1,19 L, only from liquids). Higher education level was associated higher water intake (1,22 L vs. 1,52 L, only from liquids).

Conclusions: Our study points out that water intake by the elderly people remains below the recommended daily amount of water intake. Given the potential health consequences, interventions involving family members and health care professionals to promote fluid consumption seem to be necessary.

Keywords: (maximum 5): elderly, hydration, fluid intake

149/1301. The effects of short-term reduction in high-fat, high-salt diet intake on obesity and hypertension in Asian People

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Introduction: Obesity is a major risk factor for type 2 diabetes mellitus and cardiovascular disease. Chronic consumption of a high-fat-, high-salt-diet increases risks of both diabetes and hypertension reducing life expectancy 20-25 years.

Objectives: To devise an effective strategy to prevent and/or deleterious effects of persistent intake of high-fat, high-salt diet.

Method / Design: Forty-six Asian (28 female, 22 male), adult (56+7 years old), obese (BMI 30+3), hypertensive (SBP 142+3) patients were studies for 9 months. All patients were on maximum tolerated doses of their anti-hypertensive medications for at least three months which included combinations of diuretics, ACEi, ARB blockers, beta-blockers or calcium channel antagonists. The participants were given a strict dietary advice to reduce their fat intake by 50% and limit salt-intake to less than 4 g/day. The subjects were followed up on a bi-weekly basis to assess physical and laboratory values as well as to discuss their dietary intake journals. There were no added pharmacological interventions,

Results: All participants remained in the study for whole duration. There was trend in body weight and BP reduction from week 2, reaching statistically significance from week 10. At the end of the study, total body weight was 8%+2, with 60% of patients losing >14% of their body weight. The systolic blood pressure changes was 5.4+1.7 mmHg with 40% of patients having mean SBP reduction of >9.5 mmHg. There was significant reductions in lipid profile total cholesterol (-30+3%), LDL (-50+6%), HDL (+20+8%), triglycerides (-35+6%) and free fatty acids (42+5%). There was significant reduction in FPG (37%) and HbA1c by 0.61+0.05%

Conclusions: Strict dietary control has significant impact in blood pressure,body weight, lipid profile and blood glucose. This study underlines the importance of adequate education and non-pharmacological intervention in reducing obesity and hypertension and potentially diabetes.

Keywords: (maximum 5): high fat, high salt

149/1302. Bioactivity potential of saprotrophic fungal species Coprinellus disseminatus (Pers.) J.E. Lange 1938

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Introduction: In the last decades, edible fungal species became of great importance as sources of new natural bioactive substances expressing various medical effects: antioxidant, anticancer, immunomodulating, antimicrobial, hepatoprotective and other. Coprinellus disseminatus (Pers.) J.E. Lange 1938 is an edible saprotrophic fungal species with bioactive potentials are not much investigated, mostly due to its small size.

Objectives: The aim of this work was to study antioxidant and cytotoxic activities of ethanolic and water extracts, as well as antibacterial activity of hexane extracts obtained form wild-growing mushroom species Coprinellus disseminatus originated from location in Novi Sad.

Method / Design: Determination of antiradical effects on DPPH• radical and ferric reducing ability (FRAP), as well as the content of total phenolics and flavonoids in ethanolic and water extracts were performed using standard spectrophotometric assays. Antiproliferative activity against estrogen dependent MCF 7 breast cancer cell lines was diagnosed using both MTT and SRB assay. Antibacterial activity was tested using double microdilution assay against three pathogenic strains: Staphylococcus aureus ATCC25922, Bacillus subtilis ATCC6633 and Esherichia coli ATCC25923.

Results: Contents of total phenolic and total flavonoids showed higher values for ethanolic extract (59.94 mg GAE/g d.w. and 11.37 mg QE/100g d.w., respectively). Water extract (IC50 = 250.37 μg/ml) had higher DPPH antiradical effect, but ethanolic extract reached higher FRAP activity (9.74 mg AAE/g). Both extracts showed activity against MCF 7 cell line although ethanolic extract showed better effect than water extract after 72h both in MTT and SRB assay, reaching IC50 at 217.90 and 205.90 μg/ml, respectively. The lowest MIC and MBC values were obtained for Gram positive bacteria S. aureus at 0.78 mg/ml.

Conclusions: Obtained results indicated that Coprinellus disseminatus mushroom species is a promising source of bioactive comp ounds such as antioxidant, cytotoxic and antibacterial agents.

Keywords: (maximum 5): Coprinellus disseminatus, phenolic compounds, antioxidant activity, cytotoxic activities, antibacterial acitivities

149/1304. The Program Impact Pathways Analysis: a key step for a successful process evaluation

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Introduction: Evaluations are often limited to answering what impact, if any, interventions have, without providing enough insights into "how" and "why" these impacts are achieved. We need to understand how well interventions are delivered, and what are the impact pathways through rigorous process evaluation. This starts with a Program Impact Pathways (PIP) analysis documenting the program flow from inputs to impact.

Objectives: To develop a PIP for a cash transfer program targeting the "1,000 days period" and aiming at improving child nutrition that is currently being implemented in two rural regions in Togo.

Method / Design: A two-day participatory workshop was organized in each region, where 30-35 stakeholders were asked to i) describe the program flow, including information on program process, organizational structures and content; ii) reflect on program mediators/effect modifiers that may arise along the PIP; iii) identify research questions that should be investigated during process evaluation.

Results: The PIP analysis identified several pathways that will be detailed during the conference. An important one was the "household income and diet quality pathway": cash transfers may increase income in beneficiary households, which in turn may allow households to purchase more nutrient-dense foods and increase diet quality, leading ultimately to improved child nutrition. Along this pathway, the matters of women's control over resources, women decision-making power and intra-household food allocation were identified as key elements for impact achievements. For example meat is proposed to children at the end of the meal to encourage them to eat; therefore children are likely to be satisfied with little meat quantity, and meat can be redistributed to adults. This shows how the hypothesized causal link between cash distribution and improved child nutrition can be diverted.

Conclusions: The PIP is essential to understand an intervention and identify what needs to be investigated during process evaluation.

Keywords: (maximum 5): program impact pathways, process evaluation

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149/1311. Adherence to the mediterranean diet and risk of pancreatic cancer within the epic cohort study

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Introduction: The Mediterranean Diet (MD) has been proposed as a means for cancer prevention, but limited data is available regarding its preventive utility against pancreatic cancer risk.

Objectives: To investigate the association between adherence to the MD and pancreatic cancer risk in the EPIC (European Prospective Investigation into Cancer and Nutrition) cohort study.

Method / Design: Prospective cohort study

477,309 participants of the EPIC study, recruited during 1992-2000 in 10 European countries. 865 participants developed pancreatic cancer after 11.3 years of follow-up. Information on diet was obtained through validated dietary questionnaires.

Outcome: exocrine pancreatic cancer (C25.0–C25.3, C25.7-C25.9, according to ICD-O, 3rd edition).

Exposure: Adherence to the MD. The adapted relative Mediterranean Diet Score arMED (without alcohol) was considered as categorical (low, medium and high adherence) and as continuous variable (per increments of 2 units in the score).

Analysis: Cox regression, stratified by age, sex and center, and adjusted for energy intake, body mass index, smoking, alcohol and self-reported diabetes status, to estimate Hazard Ratios (HR) and 95% Confidence Intervals (CI).

Results: Adherence to the arMED was not associated with risk of pancreatic cancer (HR high versus low adherence = 0.99; 95% CI: 0.77-1.26, and HR per increments of 2 units = 1.00; 95% CI: 0.94-1.06). Inverse associations, though not statistically significant, were observed between the adherence to the arMED and pancreatic cancer risk in smokers and in obese participants (HR high versus low = 0.67; 95% CI: 0.41-1.11 and HR = 0.56; 95% CI: 0.29-1.08, respectively). The association became stronger in the obese when the analysis was restricted to microscopically confirmed cases (n=608): HR = 0.41: 95% CI: 0.18-0.94.

Conclusions: A high adherence to the MD is not associated with risk of pancreatic cancer in the EPIC study. The apparent inverse association in some high-risk groups warrants further investigation.

Keywords: (maximum 5): pancreatic cancer, risk, mediterranean diet, cohort study

149/1316. Low-GI bread enriched with oat beta-glucans attenuates postprandial insulin response in healthy subjects

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Introduction: In the context of current dietary strategies it is imperative to consider the consumption of foods that reduce postprandial glycaemia and insulinaemia. The continued intake of high-GI foods, which rapidly elevate blood glucose and stimulate insulin secretion, is associated with increased cardiometabolic risk. Carbohydrates constitute the most important dietary energy source and bread is, among carbohydrate-rich foodstuffs, the most frequently consumed. Many ingredients have been incorporated into bread aiming to attenuate glycaemic and insulinaemic response, with fibre-rich flours and pure dietary fibre, including beta-glucans, to offer high benefit.

Objectives: This work includes the design and production of a whole wheat rye barley bread enriched with 2% oat beta-glucans (WRBBG), and the evaluation of the postprandial glucose and insulin responses.

Method / Design: In the present randomized single-blind crossover design trial, ten normoglycaemic subjects were recruited (mean age:23±4, BMI:22.6±2.5 kg/m2). Subjects were provided with white bread (WB, reference food) and WRBBG bread after overnight fast with one week interval and in amounts that yielded 50g available carbohydrates. Baseline anthropometric and biochemical measurements were performed. Plasma glucose and serum insulin were determined before consumption and after 30,45,60,90 and 120 min postprandially.

Results: Acute ingestion of WRBBG resulted in 64.8% lower ($p<0.05$) incremental area under the curve (iAUC) for glycaemic response, mean plasma glucose was significantly lower at 30,45,60,90 and 120 min postprandially when compared to WB. The GI was calculated 34.2±4.5 using WB as reference food. iAUC for insulin response was 32.3% lower ($p<0.05$) and the insulinaemic index was 72.6±6.8 ($p<0.05$).

Conclusions: WRBBG bread is a low-GI food. Given that WRBBG consumption resulted in attenuated glucose and insulin res-

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ponses, it is concluded that glucose was delivered to plasma at a lower rate decreasing insulin secretion.

Note: Ms Stamataki was supported by «IKY Fellowships of Excellence for Postgraduate studies in Greece- Siemens Program». The study was also supported by grant from General Secretariat for Research and Technology «PAVET 2013».

Keywords: (maximum 5): glycaemic response, insulinaemic response, bread, beta-glucans

149/1324. Walnuts improve neuronal and behavioral function in aging

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Introduction: Walnuts are rich in polyunsaturated fatty acids (PUFAs) and polyphenols which have been shown to improve neurochemical and behavioral function.

Objectives: This study investigated the mechanisms associated with age-related behavioral improvements in rats fed diets supplemented with walnuts.

Method / Design: Young (3 months, n=30, 10/group) and old (19 months, n=45, 15/group) male Fischer 344 rats were supplemented with control (0%), 6% or 9% walnut diets for about 10 weeks, equivalent to 1oz or 1.5oz in humans, respectively.

Results: Behavioral testing in a radial arm water maze, conducted during weeks 9-11, showed significant effects of age, with older rats making more total, reference memory, and working memory errors. The walnut diets protected against these decrements by enhancing protective signaling, reducing inflammation in the brain, and affecting the expression of immediate early genes involved in cognitive function.

Conclusions: The results suggest that dietary walnuts may have protective effects on the aging brain. If these effects translate to older adults, the inclusion of walnuts in the diet present a potential means of delaying or minimizing the negative effects of aging on the brain.

Keywords: (maximum 5): walnuts, cognition, signaling, inflammation-

149/1330. Dietary antioxidant profiles by scores of adherence to the Mediterranean Diet in EPIC-Granada and EPIC-Gipuzkoa

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Introduction: The Mediterranean Diet (MD) is a dietary pattern that features a high quotient of antioxidant-rich foods. Many different indices of adherence to the MD have been developed.

Objectives: To compare the dietary antioxidant profile of 20 different indices of adherence to the MD.

Method / Design: Cross-sectional study of 15,450 participants of EPIC-Granada and Gipuzkoa, recruited during 1992-1996. Participants with extreme values of energy intake very excluded.

Variables: Dietary data was obtained through a validated diet history questionnaire and the EPIC-ENDB database. Non-enzymatic total Antioxidant Capacity (NEAC) was estimated using published values of NEAC in food (Pellegrini et al).

20 indices of adherence to the MD were calculated: Mediterranen Diet Scale (MDS) or score (MDScore), MD Lifestyle index (MEDLIFE), alternate MD index (aMED), Modified MD (MMD), MD pattern (MDP), Short MD Questionnaire (SMDQ), etc.

Analysis: 1) Spearman´s correlation between indices. 2) Cross-index comparisons of mean antioxidant intakes (Student´s t-test).

Results: The highest correlation coefficients (r>0.80) were observed between MDScore04/MDP06 (r=0.88), MDP06/rMED (r=0.83), MDS95/MDScore03 (r=0.83), and MDS03/MDS13 (r=0.80). The correlation coefficients were moderate (r~0.4-0.6) for the remaining indices.

Dietary intake of antioxidants was highest for the indices MDS00 and MDP02, (ß-carotene and Vitamin C: 6313 µg/d and 6241 µg/d; 336 mg/d and 256 mg/d, respectively) and lowest for MDP03 and MDScore05 (2701 µg/d and 3007 µg/d; 123 mg/d and 123 mg/d, respectively), with these differences being statistically significant (p<0.001).

A high adherence to the MD defined as MDScore01 and MEDLIFE was related to a higher dietary NEAC (TRAP >30.000 µmol TE, FRAP >60.000 µmol Fe2+, TEAC >15.000 µmol TE), while MDScore05 and L-based MD showed the lowest NEAC (p<0.001).

Conclusions: Some of the indices of adherence to the MD showed a better antioxidant profile, which may support their epidemiological application to evaluate diet–disease relationships.

Funding: AES (PI12/00002, PI13/00061, PI13/02509). Co-funded ERDF

Keywords: (maximum 5): mediterranean diet, antioxidants, dietary patterns

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149/1331. Impact of daily apple consumption on serum lipids and cardiovascular disease biomarkers.

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Introduction: Apples are a rich source of polyphenols and fibre and are widely consumed worldwide. Intervention studies in animals and humans suggest that apples may have beneficial effects on cardiovascular disease (CVD) risk factors including serum cholesterol, glycaemia reduction and anti-inflammatory effects. Animal studies suggest a synergistic interaction between apple polyphenols and pectin fibre, which could increase their biological activity and beneficial effects compared to the individual compounds. However, the potential mechanisms are still unclear.

Objectives: To determine the effects of daily apple consumption on CVD risk factors including serum lipids and vascular function in 40 mildly hypercholesterolemic men and women.

Method / Design: We performed a randomized, controlled, crossover, dietary human intervention study (AVAG study). Volunteers, (23 women, 17men) with a mean BMI 25.3±3.7 kg/m2 and age 51±11 years, consumed either 2 apples a day (Renetta Canada) or a control sugar matched apple juice (containing no fibre or polyphenols) for 8 weeks separated by a 4 week washout period in a random order. Fasted blood and 24 hours urine samples were collected before and after each treatment. Blood lipids, glucose, insulin, and endothelial function biomarkers were assessed, in addition to vascular function using Laser Doppler Imaging with Iontophoresis (microvascular reactivity) and Pulse Wave Analysis.

Results: Preliminary results show a significant diet interaction for total cholesterol (TC) (P=0.04) and a trend for vascular cell adhesion molecule-1 (VCAM-1) (P=0.076). TC concentrations were lower after apple treatment compared to the baseline and the control apple juice (P=0.019 and P=0.022, respectively).

Conclusions: Consumption of 2 apples daily may beneficially modulate blood lipid metabolism although this needs confirmation in further studies. Current work, includes the determination of other CVD markers (cytokines, adipokines etc) and vascular function assessment.

This trial is registered at http://clinicaltrials.gov/show/NCT01988389.

Keywords: (maximum 5): Apple, juice, CVD, lipid, cholesterol

149/1337. Nutritional status in patients with chronic kidney disease receiving hemodialysis

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Introduction: Patients with chronic kidney disease (CKD) frequently suffer from malnutrition and protein-energy wasting (PEW). Studies show that protein-energy nutritional status progressively decline as glomerular filtration rate (GFR) declines with the progression of CKD. PEW is associated with major adverse outcomes and results in increased rates of hospitalization and death in this patient group.

Objectives: It was the aim to evaluate the nutritional status of the CKD population receiving HD treatment at Haukeland University Hospital Bergen, Norway.

Method / Design: This is an observational cross-sectional study in 24 HD patients (one-third of the total hemodialysis population at Haukeland University Hospital). We assessed nutritional risk, (NRS2002), dietary intake by 24-hour recall, body composition by bioelectrical impedance analysis (BIA), clincial-chemical variables and functional parameters (hand grip strength, knee extension).

Results: One third of the patients were in nutritional risk according to NRS2002 evaluations, and two patients showed PEW. Nearly all study participants had energy intakes below their estimated requirements (mean; 24 kcal/kg bodyweight). The mean protein intake was 1.0 g/kg body weight /day and 70% of patients had

Protein intakes under 1.1 g/kg/ bodyweight. Albumin levels lower than the normal range were observed 21% of the patients, handgrip strength lower than reference Levels for HD patients were observed in 42%. There was a significant positive correlation between handgrip strength and appendicular lean mass ($p<0.01$, $r=0.625$), but not with serum-albumin levels and protein intake, respectively.

Conclusions: Findings indicate that malnutrition is common in this patient group, and affects about 1/3 of patients. Many HD patients do not ingest the required amounts of energy and protein.

Keywords: (maximum 5): nutritional risk, hemodialysis, protein intake

149/1338. Reducing soft drinks consumption among students: how to scale-up an intervention which works.

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Introduction: Despite actions to reverse the increasing trend in overweight, the prevalence of childhood obesity remains worryingly high all over Europe. According to the latest estimates, 18.9% of 7-year-old boys and 23.9% of girls are overweight or obese in Hungary. Rising consumption of sugary drinks has been one of the major contributors to the obesity epidemic.

Objectives: The aim of the HAPPY (Hungarian Aqua Promoting Programme in the Young) initiative was to design and establish an effective, sustainable and transferable approach for decreasing soft drinks intake by promoting water consumption in primary schools.

Method / Design: In 2007, a 2-month-long pilot (n=397; 7-10 years) was carried out to evaluate the effectiveness of the HAPPY method (standardized education programme with free availability of drinking water in classrooms). Impact was assessed by questionnaires (baseline and after) and by a 1-year follow-up. Pilot was followed by a re-designing phase that resulted in a sustainable one-week-long programme which is running since 2010. HAPPY week consists of a downloadable education package, a set of voluntary elements (e.g. flash mob, water bar, drawing competition, water police service, restriction of soft drinks in vending machines), free drinking water for one week, and evaluation.

Results: Starting with 78 primary schools (n=24,300 children) in 2010, HAPPY week was extended to 450 primary schools by 2015 and reached more than 120,000 children in Hungary. Besides, Malta took over and started to implement the same protocol.

Conclusions: Expanding health promotion programs into widespread use with meaningful population impact is always a challenge. HAPPY was successfully scaled-up and disseminated not just in Hungary, but beyond. Working together with the private sector, however, needs clear rules.

Keywords: (maximum 5): childhood obesity, soft drinks, water consumption, scaling-up

149/1339. Dietary and plasma non-enzymatic antioxidant capacity with regard to biomarkers of antioxidants nutrients in EPIC-Granada/Gipuzkoa

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Introduction: Non-enzymatic Antioxidant Capacity (NEAC) represents the antioxidant potential of the diet or body. For NEAC to be used in epidemiological studies, its relationship with nutrient-related biomarkers needs to be assessed.

Objectives: To investigate the relationship between dietary and plasma NEAC, as well as with biomarkers of exposure to antioxidant nutrients.

Method / Design: Cross-sectional study of 210 participants of EPIC-Granada/Gipuzkoa, recruited during 1992-1996. Participants with extreme values of energy intake, diseased at recruitment and users of dietary supplements very excluded.

Dietary data was obtained through validated diet history questionnaires. Dietary NEAC was estimated using published values of NEAC in food (Pellegrini et al, USDA database).

Biomarkers: Plasma NEAC was analyzed through the assessment of the FRAP, TRAP, TEAC-ABTS and ORAC assays. Biomarkers of selected antioxidant nutrients (ascorbic-acid, ß-carotene, α-tocoferol, coenzyme Q10 and retinol) were also analyzed.

Analysis: 1) Spearman´s correlation; 2) Multivariate linear regression analysis (adjusted for sex, age, BMI and smoking status) to calculate ß-regression coefficients for each biomarkers´ unit increase across NEAC.

Results: The degree of correlation between dietary and plasma FRAP was low (r=0.24; p<0.001). TRAP from diet and plasma were also weakly correlated (r=0.17; p=0.01), while for the remaining NEAC assays no statistically significant correlations were observed. NEAC from legumes and non-alcoholic beverages showed the highest correlation coefficients with plasma NEAC, although fruits and vegetables were the main contributors to dietary NEAC (50-60%).

With increasing dietary and plasma FRAP, there was a significant increase in all antioxidants plasma levels: e.g. plasma FRAP µmol TE/L per 1 unit increase in: ascorbic-acid µmol/L, ß=0.43; p=0.03; ß-carotene µmol/L ß=0.45; p=0.05; α-tocoferol µmol/L ß=0.71; p=0.01.

Conclusions: Plasma and dietary FRAP and TRAP are weakly correlated, possibly due to the low bioavailability of some antioxidants, e.g. flavonoids, in vivo.

Funding: AES (PI12/00002, PI13/00061, PI13/02509). Co-funded ERDF

Keywords: (maximum 5): non-enzymatic antioxidant capacity, biomarkers, antioxidants, nutrients

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149/1345. Adherence to nutrition-based cancer prevention guidelines and cancer risk in the MCC-Spain case-control study

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Introduction: Higher adherence to cancer prevention guidelines on diet, physical activity and body fatness has been associated with lower risk of developing certain cancer types.

Objectives: The aim of the present study was to evaluate the association between an index score reflecting adherence to the World Cancer Research Fund / American Institute of Cancer Research (WCRF/AICR) recommendations for cancer prevention, and colorectal, breast and prostate cancer risk in the MCC-Spain case-control study.

Method / Design: A total of 1796 colorectal, 1418 breast and 922 prostate cancer cases and 3394 population-based controls recruited in 12 Regions from Spain between 2007 and 2012, were included in the present study. Data derived from a general questionnaire and a validated FFQ were used to construct the WCRC/AICR score based on six recommendations for cancer prevention (on body fatness, physical activity, foods and drinks that promote weight gain, plant foods, animal foods and alcoholic drinks; score range 0-6, higher score indicates higher adherence to recommendations). We used logistic regression analysis adjusting for sex, age, region, education, tobacco, family history of cancer, and total energy intake.

Results: One-point increment in the WCRF/AICR score was associated with 18% (95% CI 23-12%) lower risk of colorectal cancer, and 12% (95% CI 19-4%) lower risk of breast cancer; no association between the WCRF/AICR score and prostate cancer risk was detected.

Conclusions: In this Spanish population, greater adherence to cancer prevention guidelines on diet, physical activity and body fatness was associated with lower colorectal and breast cancer risk, but not with prostate cancer.

Keywords: (maximum 5): cancer risk, diet, physical activity, body fatness, cancer prevention guidelines

149/1353. Beneficial effects of raisin consumption in patients with non-alcoholic fatty liver disease (NAFLD)

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Introduction: NAFLD is the most prevalent cause of hepatic injury without standard and effective therapy.

Objectives: The aim of the study was to assess the potential beneficial effects of incorporating raisins, a dried fruit with known antioxidant properties and median glycemic index, into the diet of patients with NAFLD.

Method / Design: This was a randomized parallel arm clinical study involving 56 patients with NAFLD, who were randomly assigned to two isocaloric dietary treatments for 24 weeks: (a) a low-calorie diet (control group, N=28) (b) the same diet with the addition of raisins (36 g/day), substituting snacks of isocaloric content (intervention group, N=28). Anthropometric measurements, MedDietScore, NAFLD Fibrosis Score, liver imaging (ultrasound, elastography), measurement of fasting metabolic parameters (glucose, insulin, HbA1c, HOMA-IR, lipids, liver enzymes, leptin, adiponectin, CRP) were performed pre- and post-intervention.

Results: A total of 51 patients completed the trial. Six patients were excluded from analysis due to non compliance. No significant differences in any parameter were found at baseline between two groups. Weight loss was observed in both groups (-3.9±0.7 kg, p <0.0001 in control and -2.8 ±0.5 kg, p <0.0001 in intervention group, p=NS between groups). When patients who didn't lose any weight were excluded, 18 patients remained in each group. In these, liver stiffness, CRP, and serum leptin were decreased significantly in intervention group (-0.5±0.2 kPa, p=0.013, -1.5±0.4 mg/L, p=0.002, and -19.9±8.7 ng/ml, p=0.036, respectively). Fasting glucose was significantly decreased in intervention group (-8.2 ± 1.8 mg/dl, p<0.0001), and was significantly different between the two groups at the end of the study (p=0.005). MedDietScore increased significantly in both groups (+2.8 ±1, p=0.015 in control and 5.1.±1, p<0.0001 in intervention group, p=NS between groups post-intervention).

Conclusions: The addition of raisins to the diet of patients with NAFLD, results in beneficial effects on glycemia, liver stiffness, and indices of inflammation.

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Keywords: (maximum 5): raisin, NAFLD

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149/1362. Yogurt and Dairy Products- Which is better related to optimum nutrition and life style?

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Introduction: The importance of dairy products is recognized for their health benefits, but not separated from yogurt.

Objectives: To investigate the factors associated with yogurt and dairy products consumption in an adult sample.

Method / Design: 2557 subjects were recruited based on the quantity of consumption in grams/day of yogurt and of "other dairy products" –ODP (milk, cheeses, and fruit-milk smoothies), divided as four groups: Group 1 (low intake of yogurt and ODP), Group 2 (low intake of yogurt and high of ODP), Group 3 (high intake of yogurt and low of ODP), and Group 4 (high intake of yogurt and ODP), which were compared according to nutritional, demographic, anthropometrics and lifestyle characteristics (physical activity, smoking, drinking, SEL).

Results: Differences were observed between groups, especially for nutrient intake and physical activity, but not in nutritional status. Group 3 presented a significantly greater intake of calcium, vitamin D, phosphorus, and saturated fat and a higher prevalence of women and active individuals in their leisure time as compared to Group 1. However, compared with Group 2, group 3 showed a significantly lower intake of calcium, vitamin D, phosphorus and added sugar. Individuals belonging to Group 2, additionally, were more active and showed a significantly higher intake of nutrients, and lower of added sugar when compared to Group 1. Group 1, furthermore, showed a significantly lower intake of all nutrients than Group 4, except for added sugar. Individuals from Group 4 were predominantly female, with higher schooling level and more active in their leisure time.

Conclusions: Yogurt by far and dairy consumption is associated with a better nutrient intake and higher prevalence of active lifestyle.

Keywords: (maximum 5): dairy products, yogurt, lifestyle, adult; cross-sectional studies

149/1365. High fructose corn syrup leads to body weight changes: Preliminary look to developmental programming

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Introduction: Dietary changes during preconception, throughout pregnancy and lactation affect the development of tissues and organs of the fetus resulting in irreversible changes i.e. fetal programming.

Objectives: The aim of this study is to investigate the effects of maternal high fructose corn syrup (HFCS) intake or sucrose on body weight, feed intake and water intake of the mother rats and pups.

Method / Design: This study was carried out on Sprague Dawley strain female mother rats (n=10) and pups (n=50). After two-weeks wash-out period the rats were randomly divided into two groups. Water including HFCS (0.2 g/mL (20% w/v) or sucrose (0.2 g/mL (20% w/v) was administered for 12 weeks. Body weights, water and feed intakes were measured during the study.

Results: It was determined that mean body weight of mothers in HFCS group was 242.1 ± 14.40 g while in sucrose group was 234.4± 15.05 g ($p<0.05$). Mean body weight of pups in HFCS group was 23.5 ± 7.11 g whereas 21.2 ± 5,31 g in sucrose group ($p<0.05$). While, there was a significant difference of water intakes of mothers, mean intake from HFCS added water was 30.3 ± 3.08 ml and from sucrose added water was 32.8 ± 4.09 ml ($p<0.05$). Mean feed intake of mothers in HFCS group was 11.8 ± 1.04 g while in sucrose group was 9.8 ± 0.96 gr ($p<0.05$). Briefly, body weights and feed intakes were higher in the mother rats and pups exposed to HFCS, although rats in HFCS group had lower water intake compared to sucrose group.

Conclusions: Large amounts of maternal HFCS intake during preconception, throughout pregnancy and lactation periods, elevate body weight levels both in mothers and pups. Consequently, high amount of fructose, taken with processed foods, in maternal diet may increase the risk for obesity.

Supported by Hacettepe University (THD-2015-5528)

Keywords: (maximum 5): HFCS, sucrose, fetal programming, body weight, feed intake

149/1366. Effect of blueberries and Insulin on glucose induced neurotoxicity in brain cells in vitro

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Introduction: Literature had shown that disruption in glucose metabolism seen in metabolic syndrome maybe responsible for neuronal cell-death. Oxidative stress (OS) and inflammation (INF) triggered by the impaired metabolic process are considered to be the primary factors for the toxic neuronal atmospehere. Blueberries (BB) have been shown to improve cognitive function by reducing OS and neuroinflamation.

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Objectives: 1) To investigate the effect of glucose on OS and INF signalings in microglia and 2) To examine the effect of insulin and BB on these signaling molecules.

Method / Design: Rat microglial cells (HAPI) were grown in various glucose concentrations (1g/L-9g/L) and treated with either BB (2%), insulin (INS; 50mM), lipopolysaccharide (LPS; 100nM) or in combination. After 24 hours, expression of iNOS, NOX2, COX2, GLUT1, and GLUT4 were assessed using immunoblotting or immunocytochemistry; while NO2 production was measured in the media via ELISA.

Results: Elevation in glucose induced neurotoxicity through OS and INF; further enhanced by LPS. BB and INS significantly reduced LPS-mediated neurotoxicity under high glucose conditions by altered the expression of signaling molecules related to OS and INF.

Conclusions: High blood glucose levels may induce neurotoxicity via OS and INF. Under low-glucose conditions, blueberries primed the cells to withstand the deleterious effects of LPS. While, under high-glucose conditions, BB and INS attenuated the glucose-induced neuronal damage by altering insulin sensitivity and reducing the OS and INF. These results provide possible mechanisms for neuroprotective effects of BBs during metabolic syndrome.

Keywords: (maximum 5): inflammation, Oxidative stress, signaling, lipopolysaccharide

149/1369. The place of fruits and vegetables in the diet of Algerian Adolescents

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Introduction: Several studies have shown a positive relation between eating fruits and vegetables (F&V) with reduced risk of various chronic diseases. Increased incidence of obesity is related to increased consumption of fast and processed food and decreased consumption of fruits and vegetables. World Health Organization (WHO) recommends consumption of at least five portions of F&V a day.

Objectives: The aim of our study was to evaluate the adolescents' consumption habit of fruit and vegetable and to estimate the prevalence of obesity among them in Algiers.

Method / Design: We conducted a cross-sectional study of a random sample of 350 adolescents in the public schools in Algiers in 2014. Anthropometric data and the frequency and the quality of these habits were recorded in a questionnaire.

Results: 350 Algerian adolescents (165 boys and 185 girls) between 10 and 19 years old participated to this study. They were 185 girls (52.9%) and 165 boys (47.1%) with 13.17 ± 1.51 years old average age. The average weight was 48.42 ± 11.51 (range 25 to 92 kg), and the average size was 1.59 ± 0.11 m (range 1.20 to 1.90 cm). The Body Mass Index (BMI) was 19.03kg/m2 ± 3.77 (range 12.17–38.19). Obesity was more common in boys (2.42%) than girls (0.54%). 40 % children consume fruits and vegetables, they take it at lunch and dinner. 30% take a fruit juice for snack in school.

Conclusions: School interventions have the potential to increase children›s preferences for fruits and vegetables. Encouraging fruit and vegetable consumption should be part of obesity prevention of children.

Keywords: (maximum 5): Fruits and vegetables, BMI, Adolescents, Algeria.

149/1372. Foodborne illness in Morocco: results of a nationwide study

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Introduction: Foodborne disease takes a major toll on health. Thousands of millions of people fall ill and many die as a result of eating unsafe food.

Objectives: This study was conducted to determine the main characteristics of foodborne diseases in the Moroccan population.

Method / Design: This is a retrospective study of food poisoning cases, reported to the Moroccan Poison Control Center during the period 2000-2012.

Results: During the period of study, there were 19 312 cases of foodborne illnesses in Morocco, which was 22.8% of poisoning cases notified during this period. More than one-third (38.8%) of the cases were children under the age of 15 years. The average age of the patients was 22.5±0.1 years. The most commonly implicated foods were dairy products. The poisoning symptoms were dominated by abdominal pain, diarrhea, cephalalgia, fever and malaise. Among the 15 054 cases for whom the outcome was known, 52 (0.34%) of them died. For other cases, the outcome was favorable with or without sequelae.

Conclusions: Weaknesses and variations in foodborne disease surveillance systems, where such programmes exist, make a global estimation of foodborne diseases difficult. However, such data are essential for raising awareness about existing problems, setting priority food safety measures, using resources in a cost-effective way, and evaluating the impact of measures.

Keywords: (maximum 5): Food poisoning, Epidemiology, Morocco

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149/1375. Integrated analysis of gene expression data in chronic disease based on nutrigenomics: obesity, breast cancer and DMT2

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Introduction: Chronic diseases such as breast cancer, type 2 diabetes mellitus (T2DM) and obesity is a serious health problem worldwide and the most prevalent in Mexican people. Microarray technology is important to study the complex gene networks and their relationship with molecular nutrition. In this work we investigated the interaction of micronutrients such as vitamin D, selenium and omega in genomic profiles associated with these chronic diseases.

Objectives: Analyze the effect of vitamin D, selenium and omega intake on the genes (FT0, PPARγ, ER-a, ER-b, BRC1 and BRC2) in Mexican population associated with chronic diseases.

Method / Design: DNA microarrays data are used to measure and compare the gene expression on a large scale. Were identified and analyzed the genes responsible for chronic diseases (breast cancer, T2DM and obesity) and the possible effects of selenium, vitamin D and omega intake. This identification was based on various international data bases of gene expression and the comparison of experimental data of 50 Mexican population's patients from the city of León, México associated with chronic diseases.

The clustering of gene networks by applying the mathematical procedure of Principal Component Analysis (PCA) to the gene expression data was also investigated. Formal methods and computational tools of bioinformatics were used to model and generate complex gene networks.

Results: We propose a simple network of interacting genes (FT0, PPARy, ER-a, ER-b, BRC1 and BRC2) for chronic disease. Furthermore, we analyzed the gene expression levels in diets based on selenium, vitamin D and omegas intake.

Conclusions: This model may help to control variables associated with selenium, vitamin D and omega to prevent health and nutrition problems in Mexican population's diet. This integrative analysis offers a new conceptual framework that could enhance our view of nutrigenomics and various human pathologies.

Keywords: (maximum 5): Nutrigenomics, microarray, chronic diseases, Networks

149/1377. Assessing delivered dose of an in-store nutrition education strategy in Australian remote Indigenous communities

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Introduction: Nutrition education can raise individual knowledge and self-efficacy to positively influence healthy food intake. Rigorous process evaluation can inform study findings and future strategies.

Objectives: To describe a framework to comprehensively evaluate the delivered dose of a nutrition education strategy conducted in remote Indigenous Australia to promote purchase of fruit, vegetables, water and discourage softdrink consumption in 10 remote community stores servicing >3000 individuals

Method / Design: A 24-week nutrition education strategy based on monthly themes was developed comprising posters, activity sheets, two taste-testing sessions, one cooking demonstration, three receipt competitions, a sugar-in-drinks display, and fridge stickers. In each community, data on the delivered dose and other process evaluation measures were collected via monthly in-store spot checks, two-monthly semi-structured interviews with store managers, a post intervention semi-structured interview with five key informants and other documented material. A customer survey was conducted with 30 people in 5 of the 10 communities.

Results: The strategy was fully implemented in three stores. One or two theme posters or activity sheets not displayed resulted in less than full implementation in five communities. Road closures due to the weather conditions prevented implementation of the cooking demo and taste testing activities in two communities. The most successful data collection methods to assess dose delivered were documentation of participant's attendance at the taste testing and cooking demonstrations (28/28), documentation of activity sheets returned (50/60), stakeholder interviews (4.8/5), store manager interviews (2.4/3) and in-store spot checks (4.2/6). The most challenging process evaluation methods to implement were the customer survey (81/150) and the documentation of number of entries in the receipt competition (9/30).

Conclusions: This paper contributes insight into a process evaluation to assess the delivered dose of an in-store nutrition education strategy and provides a practical and tested framework to assess the level of implementation of other similar strategies.

Keywords: (maximum 5): 149/1380. Nutritional status and food consumption patterns of young children living in Kenitra, north west of Morocco

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Introduction: The future of the society depends on the quality of life of the children. The nutritional status of school aged children impacts their health, cognition and subsequently their educational achievement.

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Objectives: The present study was conducted to determine the nutritional status and food consumption in Kenitra city; Morocco. of primary school children (7-15 years) in north West of Morocco.

Method / Design: A cross-sectional study was carried out with 300 schoolchildren, from 6 to 15 years old, enrolled in public schools located in the urban area of Kenitra city, Morocco. A structured questionnaire composed of different items: household demographic data , socioeconomic data anthropometric measurements, food and nutrition evaluation was delivered to get answers. Dietary data were collected through a validated food frequency questionnaire specific for children and adolescent. Haemoglobin levels of children were estimated using Haemocue digital photometer.

Results: Underweight (WAZ<-2) and stunting (HAZ<-2) occured in 5% and 7% respectively. The malnourished children were classified on the basis of (WHO/NCHS) reference population BMI z-score as being: 4,1% underweight (<-2SD) and 10% obese (>+2SD). The prevalence of anemia was 16.2%. The mean hemoglobin concentration was 12.53 g/dl in boys and 12.52 g/dl in girls.

Conclusions: Child›s nutritional status is strongly associated with the literacy of both parents and family size. It is concluded that poor anthropometric indices , under nutrition and iron deficiency anemia may be due to lower intake of food and nutrients than recommended.

Keywords: (maximum 5): Nutritional status, Schoolchildren, Anthropometrics, Haemoglobin.

149/1381. Eating attitude index in overweight and obese adolescents: the Evasyon Study.

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Introduction: Childhood obesity affects millions of school-aged children and young people around the world. In addition, the prevalence of overweight and obesity has increased in the last decade, leading to a higher risk of metabolic disorders across Europe

Objectives: The aim of this study was to compare eating attitudes towards healthy and non-healthy foods in adolescents with their personal, familial and environmental characteristics in order to establish associations between these obese risk determinants.

Method / Design: EVASYON is a multi-centre study conducted in 5 Spanish hospital settings (Granada, Madrid, Pamplona, Santander and Zaragoza), where 204 overweight/obese adolescents were treated in groups of 9 to 11 subjects throughout 20 visits during a one-year follow-up. Data on food intake, dietary and meal-related habits together with eating behaviours were collected by means of dietary questionnaires.

Results: Significant differences between eating attitude indices were observed especially when focusing on non-healthy food groups. A lower level of non-healthy eating attitude index was found in overweight than in obese adolescents. In addition adolescents who ate at school had a lower level of non healthy eating attitude index compared to those who ate at home/grandparents house. Higher levels of non-healthy eating attitude index were found in those subjects showing normo-weight fathers and whose mothers cooked at home.

Conclusions: Even though improving diet quality and increasing physical activity should be two important aspects to take into account when trying to tackle childhood obesity, the impact of family and school eating conditions are two important determinants to work on. Improving parenting eating behaviours as well as school nutritional interventions could have a considerable effect when treating childhood obesity. However, further research is needed to find out the changes of this sample throughout the intervention performed in the EVASYON study in order to evaluate its effectiveness.

Keywords: (maximum 5): Childhood obesity, eating attitudes, adolescents, healthy food preferences

149/1383. What determines child undernutrition in Pakistan? Comparative analysis using Demographic and Health Survey data

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Introduction: Despite the economic development, Pakistan is facing a silent crisis of Undernutrition with worst nutrition indicators in the world and hardly any improvements in last four decades.

Objectives: This empirical study tries to capture the individual, community level, environmental, social, family's economic status and household specific factors that affect child undernutrition in a comparative framework using nationally representative demographic and health survey data of Pakistan. This study will incorporate gender inequality and poverty status to capture the broader development picture which help in determining the cross sectoral nature of undernutrition problem in Pakistan.

Method / Design: Data for all the variables is taken from two episodes of Pakistan Demographic and health survey (PDHS). Analysis will be carried out at the descriptive, univariate, bivariate, and multivariate levels. Multivariate analysis will help in empirical examination

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of the factors affecting malnutrition and use will be made probably of logistic (fractional logistic) regressions techniques.

Results: Undernutrition is one of the paramount, although least recognized, challenges faced by contemporary Pakistan. It is estimated that level of development as well as education have important lessons for household in urban as well as in rural Pakistan. Balochistan and Sindh are two important provinces lie well beyond the national as well as global averages in terms of nutrition indicators.

Conclusions: Therefore, in order to focus the attention of policy makers on this problem it is essential to quantify what factors add to burgeoning malnutrition in the economy? Also, this kind of research will help in bringing forth the challenges that policy maker face and some possible solutions/suggestions for improving nutrition strategy at national level in Pakistan.

Keywords: (maximum 5): Undernutrition; Child Health; Pakistan; Public Policy.

149/1385. Evaluation of a behavior change communication program for promoting early initiation of breastfeeding in rural Niger

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Introduction: This research aims to evaluate the effects of a behavior change communication program promoting early initiation of breastfeeding within the first hour of birth among the most vulnerable mothers in rural Niger.

Objectives: The main objectives are to identify the social determinants of initial breastfeeding and to examine the typology of integrated communication strategies for the socio-economically vulnerable group of populations.

Method / Design: Secondary analysis of a cross-sectional post-intervention survey was conducted in 2011 in 4 regions. Stratified random sampling was drawn to select 2091 women divided into two strata, the intervention and control groups. Women aged 15-49 years, having at least one child less than 24 months born with vaginal delivery were included. Statistical data analysis tools were the chi-square test and multivariate logistic regression. Independent variables included behavior change activities, socio-demographic and economic status of mothers, health seeking behavior and hygiene practices.

Results: The hand washing and use of a latrine increased early initiation of breastfeeding by 100% (IC 95%: 45; 173) and 98% (IC 95%: 27; 110) respectively. The husbands, grand-mothers and midwives played a key role determining mothers' postpartum breastfeeding in the intervention group. Home visits by community volunteers were shown not to be significant (IC 95%: -30; 10). Participatory peer education reduced the risk of delayed initiation of breastfeeding by 70% (IC 95%: 40; 190).

Conclusions: The model of behavior change communication with a participatory and multisecotrial approach aimed at promoting various types of child health care showed an optimal positive effect on early initiation of breastfeeding and suggests a response to socio-economic disparity.

Keywords: (maximum 5): Breastfeeding, Determinants, Behavioral mechanisms, Vulnerability

149/1396. Food based nutrition education improved complementary feeding practices and nutritional status of children below 2 years in Malawi

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Introduction: Main causes for undernutrition in children under two years are poor young child feeding and hygiene practices. In Malawi a food security programme included participatory nutrition education (NE) to improve young child feeding practices with emphasis on using locally available and affordable.

Objectives: The main objective of this study was to measure the impact of the NE on the dietary diversity of children below two years.

Method / Design: A cluster randomized control trial was conducted starting with a baseline in August 2011 (n=1041). Intervention and control areas were defined following a restricted randomization based on mean height for age z-scores (HAZ). Agriculture interventions were carried out in both arms, intervention and control, whereas NE was carried out in the intervention arm only. Two years after the baseline and 9 months after the start of the nutrition education a follow-up survey was conducted to look primarily at changes on children's dietary diversity in randomly selected villages (n=921). Only children under two years and their primary caregivers were eligible to participate in the surveys. Difference in difference (DID) model analysis were performed to assess impact. Mediator analysis was performed to examine possible pathways.

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Results: The DID estimated a significant positive treatment effect on mean height for age-score (B=0.21; p<0.04) including age and sex of child and height and school education level of mother as covariates. Child dietary diversity was identified as a mediator for improved mean HAZ. Other significant intervention effects like improvements in hand washing practices and usage of soap could not be linked with changes in HAZ.

Conclusions: Community based nutrition education on IYCF has a high potential to improve the nutritional status of children in low income countries.

The study was conducted within the IMCF Project of FAO and JLU Giessen, funded by BMEL.

Keywords: (maximum 5): IYCF, nutrition education, Height-for-age-Z-score, Malawi

149/1400. A comparison of serum retinol concentration between preeclampsia and normal pregnancy.

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Introduction: Preeclampsia is a condition with high blood pressure and proteinuria during pregnancy, and the leading cause of morbidity and high mortality rate among reproductive age women in Indonesia. The theory behind the cause of preeclampsia is not yet confirmed, however, vitamin A deficiency during pregnancy is associated with increased risk of preeclampsia

Objectives: To investigate serum retinol concentration between preeclampsia and normal pregnancy.

Method / Design: This comparative cross sectional study was conducted in Tarakan hospital, Jakarta, Indonesia. Using consecutive sampling method, this study involved 50 preeclampsia and 44 women with normal pregnancy, aged 19-45 years, with >20 weeks of pregnancy. Age of women, gestational age, parity, MUAC and serum retinol concentration were assessed. Estimate intake of vitamin A was assessed using semi-quantitative FFQ.

Results: Subjects' age and gestational age ranged 23.5 – 37.1 years and 24-41 weeks, respectively. Women with preeclampsia were older (p<0.027), had higher MUAC (p<0.021), consumed much less vitamin A (p<0.0001), double number with vitamin A deficiency, but no difference in serum retinol concentration, as compared to normal pregnancy.

Conclusions: Despite low vitamin A intake, serum retinol concentration among preeclampsia was not different compared to normal pregnancy.

Keywords: (maximum 5): preeclampsia, vitamin A, Indonesia.

149/1401. The effect of soy-based snack on blood glucose and lipid profile among type 2 diabetics.

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Introduction: Dietary fiber has been proven to have beneficial effects on serum blood glucose and lipid profile in diabetics. However, fiber intake of Indonesian population and type 2 diabetics were lower than recommendation. Hence, soy-based snack as dietary fiber would be one solution.

Objectives: To investigate the effect of soy-based snack integrated in type 2 diabetic diet on serum glucose concentration and lipid profile.

Method / Design: A randomized cross-over clinical trial was conducted among 30 free living type 2 diabetics with normal liver-kidney functions,but abnormal lipid profile. Every subject underwent two treatments for 3 weeks with 1 week wash out: 5.88 g/day fiber in soy-based snack integrated in diabetic diet, and diabetic diet only. Data include age, BMI, physical activity, food intake by 3x24 hours food record method, serum glucose concentration and lipid profile, before and after treatment.

Results: Subjects were 43–63 years old, 20% overweight and 43% obese, mostly women, with low physical activity. Their HbA1C ranged 6-10.5%. Subjects were able to consume 90% of the soy-based snack, with no serious adverse events. No difference in serum glucose concentration and lipid profiles at baseline. Intakes of energy, fat, protein, carbohydrate, sucrose, and fiber were higher with soy-based snack as compared to diabetic diet only. Except for serum triglyceride concentration, no change differences in concentrations of serum glucose, total, LDL and HDL cholesterols were observed between the two dietary treatments.

Conclusions: Serum glucose concentration and profile lipid did not differ after consumption of soy-based snack integrated in diabetic diet regimen.

Keywords: (maximum 5): diabetes, soybean snack, Indonesia.

149/1405. Inhibition of aggregation of beta amyloid by melatonin and derived indolic compounds

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Introduction: Melatonin and other indolic compounds are present in fermented products by means of yeast metabolism. Their

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occurrence in foods and beverages contribute to a dietetic intake that might exert beneficial effects. Certain bioactivity properties have been extensively studied such as circadian rhythms, reproductive functions and antioxidant prperties. 1-2

Alzheimer Disease (AD) is a progressive and irreversible neurodegenerative disorder. One of its principal hallmark is the formation of extracellular amyloid plaques by accumulation of amyloid β peptides.

Objectives: The aim of the present work was evaluate the putative bioactive potential by the inhibition of the aggregation of Aβ by melatonin and derived compounds.

Method / Design: Tht (Thioflavin) essay was used to determine if Aβ fibrils are forming. ThT was added followed by addition of each compound (100 μM) following by addition of either Aβ (10 μM).

Results: The inhibition of the aggregation was measured for seven compounds: melatonin and others indolic compounds (tryptophan, tryptamine, serotonin, tryptophol, n-acetyl serotonin and 3-indolacetic acid). All of them presented a potential inhibition of the aggregation of Aβ peptide. The ranking order was as follows: Tryptophan>melatonin> serotonin>tryptophol>tryptamine> n-acetyl serotonin and 3-indolacetic acid.

Conclusions: Melatonin, tryptophan, tryptamine, serotonin, tryptophol, n-acetyl serotonin and 3-indolacetic acid are potent inhibitors of Aβ aggregation that suppose a new approach for the prevention of the formation of senile plaques responsible of neurotoxicity.

Keywords: (maximum 5): Alzheimer, neurotoxicity, bioactive, melatonin, indolics.

149/1409. Are organic consumers really healthier? The effects of popular diets on health.

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Introduction: Organic farming is one of the most developing sectors of agriculture. Many of the consumers believe, that organic food is healthier than conventional food, still, there are only a few investigations about the health benefits of organic food. At the same time animal experiences show, that organic food has positive effects on health.

Objectives: Organic farming is only one of many factors which determine food quality. The processing methods and the type of the diet are as well influencing the health effects of food. The aim of the present study is to investigate how much the health benefits of organic food depend on the followed diet, or rather if there are still health benefits of organic diet when the followed diet is not healthy, according to the official recommendations.

Method / Design: Purposeful sampling. Online and as well paper based questionnaire, with questions from ELEF 2009 (Hungarian Health Survey), NVS (Nationale Verzehr Studie II.)The participants of the study are intensive organic consumers (consuming more than 80% organic products) mostly from Budapest. Planed number of participants is 300. The health parameters investigated are chronic diseases, considering the chronic diseases before they began the currently followed diet too. The exact content and quantity of food is as well asked.

Results: The expected results are, that there are big differences between the eating habits (except whole food) regarding the consumption of fruits and vegetables, sugar, bread and other products based on cereals, and fat.

Conclusions: I will present the final results on the congress, because the evaluation of the results on health benefits are not finished yet.

Keywords: (maximum 5): organic consumers, health effects, whole food, chronic diseases

149/1419. Identification of Urolithin B as a new regulator of skeletal muscle mass.

Author(s): (1) Julie Rodriguez; (2) Nicolás Pierre; (2) Damien Naslain; (3) Françoise Bontemps; (4) Daneel Ferreira; (5) Fabian Priem; (6) Louise Deldicque; (2) Marc Francaux.

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Introduction: The control of muscle size is an essential feature of health. Indeed, skeletal muscle atrophy leads to reduced strength, poor quality of life and metabolic disturbances. Consequently, strategies aiming to attenuate muscle wasting and to promote muscle growth during various (patho-) physiological states like ageing, immobilization, malnutrition, cancer or sepsis are needed to address this extensive health issue.

Objectives: To study the effects of urolithin B, an ellagitannin-derived metabolite, on skeletal muscle.

Method / Design: C2C12 myotubes were treated with 15μM urolithin B for 24 hours. Urolithin B-induced muscle hypertrophy was studied in vivo. Mice were implanted with mini-osmotic pumps delivering continuously 10μg of urolithin B during 28 days. Muscle atrophy was studied in mice with a sciatic nerve denervation receiving urolithin B by the same way.

Results: Urolithin B improved the development of C2C12 myotubes in culture by increasing protein synthesis and repressing protein degradation. Signaling analysis suggested a translational regulation mediated by the mTORC1 pathway and an inhibition of the ubiquitin-proteasome pathway (UPP), autophagy remaining poorly affected. We also found that urolithin B probably acts through the androgen receptor since the effects of urolithin B in C2C12 myotubes were completely blunted during gene silencing experiments targeting specifically this receptor (siRNA). Moreover, urolithin B increased muscle mass of

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mice by enhancing protein synthesis and also reduced muscle atrophy in a denervated mice model.

Conclusions: All together, these data indicate that urolithin B regulates muscle mass by a mechanism implicating probably the androgen receptor. Our observations also strongly suggest a cross-talk between the androgen receptor and, mTOR and UPP.

Keywords: (maximum 5): polyphenols, hypertrophy, androgen receptor, mTORC1 signaling

149/1421. Dietary quality and patterns and non-communicable disease risk of an Indian community in Kwazulu-Natal, South Africa

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Introduction: Limited data exist on the South African Indian diet despite their high prevalence of non-communicable diseases.

Objectives: This study attempted to determine the dietary quality and patterns of an Indian population in KwaZulu-Natal with reference to the high prevalence of non-communicable diseases.

Method / Design: Two-hundred-and-fifty apparently healthy Indians, aged 35–55 years participated in a cross-sectional study where diet was assessed using a validated quantitative food frequency questionnaire. Mean intakes were compared to the World Health Organization goals. Dietary quality was determined by index construction and dietary patterns by factor analysis.

Results: The mean daily percentage of energy (%E) from n-3 fatty acids (0.24%E), dietary fibre (18.4 g/day) and fruit and vegetable intakes (229.4g/day) were below the World Health Organization goals. Total fat (36.1%E), polyunsaturated fatty acids (11.8%E), n-6 fatty acids (11%E) and free sugars (12.5%E) exceeded the goals. The means for the deficient index reflected a moderate diet quality whereas, the excess index reflected good diet quality. The Pearson partial correlation coefficients between the deficient index and risk markers were weak whilst, the excess index was inversely correlated with waist circumference for the whole sample. Two factors were identified, based on the percentage of fat that contributed to each food group: factor 1 (meat and fish versus legume and cereal pattern), which accounted for added fat through food preparation; and Factor 2 (nuts and seeds versus sugars and visible fat pattern), which accounted for obvious fat. The medians for waist circumference, blood glucose, cholesterol and triglyceride levels showed significant decreasing trends for factor 1 ($p<0.05$). The medians for blood glucose and cholesterol showed significant decreasing trends for factor 2 ($p<0.01$).

Conclusions: A shortfall of fruit and vegetable, fiber and n-3 fatty acid intake in the diet is highlighted. When assessing the diet quality and patterns, guidance on the prudent use of added fats may lead to a healthier lifestyle reducing the prevalence of non-communicable diseases.

Keywords: (maximum 5): Diet quality, Diet patterns, Non-Communicable diseases

149/1424. Operationalising local level governance for nutrition based on the system approach

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Introduction: Addressing malnutrition requires a multisectoral and coordinated approach that incorporates all departments including health, education, water and sanitation, planning units, community development, natural resources, agriculture.

Undernutrition leaves 1 out of every 3 children in Uganda with underdeveloped brains and bodies. Without the right nutrients, health services and care within the first 1,000 days of life, a child's brain and body fail to develop properly. They have lower IQs and more likely to drop out of school

Objectives:
- To coordinate multisectoral nutrition interventions for common objectives of addressing undernutrition
- Address the bottlenecks that undermine the efficiency of existing interventions
- Improve access to and utilization of services related to maternal, infant and young child nutrition

Method / Design: Uganda has developed and launched an Uganda Nutrition Action Plan (UNAP 2011- 2016) that streamlines a multisectoral approach in addressing nutrition issues by enhancing resource mobilization and political commitment to strengthen the link between food and agriculture systems and nutrition; scaling up proven nutrition-sensitive food and agricultural interventions at country level.

There are global initiatives and international organizations offering practical, financial, and scientific assistance in implementing nutrition-specific policies and programs such as those affiliating under the Scaling Up Nutrition Movement (SUN 2012).

Results: Currently districts have been guided to form District Nutrition Coordination Committees (DNCC) chaired by the Chief Administrative Officer, comprising of representatives from sectors of Health, Agriculture, Education, Gender, Water, trade, comparatives, Non- governmental Organizations, private sectors and Community based organizations (CBOs).

Conclusions: To have a healthy and productive population, all sectors need to be aligned, address the institutional failures in nutrition-related governance and monitor progress towards Uganda's committed nutrition aims.

Keywords: (maximum 5): Operationalising nutrition local level governance

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149/1425. Process evaluation of a cash transfer program in rural Togo: an opportunity for operational troubleshooting

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Introduction: In Togo, the Government is implementing a conditional cash transfer program associated to Behavior Change Communication (BCC) activities in two vulnerable regions. The program, which targets women during the "1,000 days period" and aims at promoting children's nutrition, is being evaluated in terms of process and impact.

Objectives: To document the key implementation challenges of the program, 6 months after it started, and suggest improvements.

Method / Design: A Program Impact Pathways analysis was first conducted to identify program areas deserving special attention. Data collection was then tailored accordingly and conducted using mixed-methods at various program levels (from program designers to beneficiaries); it encompassed focus group discussions, home-based interviews, review of program documents, direct observations of payments and BCC activities.

Results: Front line workers (FLWs) had a wrong understanding of some aspects of the program, notably the conditions associated to the transfer. In large villages with many beneficiaries, FLWs were overloaded with BCC activities (information/sensibilisation sessions and home-visits). Information, training and motivation of community staff should be reinforced to alleviate FLWs' workload. The program suffered from a lack of communication at all levels. Regular meetings should be organized to identify problems and turn suggestions for improvement into actions. The cash distribution went well despite some delays in payments and long hours queuing for women. Risks of hold-ups were also feared by the financial institution responsible for payments in villages, suggesting that additional security protection may be needed. According to beneficiaries and FLWs, village heads should be further involved in the program. They are influential community members who, for instance, may help mobilizing husbands whom participation to the program is likely to be a key to success.

Conclusions: Process evaluation initiated at an early stage may help refining programs by identifying obstacles that can affect program services and quality of implementation.

Keywords: (maximum 5): process evaluation, cash transfer program, Togo.

149/1431. Leptin induces in vitro and in vivo the inflammatory response in mammary epithelial neoplastic cells

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Introduction: In post-menopausal women,obesity increasesthe risk of breast cancer and mortality. Overweight is characterized by hyperleptinaemia, oxidative stress and inflammation. That results in lipid peroxidation leading to the production of key pro-inflammatory compounds of carcinogenesis.

Objectives: The study focused on the effects of leptin on the inflammatory response via the lipid peroxidation by in vitro and in vivo approaches.

Method / Design: In vitro study was conducted on HMEC cells, MCF-7 and MDA-MB-231 in the presence of leptin (10/100 ng / ml) by the determination ofhydroperoxides and isoprostanesand by gene expression and catalytic activity of the glutathione peroxidase 1 (GPx1) and cyclooxygenase 2 (COX2). The inflammatory response in vivo has been characterized in the C57 / BL6 (mammary cancer: EO771), levels by quantification of interleukins, leptin and isoprostanes in plasma and by thedetermination ofhydroperoxides, isoprostanes and COX2 activityin tumors.

Results: In vitro, whatever the concentration of leptin, a slight increase in production of cellular reactive oxygen species is observed. Induction of expression of GPx1 at 1 hour and of its catalytic activity at6 hours is resulted in a low lipid peroxidation for HMEC. Conversely, in cancer cells, GPx1 is not activated which causes a large increase in lipid peroxidation and overexpression of COX-2 ($p < 0.05$). These results are in agreement with the in vivo model for which an increase of the plasma leptin is associated with an increase in inflammatory cytokines (TNFa, IL-6).

Conclusions: This study confirms the impact of leptin on lipid peroxidation and inflammatory response in neoplastic mammary epithelial cells, strengthening the link between obesity and breast carcinogenesis.

Keywords: (maximum 5): Leptin, obesity, breast cancer, lipid peroxidation

149/1433. Physical activity coupled with calcium and vitamin d3 supplementation: important determinants to improve elderly bone health

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Introduction: Poor physical activity, inadequate dietary calcium (RDA: 1200mg/day) and vitamin D intake along low serum vitamin D (<30ng/ml) are common amongst older adults of both gender and contribute to the high prevalence of osteoporosis globally.

Objectives: Mapping the poor bone mineral density and its potential risk factors. Intervention with calcium and vitamin D and weight bearing exercises to evaluate impact on bone mass density (BMD).

Method / Design: 500 subjects (mean age: 66.3±5.1 years) were screened for poor BMD. Lifestyle, dietary and serum calcium and vitamin D etc. were assessed. 100 subjects with poor BMD and vitamin D deficiency or insufficiency were randomly selected and divided in two groups (experimental=50, control=50) with 30 males and 20 females in each group. 1000 mg calcium and 500 IU vitamin D were supplemented along with weight bearing exercises to the experimental group. Similar supplementation was given to the control group but without exercises for a period of 3 months.

Results: 56.2% subjects were osteopenic and 28% were osteoporotic. BMD was positively correlated with serum calcium levels (R: 0.326, P≤0.05), and higher level of physical activity (R: 0.09, P≤0.05). Increase in inactivity, however, showed decrease in bone health (R: 0.101, P≤0.05). Inactivity coupled with low dietary calcium intake and loco motor problems predict BMD with an occurrence probability of 21.2% (R: 0.212). Intervention showed a beneficial effect on 38% osteoporotic subjects with their levels shift in osteopenia category. Mean BMD and serum calcium levels significantly improved to -1.9±0.4 and 9.7±0.22 from -2.4±0.5 and 9.4±0.63 in experimental group and to -2.13±0.4 and 9.6±0.3 from -2.42±0.54 and 9.4±0.53 in control group (P≤0.001). Improvement was higher in experimental group (P≤0.05) and among males (P-4.024E). Overall, serum vitamin D levels became normal among 78% subjects. Mean grip strength, standing balance score and mean rise from chair score was increased to 15.9±5.64, 3.34±0.71 (P≤0.001) and 13.92±2.7 (p-≤0.05) from 14.2±4.9, 2.5±0.9 and 13.5±0.41, respectively; with the change more in males (P≤0.05).

Conclusions: Thus, a significant positive impact of physical activity was observed in our experimental group along with supplementation.

Keywords: (maximum 5): Calcium, BMD, vitamin D, physical activity, elderly

149/1435. Phenolic compounds in fresh and processed vegetables and spices

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Introduction: Phenolic compounds are one of major antioxidants in foods. They have protective effect against free radicals made during oxidation and other processes. Phenolics are synthesised in plant cells during secondary metabolism by phenylpropanoid pathway. Biosynthesis is complicated cycle, starting with simple phenols to more complex structure flavonoids. There are many forms of phenolic compounds, not only as simple compounds but also bonded with sugars, esters etc. Many processing methods have been used to increase content bioavailability of antioxidants.

Objectives: The aim of research was to determine the phenolic compound changes in fresh and processed with steam (for 1.5 and 3.0 minutes) vegetables and spices (dill, celery, parsley, leek, onion, garlic, celery root, carrot and pumpkin).

Method / Design: For 21 individual phenolic standard compounds was modified high performance liquid chromatography- diode array detection (HPLC-DAD) method combining temperature, solvent acidity and their proportions, and flow rate change during analysis. This method was combined with previous research, where spectrophotometric method for phenolic compounds and their antiradical scavenging activity were determined

Results: In the present research it was found that during steaming it is possible to increase or modified phenolic compounds to other forms in vegetables and spices. In analysed spices samples flavonoids and phenolic acids as most common compounds was detected, however in vegetables – flavonoids are presented in higher concentrations than phenolic acids. It could be concluded, that it is possible to increase or decrease individual phenolic compounds using steaming as pre-treatment. Combining with spectrophotometric method, by HPLC method total phenolic compound content is lower because diversity of phenolic compounds in analysed samples is wider than it was analysed.

Conclusions: Changes during processing could be explained with possible dividing of phenolic compound complex in more simple forms and also with biochemical processes in vegetables and spices

Keywords: (maximum 5): vegetables, spices, steaming, phenolic compounds, HPLC-DAD, antiradical activity

149/1437. Health behavioural and nutrition status among school aged children- development of skills for health education program in Macedonia

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Introduction: Global computerization is a social phenomenon worldwide which is closely related to the nutrition and health status of children and adolescents.

Objectives: To estimate the prevalence of obesity in school aged children, and the significant correlation between the nutrition status, behavioural risk factors and biological markers. The specific objective was to develop an innovative skills-based nutrition education program in Macedonia.

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Method / Design: The cross-sectional study examined the correlaton between dietary habits, physical activity including sitting time and the nutrition status using standardized non-quantitative, Food Frequency Questionnaire (FFQ), the International Physical Activity Questionnaire (IPAQ) and the anthropometric measurements (BMIkg/m2) using theWHO Child Growth Standards. Some functional variables (arterial tension, pulse) and biochemical analysis (haemoglobin, eritrocites) were included as biological markers . The total sample was 200 randomly selected schoo aged children of 12-13 years old. Statistical analysis was included descriptive statistics, Pearson Chi-square test and logistic regression analysis using SPSS Statistics 17.0.

Results: Healthy Body Mass Index (BMI =18.5-24.9 kg/m2) was estimeted in 61.76% boys and 68.71% girls of the study participants. Nearly 31% had a poor nutritional status: the prevalence of undernutrition was 17%. Overweight and obese were 14% of all school aged children. Significant impact on development of obesity have sitting time and moderate intensity physical activity per day. Significant correlations was estimated between sweetness food, soft drinks and obesity, but drinking water have a protective effect.

Conclusions: have a protective effect.

CONCLUSIONS: Obesity requires systems-level approaches that include the skills of registered dietitians, environmental support across all sectors of society developing an innovative "Skills for health" nutrition education program in Macedonia. Secondary prevention should emphasise family-based approaches that include dietary counseling by physicians, parenting skills, behavioral strategies, and physical activity promotion.

Keywords: (maximum 5): health behaviour, obesity, children, education, national program

Topic 5: Food quality, food safety, sustainability, consumer behavior and policy

149/3. Effect of coconut milk on the systemic immune response and mucosal

Author(s): Addou Samia; Benaissa Yamina; Belmokhtar Amina; Saidi Djamel; Khéroua Omar.

Affiliation: *Researcher. Laboratory of Physiology of Nutrition and Food Safety. University of Oran. Algeria.*

Introduction: The coconut milk is a vegetable milk, it is the natural oil-in-water emulsion extracted from the endosperm of mature coconut (Cocos nucifera L.), can easily be prepared , Coconut milk is also used as a vegan base for many alternatives/substitutes of traditional dairy products (e.g.non dairy milk, yogurt, creamer and ice cream), especially for people suffering from allergies to cow's milk.

Objectives: The objects of our study is to obtain the antigenicity of coconut milk .

Method / Design: Coconut milk measured by ELISA and investigate the effect of coconut milk on the histological appearance of the intestine of mice

Results: A trongre activity to serum IgG anti ß-lg at D35, and a highly significant decrease in J63 after a milk diet coconut.

At the level ofthe intestinal mucosa of mice fed a milk diet coconut, we obtained an increase invillous height compared to thepositive control group, and lymphocyt infiltration comparable to the negative control group.

Conclusions: our results indicate that the coconut milk reduces the antigenicity, and has a beneficial effect on the intestinal mucosa.

Keywords: (maximum 5): Cow's milk allergy, antigenicity, coconut milk

149/25. Determination of vitamin B1, vitamin B2, niacin and trace metals in pigmented thai rice varieties

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Introduction: There are many indigenous varieties of rice in Thailand, and some have been commercially successful. They are exported to many countries because of their higher yield, disease resistance, ability to be harvested throughout the year, especially palatability and nutritional value.

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Objectives: This study determined the contents of vitamin B1, vitamin B2, niacin and trace metals in twenty varieties of half-milled pigmented Thai rice.

Method / Design: The levels of essential elements were determined by atomic absorption spectrometer (AAS) and mercury was determined using an in-house developed cold vapor-AAS method. Normal and glutinous rice varieties of purple to black (n=9), orange to deep red (n=9) and white pigmentation (n=2) were collected from various rice research centers throughout Thailand.

Results: All varieties of rice had high contents of vitamin B1, especially Hom-Dang Sukhothai 1 and Khao Dawk-Mali 105 varieties. Most varieties of rice had low levels of vitamin B2, except PSL00255-4-4-5R and Hom-Dam Sukhothai 2 varieties had rather high contents of vitamin B2. All varieties of rice had a small amount of niacin (less than 15 microgram per gram). Most types of rice showed high levels of Fe, Mn and Zn, especially Hom-Phukhiew and Dang-Muenglong varieties, while all had low levels of Cr, Cu and Se. Eleven varieties of rice had trace levels of mercury (less than 0.5 microgram per gram) and in nine kinds mercury was undetectable (lower than the detection limit = 0.0034 microgram per gram).

Conclusions: The contents of vitamin B1, vitamin B2 and niacin were no difference between pigmented, normal and glutinous rice.

Keywords: (maximum 5): Pigmented rice, Oryza sativa, Nutritional value

149/55. Carotenoids content, microbiological and physicochemical quality of crude palm oil sold in Douala-Cameroon

Author(s): (1) Dongho Dongmo Fabrice Fabien; (1) Ngono Ngane Annie; (1) Sameza Modeste Lambert; (1) Mouokeu Raymond Simplice; (1) Demasse Mawamba Adélaïde; (2) Schweigert Florian; (1) Gouado Inocent.

Affiliation: *(1) Departement of Biochemistry. University of Douala. Cameroun.; (2) Institute of Nutritional Science. University of Potsdam. B Germany.*

Introduction: Crude palm oil (CPO), richest food in provitamins A, is the major cooking oil in Cameroon where it is an essential ingredient of local recipes. However, its quality is subject to doubt, considering the very often inadequate conditions of extraction, conditioning, storage and selling in the fast growing small holder sector or in the market.

Objectives: This work was done to assess the microbiologic and physicochemical quality and the carotenoids content of CPO sold in Douala.

Method / Design: A total of 194 samples of CPO were randomly collected in seven markets of Douala among which: 95 during the rainy season and 99 during dry season; 93 from CPO contained in opened containers and 101 in close containers. In these samples, total bacteria load, total fungi load, peroxide value (PV), free fatty acids (FFA) content, impurity level and carotenoids content were assayed.

Results: We found that instead of impurity level which the value (0.34±0.16%) was above the maximal limit recommended by standards; total bacteria load (4.48±1.86x105cfu/ml), total fungi load (3.00±1.37x104cfu/ml), PV (1.81±0.74meqO2/kg), FFA content (4.30±1.82%) and carotenoids content (756.41±110.67mg/l) had the values within acceptable interval as recommended by standards. Also, none of these parameters had varied according to the market. Moreover, among these parameters, PV and carotenoids content were not varied whatever CPO is sold during rainy or dry season, in open or closed containers while others parameters analysed were significantly (p<0,05) higher during dry season or when the CPO was contained in open containers.

Conclusions: Considering these results, one can conclude that CPO sold in Douala has an acceptable quality and carotenoids content. But, traders have to make efforts to avoid CPO contamination during the selling. They could keep it in closed containers and expose it in an adequate space particularly during dry season.

Keywords: (maximum 5): Crude Palm Oil, Microbiology Quality, Physicochemical Characteristics, Carotenoids Content, Douala

149/59. A comparative study of food security sustainability among households in selected rural villages of Nigeria.

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Introduction: Developing countries across the globe have been grabbling with the problem of food insecurity due to poverty prevalent in the regions.

Objectives: To compare the household food security status among mothers/caregivers of children aged 6-23 months in selected villages of Ife East Local Government Area of Osun state Nigeria.

Method / Design: The study design was a comparative cross sectional study which was conducted in six villages of Ife East Local Government Area Osun State Nigeria. Three of the villages were participating in Agricultural Extension Programme (AEP) activities of the Obafemi Awolowo University, Ile Ife, Nigeria, while the other three were comparison villages. Mothers/caregivers nursing children aged six to twenty three months were recruited from both groups of villages for the study by convenience sampling method. Respondents, 257 and 261 women were recruited from AEP and comparison villages respectively. Quantitative data was collected from respondents with interviewer administered questionnaires that obtained information on socio-demographic characteristics, household food security status of the respondents. Household food security status was determined using an adapted Household Food Insecurity Access Scale (HFAS) There were nine questions each representing an increasing level of food insecurity (access) ranging from "no" which attracts 1 score, "rarely" which attracts 2 scores "sometimes" which attracts 3 scores and often which attracts 4 scores. Households with total score of 9-20 for

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all items were considered food secured while those with total score of 21 or more were considered food insecure. Data were analysed using SPSS version 16.

Results: Household food security status showed, 176 (66.8%) and 201 (77%) of households in Agricultural Extension Programme and comparison villages were found to be food secured. ($p < 0.05$)

Conclusions: The food security status was better among households in comparison villages compared with the Agricultural Extension Programme villages.

Keywords: (maximum 5): FOOD SECURITY, HOUSEHOLDS, VILLAGES.

149/70. Biochemical responses to a consumption of hibiscus sabdariffa dried calyx tea (folere)-supplemented beverage in humans

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Introduction: The foléré (a sweetened aqueous extract of Hibiscus sabdariffa dried calyx) is gradually assuming the position of a national drink in Cameroon as it is commonly produced, sold and consumed by the whole society. However, its functional properties have not been elucidated yet.

Objectives: This study aimed at investigating the effect of consumption of foléré on some hematological and biochemical parameters in humans.

Method / Design: A standardized extraction procedure was set up and the foléré was prepared for 32 male volunteers' subjects aged from 21 to 32 years, recruited for the experiment. Each participant consumed one liter per day (500mL in the morning and 500mL in the evening) during 2 weeks. The hematological parameters (red and white blood cell counts, platelet, hemoglobin, haematocrit, lymphocytes, granulocytes) were determined in whole blood while the biochemical parameters (total cholesterol, HDL-C, LDL-C, triglycerides, glycemia, creatinine, urea, GOT and GPT) were determined in the serum from fasting sample collections performed on days 0 and at the end of each week. Results were analyzed using one way ANOVA and Newman-Keuls Tests. A P value of less than .05 was considered statistically significant.

Results: Results obtained showed a significant increase of red blood cells (3.59-4.62×106/µL), hemoglobin (11.45-14.80 g/dL), haematocrit (22.95-31.94%), HDL-C (32.05-42.14 mg/dL), triglycerides (46.80-128.5 mg/dL), creatinine (0.52-0.71 mg/dL) and a significant decrease of white blood cells (5.34-4.37 ×103/µL), LDL-C (84.70-37.97 mg/dL) and total cholesterol (134.1-101.7 mg/dL) ($P< 0.05$). There was no significant change on glycemia (0.99-0.99 g/L), GOT (7.01-6.94 UI/L), GPT (3.67-4.55 UI/L), urea (19.06-20.80 mg/dL), platelet (178.5-147.2×103/µL), lymphocytes (48.56-47.14 %) and granulocytes (41.86-45.52 %).

Conclusions: These findings suggest that consumption of Hibiscus sabdariffa dried calyx tea (foléré) might be beneficial to the hematopoietic system and also revealed a good cholesterol lowering potential. No hepatoxicity has been observed as far as transaminases are concerned.

Keywords: (maximum 5): Foléré, health, well being, human.

149/71. Inverting the pyramid! Extent and quality of food advertised on Austrian television

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Introduction: Research showed that food marketing for children frequently contradicts national dietary guidelines. Children, unlike adults, are not able to understand the persuasiveness of the advertisements with its short- and long-term effects on health, thus the common international tenor is to restrict food marketing.

Objectives: In this study we analyze the quality and screening frequency of a set of advertisements broadcasted on Austrian television targeted at children.

Method / Design: Promoted products were categorized as food and non-food (target product) items targeted at children or adults (target audience). Content analysis of the displayed food was based on the Austrian Nutrition guidelines. The children's food was analyzed according to the newly established nutritional quality criteria for advertised food (EU Pledge Nutrition Criteria).

Results: 360 hours of video material was recorded in February and March 2014. A total of 1919 food advertisements, with 15.1% targeted at children were broadcasted. 92,4% of the advertised foods targeted at children was for fatty, sweet and salty snacks, while no ads for vegetables, legumes or fruits were shown. Further analysis revealed that 95.9% of the advertised food for children showed aspects of nonconformity with the EU Pledge Nutrition Criteria and at the same time 64.7% of the displayed food featured aspects that should be encouraged.

Conclusions: We showed that in Austria, food associated with unhealthy aspects is advertised and that almost all advertisements would be permitted under the new EU Pledge Nutrition Criteria. We discuss our findings in the context of public health nutrition and present a perspective for future directions in this important field of research.

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Keywords: (maximum 5): Advertising, children, television, EU Pledge Criteria, food marketing regulation

149/84. Mineral content, proximate composition and protein bioavailability of two proceed Amaranth harvested in West of Cameroon

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Introduction: Leafy vegetables are widely eaten in developing countries and serve as nutrients supplements.

Objectives: The present study examined the effect of slicing, sun drying and cooking on minerals, proximate composition and protein bioavailability of two vegetables Amaranthus hybridus and Amaranthus cruentus harvested in West of Cameroon.

Method / Design: The vegetables were divided into two main groups: the first group was chopped before any treatment and the second group was processed without slicing. Each group was next divided into three portions as followed, sun dried, shade dried and cooked portions. The minerals and heavy metals content was evaluated by inductively coupled plasma optical emission (ICP-OES) spectrometry while proximate composition was assessed by standard method. The nutrient utilization and growth performance of the processed vegetables were determined using rats bioassay; 36 young rats were distributed in six groups of six elements. Test groups received respectively sun dried A. hybridus based, cooked A. hybridus based, sun dried A. cruentus based and cooked A. cruentus based diets.

Results: . Minerals elements like Na, K, Ca, P, Mg, Fe, Zn were present. The sun dried A. cruentus and cooked A. hybridus contained the higher values of crude protein 32.22 and 31.79% respectively while the higher crude lipid, 3.80 and 2.58% were shown by sun dried A. hybridus and cooked A. cruentus respectively. Cooked A. hybridus shown significantly ($P<0.05$) the highest values of food intake, faeces weight, efficiency food utilization (EFU), protein utilization ratio (PER) and True digestibility (TD). Sun dried A. cruentus caused the death of all animals before the end of experimental period. GOT, GPT, creatinine and albumin were not significantly different ($P>0.05$) for both cooked vegetables

Conclusions: These green leafy vegetables will not support growth but their consumption could help in the fight against constipation and related diseases.

Keywords: (maximum 5): Amaranthus, Processing, Protein bioavailability, Rats

149/91. Color development in toasted bread as a parameter of acrylamide content

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Introduction: The acrylamide (AA) contamination of food products is nowadays among the main risk factors for public health. AA can cause cancer in animals and according to some experts, also in humans. Acrylamide is a chemical compound that typically forms in starchy foods during baking, frying or roasting at high-temperatures (usually higher than 120 °C) and low moisture. It is mainly formed in food by the reaction of asparagine with reducing sugars (particularly glucose and fructose) as part of the Maillard reaction. AA has been found in a wide variety of foods cooked in catering, at home and those prepared industrially.

Objectives: The objective was to find a relationship between browning development during toasting of wheat and whole-wheat bread and acrylamide formation in toasted bread.

Method / Design: AA was separated by RP - HPLC - DAD. Surface color of toasted breads was measured by a portable spectrophotometer MiniScan EZ in units CIE L*a*b*.

Results: It was observed that intensity of toasting has a strong effect on color formation in toasted bread. L* value decreased with increasing toasting time. Both a* value and b* value increased during toasting. High correlation was found between AA formation and browning development in all types of toasted bread. Hence, the color in terms of CIE parameters can be used as the predictor of acrylamide concentration in toasted bread.

Conclusions: The health quality of toasted bread decreases with the higher intensity of toasting. The consumer should use surface color (browning) as an indicator of acrylamide levels in some foods and keep light brown colour when toasting bread and related products.

Keywords: (maximum 5): ACRYLAMIDE, MAILLARD REACTION, COLOR, TOASTED BREAD, HPLC

149/93. The effect of heating treatment on acrylamide content in some home-prepared foods

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Introduction: The acrylamide (AA) has the potential to increase the risk of cancer. It is formed in high-carbohydrate foods, during heating at temperatures greater than 120°C. AA has been found in a wide range of commercially processed and home-cooked foods, mainly potato- and grain-based products. High levels of this compound have been also found in many ready-to-eat products, which were heat treated at home.

Objectives: The purpose of this study was mainly to compare the effects of different heating methods such as roasting, pan-frying, and deep-frying and microwave treatment on the formation of acrylamide in some ready-to-eat foods.

Method / Design: The experiment was performed with ten different commercially available ready-to-eat croquettes with meat filling. All products were prepared with domestic methods such as roasting, pan-frying, deep-frying and microwaving according to the information on the labels. AA content was determined by RP - HPLC - DAD methods.

Results: Before preparation all products showed the lowest (190 µg/kg) acrylamide content. The highest acrylamide content was found when microwave radiation was used. The mean AA content in all samples prepared this way (420 µg/kg) was significantly higher than that of roasting (360 µg/kg), deep-frying (298 µg/kg) and pan-frying (285 µg/kg), ($p<0.05$).

Conclusions: The high AA content in commonly heated foods can decrease the consumer sense of safety of thermally processed foods. The acrylamide is present in ready-to-eat food even before heat treatment at home. Comparing to conventional heating, microwave treatment is more favourable for AA formation in home-prepared products. Therefore, the use of microwave heating for thermal processing of carbohydrate-rich food should be limited by consumers.

Keywords: (maximum 5): ACRYLAMIDE, READY-TO-EAT FOOD, FOOD PREPARATION, HEATING METHODS, HPLC

149/101. Mediation of sustainable food consumption in educational institutions

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Introduction: Due to a high growth rate of overweight and obesity, particularly among children and adolescents (see KiGGS), an improvement of the nutritional knowledge through educational institutions is required. Indeed, several measures and projects have been developed, but these particularly neglect students in vocational schools.

The increasing significance of the topic sustainability, also in the nutritional sector, is being integrated into the school curricula respectively learning area (Lernfeldkonzept). Nevertheless, students still have difficulties in establishing references to their own acting in everyday life.

Objectives: In order to improve the cooking skills, as well as the nutritional competence and in this context to broach the issue of sustainability, a didactic concept can combine both topics and mediate necessary theoretical and practical elements for a sustainable and healthy nutrition.

The vegetarian nutrition is used as an exemplary research subject.

Method / Design: Questionnaires identify the vocational students' current knowledge regarding cooking skills, nutrition, sustainability and meat alternatives (as part of vegetarian nutrition). The results are used to select relevant contents that are didactically reduced.

Within the scope of experiments students have to prepare meals and taste them by means of ranking tests (DIN ISO 8587). In this way, a theoretical and practical confrontation is achieved.

The experiments are initially performed with students of vocational teaching for Food Science.

Results: Students have a heterogeneous knowledge regarding nutrition, cooking skills and sustainability.

All students consider experiments being an appropriate method to mediate the relevant topics in educational institutions.

The personal experience with cooking and tasting of different meals creates curiosity and can positively influence the students' nutritional habits.

Conclusions: The exemplary concept confirms the necessity of the close linking between theoretical discipline, practice and didactics. Experiments are suitable to create tangible and directive experiences with healthy and sustainable food consumption.

Keywords: (maximum 5): SUSTAINABILITY: EDUCATIONAL INSTITUTIONS: VEGETARIAN: NUTRITION KNOWLEDGE: COOKING SKILLS

149/120. Association between cooking practices and weight status in a general population from the NutriNet-Santé Study

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Introduction: Frequent consumption of commercially-prepared meals appears to be associated with obesity. Such a relationship could also be observed between home cooking practices and obesity but it has not been documented so far.

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Objectives: We investigated the association between weight status and cooking practices.

Method / Design: A total of 14,086 men and 48,853 women aged ≥ 18 years participating in the NutriNet-Santé cohort study were included in our cross-sectional analyses. Self-reported weight, height and cooking practices were collected using web-based questionnaires. Cooking skills, use of raw foods and kitchen equipment were assessed by a 0-10 point score and interest for cooking was a qualitative variable. Associations between weight status and various components of cooking practices were assessed using logistic regression models adjusted for socio-demographic factors.

Results: Compared with regular cooks (≥once/day), women who never cooked were more likely to be obese (odd ratio (OR=1.59 (1.28;1.96)) and men who cooked occasionally (1-6 times/week) were more likely to be overweight (OR=1.14 (1.05;1.24)). Among cooks, cooking skills were positively associated with overweight (women: OR=1.07 (1.05;1.10), men: OR=1.06 (1.04;1.09)) and with obesity (women: OR=1.09 (1.06;1.13), men: OR=1.15 (1.11;1.20)). Higher kitchen equipment was positively associated with overweight (women: OR=1.05 (1.04;1.07)) and obesity (men: OR=1.06 (1.03;1.09)). By contrast, the use of raw foods was inversely associated with obesity in women (OR=0.95 (0.93;0.97)). Compared with those who like cooking, individuals who do not like to cook were less likely to be overweight (women: OR=0.82 (0.75;0.89), men: OR=0.90 (0.81;0.99)) or obese (men: OR=0.81 (0.69;0.95)).

Conclusions: Daily home cooking and use of raw foods were related to lower risks of overweight and obesity whereas skills, equipment and interest for cooking were associated with higher risks. Such complex relationships between cooking and body weight status should be taken into account to effectively target public health efforts in obesity prevention.

Keywords: (maximum 5): cooking, weight status, skills

149/128. Lutein specific relationship among some spectrophotometric and colorimetric parameters of egg yolk from laying hen

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Introduction: Lutein is dietary essential carotenoid required to prevent age related macular degeneration in human and its presence is responsible for the coloration of egg yolk. Its content in egg yolk would be determined by High Performance Liquid Chromatography (HPLC). Another one stop method (iCheck) would be followed to determine total carotenoid of lutein rich egg yolk. Colour parameters of egg yolk due to presence of carotenoid and/or lutein would be assessed by Roche Yolk Colour Fan (RYCF) and Minolta Chroma meter.

Objectives: As the color and the lutein content are interrelated their degree of interrelationship in egg yolk has calculated in this study.

Method / Design: Wheat-barley based lutein free diet was offered to 28 pullets (Lohmann brawn, 20 weeks age) for a period of 21 days. Then for 21 days 14 birds were fed diet containing marigold (80mg lutein/kg feed) and other 14 birds offered feed containing oleoresin (45mg lutein/kg feed) followed by 21 days withdrawal of lutein. Eggs were collected periodically. The visual color of yolk was assessed on a Petri dice using RYCF (0 to 15, where higher values of more color) and Minolta Chroma Meter (a*-redness; b*-yellowness and L*-lightness). Egg yolk was analyzed for total carotenoids using a one stop device (iCheck(™)). HPLC method followed to determine the carotenoid components (lutein and zeaxanthin).

Results: Both trial showed that the increasing content of lutein enhance RYCF score (R2-0.87; P<0.01) as well as redness (R2-0.89; P<0.01). Total carotenoid (mostly lutein) has poor relationship with lightness (R2-0.13; P>0.05) and yellowness (R2-0.12; P>0.05) of the yolk.

Conclusions: It may be concluded that the lutein is potentially responsible for increasing RYCF score and redness (a*) but not so much responsible for increasing yellowness (b*) and for reducing lightness (L*) of egg yolk.

Keywords: (maximum 5): Carotenoid, HPLC, iCheck, lutein, spectrophotometry, yolk

149/143. Dietary exposure to polysorbates in German population groups using maximum permitted levels

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Introduction: Polysorbates (E 432 – 436) are used as emulsifiers in fat emulsions for baking mixes but also for food supplements, sugar confectionery and chewing gum. In 1983, the Scientific Committee for Food established a group ADI of 0 – 10 mg/kg bw/day for polysorbates. A recent publication suggests polysorbates can induce low-grade gut inflammation and metabolic syndrome.

Objectives: Children are a vulnerable group in the population. Due to a lack of information on polysorbate exposure from its use as food additive, the study estimates dietary exposure to polysorbates in these German population groups.

Method / Design: A database was created, including two recent dietary surveys (VELS and EsKiMo), which linked concentration data of food additives to a categorization system based on Council Regulation (EC) No. 1333/2008. Dietary surveys used one or two 3-day food records to provide consumption data for 2,034 individuals aged 0.4 to 11 years. Maximum permitted levels represent food additive concentrations in foods (tier-2). By using occurrence data of food additives in foods, a tier-2b approach was enabled to reduce uncertainties in regular tier-2 estimates.

Results: Percentage of consumers was at least 99 % for individuals aged more than one year. Median dietary exposure to polysorbates

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(consumers only) range from 2.4 to 10.7 mg/kg bw/day. Estimates for high consumers (95th percentile of exposure) range from 17 to 30 mg/kg bw/day. Tier-2b estimates reduces exposure of high consumers to maximum 16 mg/kg bw/day. The main food categories contributing to tier-2 dietary exposure are fine bakery wares (39 %), desserts (30 %) and flavored milk products (12 %).

Conclusions: High level exposure estimates in tier-2 and tier-2b exceeded the ADI of 10 mg/kg bw/day. ADI utilization for high consumers in tier-2b estimates range from 70 to 162 %. Polysorbates need to move to tier-3b estimations including maximum reported use levels.

Keywords: (maximum 5): FOOD ADDITIVES; POLYSORBATES; EXPOSURE ASSESSMENT

149/147. The effect of storage conditions on folate content in frozen vegetables

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Introduction: Folate are one of the most important vitamins for normal human metabolic function. These compounds are particularly sensitive to external factors: temperature, sunlight, pH, oxidizing and reducing factors. Storage of vegetables influences the oxidation of folate to the forms less digestible by the human body. It is crucial to have appropriate information on the stability of folate in given product and the effect of different storage conditions on their retention.

Objectives: The effect of temperature and time of storage in the refrigerator (2°C and 8°C) on the stability of folate in selected frozen vegetables (broccoli, green beans, spinach, mix-vegetables) were investigated.

Method / Design: : Folate were extracted in the 0.1 M phosphate buffer (pH=6.1), followed by deconjugation with conjugase (rat plasma) and separated by HPLC after clean-up using SAX spe. cartridges.

Results: In all samples two folate forms were identified (5-methyltetrahydrofolate and tetrahydrofolate).The best source of folate was broccoli (130 µg/100 g), while the lowest amount was in mix-vegetables (52 µg/100 g).Significant losses of folate in green beans and mix-vegatables samples were observed after one day of storage at 2°C and 8°C. However, in the case of broccoli and spinach, significant reduction of folate (about 20%) was found after 3 days of storage at 2°C and 8°C. Continuation of broccoli and spinach storage for 7 days at 2°C did not effect folate content, instead storage at higher temperature (8°C) caused about 34% reduction.

Conclusions: The stability of folate in frozen vegetables storing at the temperatures above 0°C depends of kind of vegetables. The results may provide a basis for the preparation of information for the consumer, for how long frozen vegetables can be stored in the refrigerator at temp. above 0°C with no significant changes in the folate content.

Keywords: (maximum 5): FOLATE, VEGETABLES, STORAGE, HPLC

149/148. The effect of the buckwheat groats preparation process on the selected health benefits

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Introduction: Buckwheat is an alternative crop belonging to the Polygonaceae family and is usually grouped with cereals because of similarity in cultivation and utilization though it is not cereal grain. Epidemiological studies have revealed that buckwheat can reduce the risk of chronic diseases such as cancer, coronary artery disease and diabetes. The beneficial effects of buckwheat have been attributed to its high level of polyphenol compounds which exhibit antioxidant activity. Rutin and phenolic acids are the most important polyphenols in buckwheat. The amount of these components depends on the kind of operations used in processing.

Objectives: The objective of this study was to determine whether the health benefits of buckwheat seeds, related with phenolics content, change during the groats production (project funded by the National Science Centre, no. N N312 469140).

Method / Design: Total phenolics were determined spectrophotometrically using Folin-Ciocalteau reagent. Phenolic acids and rutin content were analyzed using HPLC method.

Results: The content of analyzed phenolic components changed depending on the process of buckwheat groats preparation. The process of roasting caused a threefold decrease of total phenolic content, some reduction of coumaric acid and increase of vanillic acid which may suggest that this components are especially sensitive to thermal treatment. Roasting didn't influence on the other phenolic acids (ferulic and syringic) and rutin, but their content changed under dehulling process. Removing the husk resulted in more than twice reducing in rutin content and slight increase in the content of syringic acid, which may indicate, that they are sensitive to mechanical processing.

Conclusions: Health benefits of buckwheat groats depends on the kind of seed treatment which caused mainly a reduction of phenolic components. Roasting process has a greater effect on total phenolic content while dehulling influences on the rutin content.

Keywords: (maximum 5): PHENOLICS, PHENOLIC ACIDS, RUTIN, BUCKWHEAT, GROATS

149/149. Modelling rehydration kinetics of legume landraces and comparison with the Peleg's method

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Introduction: In recent years, interest by consumers for traditional foods has considerably increased. Hydration properties affect cooking time, functional and nutritional quality of legume seeds. So far insufficient work has been carried out on rehydration modelling of lentil and grass pea landraces. The widely used Peleg's equation presents several limitations, making necessary a reevaluation of models for describing hydration kinetics.

Objectives: The present study aimed at the evaluation of the hydration properties of lentil and grass pea local ecotypes by comparing different models, including the Peleg's method.

Method / Design: Seeds of lentil and grass pea ecotypes were provided by local farmers in National Parks of Apulia and Campania regions. Mathematical models were applied to weight gain of seeds during hydration in water up to 24 (lentil) and 72 (grass pea) hours. Kinetic constants tau(exp) by the exponential method, K1 and K2 by the Peleg's equation and tau(sigm) (soaking time at 50% saturation) by the sigmoid model were calculated.

Results: The exponential model was successfully applied to rehydration of all lentil and grass pea seeds from 2 to 24 hours. Some seeds required evaluation for short hydration times (0-2 hours) by a linear model. Peleg's method had limited application, whereas sigmoid model was not suitable to describe hydration kinetics of legume seeds.

Conclusions: The model proposed here, based on the exponential method complemented, for some seeds, with linear model for hydration times up to two hours was suitable to describe water uptake of lentil and grass pea landraces.

The research was funded by the MiPAAF-Project "TERRAVITA".

Keywords: (maximum 5): LENTIL, GRASS PEA, HYDRATION, PELEG

149/161. Food systems and climate change impacts

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Introduction: As the global Population climbs steadily towards 9billion, natural systems that support us all may not be able to withstand the pressure that this growth exerts. Water scarcity, land degradation and the loss of natural (ecosystem) services we all depend on, point to fundamental problems caused by unsustainable development. Food safety and factors that determine it are experienced at the level of the household and the individual. The direct causes of inadequate food access are poverty, environmental stressors and conflict. These account for 50% of the identified indirect drivers of food insecurity.

Objectives: This paper provides a short description of the potential influence of climate change, variability on food systems and local adaptation strategies as it affects food security.

Method / Design: With the shift towards Sustainable Development Goals (SDG) to replace the Millennium Development Goals (MDGs) after 2015, approaches that severe multiple purpose and provide cross-cutting benefits are highly needed. Thus sustainable food systems requires a comprehensive approach, like the Ecological based approach (EbA); that incorporates numerous fields of planning and considers a wide range of factors, which could be socioeconomic; political or environmental in nature.

Results: Adopting Ecological based approaches has helped built efficient food systems and resilient livelihoods, and ultimately achieved food security in a changing climate.

Conclusions: If the critical impacts of climate change are not addressed, the impact on sustainable food systems will be numerous, placing added pressure on already limited land space and natural resources.

Keywords: (maximum 5): Global Population, Climate change, Sustainable food systems, Unsustainable development.

149/168. Preparation of α-lipoic acid/chitosan microparticle conjugate and its in vitro antioxidative activity

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Introduction: Alpha-Lipoic acid (LA) has gained considerable attention as a nutraceutical agent due to its various medicinal properties. Despite its safety and effectiveness LA utilization is limited by its low bioavailability and stability. Recently, there has been an increasing interest in the developing of efficient oral delivery systems, such as LA/chitosan conjugate, for protection and controlled release of LA to enhance its oral bioavailability with improved biological potential.

Objectives: The aim of the research was to explore, both in vitro antioxidative activity of LA upon encapsulation into chitosan microparticles (LA/chitosan conjugate formation) and its release.

Method / Design: LA was encapsulated by dip-coating method onto ready-made chitosan microparticles of predetermined particle size, prepared by reverse emulsion polymerization technique and the encapsulation efficiency was determined, as well. Structural interactions of LA with chitosan within the conjugate were revealed by Fourier Transform Infrared (FT-IR) spectroscopy and Differental Scanning Calorimetry (DSC). Also, the prepared LA/chitosan conjugates were evaluated for in vitro released LA antioxidative activity.

Results: The applied technique allowed the production of chitosan microparticles with an average diameter between 135 μm and 169 μm, in its dried state. Furthermore, the encapsulation efficiency of LA

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was up to 50%. FT-IR analyses confirmed the presence of LA within synthetized microparticles. The disappearance of melting peak of pure LA upon encapsulation, observed at DSC thermogram, could be ascribed to the formation of LA/chitosan conjugate. A satisfactory level of antioxidative activity after sustained release of LA in pH 6.8 has been confirmed by FRAP (showing up to 56 μmolFe(II)/gmicroparticles) and ABTS (showing up to 85 μmolTrolox/gmicroparticles) assays.

Conclusions: The results showed that the prepared LA/chitosan microparticles conjugate could be used for encapsulation of LA and exhibited the potential of preserving its activity for a longer period of time, by improving its stability and functionality.

Keywords: (maximum 5): Alpha-lipoic Acid, Chitosan, Microparticles, Antioxidative Activity, Oxidative Stress

149/177. Performance and mineral metabolism of broiler fed commercial diet replaced by rice polish and citric acid supplementation

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Introduction: Citric acid considered as an alternate to antibiotic growth promoter in food animal. But its addition in commercial diet may not show further growth promotion effect in broiler due to saturation of all the micronutrients related to growth performance.

Objectives: Citric acid (CA) was tested for the performance of broiler using 0.5% level in commercial diet replaced by rice polish (RP) at 0, 5, 10, and 15% which is low in nutrient and economic.

Method / Design: A number of 240 day old broiler chicks were distributed into eight dietary groups (3 replicate cages having 10 birds in each) as 1=Control (commercial diet), 2=Commercial diet+0.5% CA, 3=5.0% rice polish (RP), 4=5.0%RP+0.5%CA, 5=10.0%RP, 6=10.0%RP+0.5%CA, 7=15.0%RP, 8=15.0% RP+0.5% CA. Acid insoluble ash (1% Celite) was added to the diets as a marker. At the end of the trial blood sample was collected from all the birds. Few birds were sacrificed to measure carcass characteristics and mineral content in tibia.

Results: There was no significance difference for body weight gain and feed intake among the groups. Feed conversion ratio (kg feed intake/kg weight gain) varied ($P<0.05$) among the groups where improved in CA groups comparison to non-CA group. Retention of Ca, P and Mg improved in CA group comparison to non CA groups but replacement of 5% commercial diet (with or without CA) caused higher retention level. Numerically higher dressing percentage observed in CA group comparison to non citric acid groups. Bone mineral concentration slightly (total ash, Ca, P and Mg) increased in CA groups ($P>0.05$).

Conclusions: Replacement of commercial diet by rice polish up to 15% would be possible maintaining growth performance of broiler where further supplementation of 0.5% CA showed more advantages for mineral metabolism.

Keywords: (maximum 5): Broiler, citric acid, rice polish, performance, mineral metabolism

149/178. Effect of dietary α-tocopherol on the bioavailability of lutein in laying hen

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Introduction: Lutein and its isomer zeaxanthin is an essential dietary carotenoid required to prevent age related macular degeneration (AMD) in human, and responsible for the coloration of egg yolk in chicken.

Objectives: Considering instability of lutein α-tocopherol (α-T) was added in layer diet as an antioxidant to observe bioavailability of lutein ester (LE) reflected in egg yolk.

Method / Design: Wheat-soybean based low lutein layer diet was offered to a number of 42 Lohmann Brown laying hens for 21 days. Then birds were divided into 3 dietary groups like: control (basal diet), LE group (40 mg LE/kg feed) and LE+α-T group (40 mg LE plus 100.0 mg α-T/kg feed) for 21 days. Carotenoid components (lutein and zeaxanthin) and α-tocopherol of yolk, blood, follicle and liver were determined by HPLC. Egg yolk was also analysed for total carotenoid using a one stop spectrophotometric method (iCheck(™)). The colour of yolk was assessed using a Roche yolk color fan (RYCF) as well as Minolta Chroma Meter.

Results: Eggs of LE+α-T group contained higher amount of lutein, zeaxanthin, α-tocopherol and total carotenoid comparison to LE group. Blood serum of LE+α-T group contains higher lutein, zeaxanthin and tocopherol comparison to LE group. Follicle of LE+α-T group contains higher lutein, zeaxanthin and tocopherol comparison to LE group. RYCF score was higher in the yolk of LE+α-T group ($p<0.05$) comparison to LE group. Similarly redness (a^*) was higher in the egg of LE+α-T group comparison to LE group (-1.76 vs -2.28). Yellowness (b^*) and lightness (L^*) was similar ($p>0.05$) in LE and LE+α-T groups but higher than control ($p<0.05$).

Conclusions: Dietary α-tocopherol enhances bio availability of lutein observed in yolk, blood serum and yolk follicle and supported by color parameters of egg yolk especially higher values for RYCF score and redness.

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Keywords: (maximum 5): Carotenoid, HPLC, iCheck, lutein, α-tocopherol, yolk

149/179. The Study of Fulani's Maid in Marketing of Milk in the Federal Capital Territory, Abuja Nigeria.

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Introduction: The economy analysis of milk distribution by the Fulani maid in Federal Capital Territory is crucial and necessary because they contribute to given the natural milk ,processing ,marketing ,distribution ,adding value to the milk intake of the citizen of the people living in Abuja

Objectives: Though there are various stages that are involve in getting the milk from the cattle, but this paper focus on the various marketing strategies involve in selling

Method / Design: .Various Interviews were conducted to get the different views and Group discussion were made to gather the relevant information .Pictures were taken to support the various finding

Results: The Findings show that there are urgent needs to promote good hygiene in selling , different practices of bottling the milk , improvement on storage and quality of the milk

Conclusions: and suggestion were also made to improve the selling strategies and best practices involved .

Keywords: (maximum 5): milk distribution, Fulani maid, Federal Capital Territory.

149/187. Microbial quality of raw minced meat in Poland based on process hygiene criterion

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Introduction: According to the Commission Regulation (EC) No 2073/2005 of 15 November 2005 on microbiological criteria for foodstuffs, process hygiene criterion is "a criterion indicating the acceptable functioning of the production process". The criterion is applicable to products before their placement on the market. Process hygiene criterion sets a contamination value with specific microorganisms above which corrective actions should be taken in order to maintain hygiene of the production process in compliance with food law.

Objectives: The aim of the study was evaluation of microbial quality of raw minced meat in Poland in respect to the hygiene criterion.

Method / Design: In 300 samples of raw minced meat, including porcine (n = 270) and bovine minced meat (n = 30) the number of aerobic micro-organisms (ISO 4833) and E. coli (ISO 16649-2) were determined.

Results: The majority of minced pork samples (90%) was of satisfactory microbial quality in terms of aerobic colony count, which was below 5·105 cfu/g. Samples, in which the aerobic bacteria count ranged from 5·105 cfu/g to 5·106 cfu/g, accounted for 9.3% of total. In 2 samples (0.7% of total collected) the number of aerobic colony count was higher than the limit of 5·106 cfu/g. All of minced beef samples were of satisfactory quality in terms of aerobic colony count. In all minced pork and beef samples E. coli count was below 5·101cfu/g, which indicates their satisfactory quality.

Conclusions: Raw minced pork and beef produced in Poland showed good hygienic quality according to the hygienic criterion. Pork minced meat was more susceptible for contamination with aerobic bacteria than beef, and thus the special attention must be paid during its production process to ensure good hygienic quality.

Keywords: (maximum 5): hygiene criterion, E. coli, meat, pork, beef

149/189. Quality assessment of pomaces received from stone and pome fruits using the electrical properties

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Introduction: Due to their chemical composition being similar to the raw material and the positive effects on appetite, at the same time resulting in a feeling of freshness, purée juices show a growing rate of consumption per person.

Objectives: The objective of the research was to define the relationship between basic physicochemical quality attributes and the electrical parameters of pomaces obtained from selected stone and pome fruits.

Method / Design: The research material comprised pomaces obtained experimentally from cherries, plums, apples and pears. The physicochemical analyses and measurements of electrical parameters were performed. The physiochemical analyses were carried out in compliance with the PN-90/A-7510 standard. The following attributes were measured: content of total soluble solids (TSS), dry matter, fibre, mineral compounds, pH, viscosity, general acidity and density. The following electrical parameters were measured: impedance (Z), resistance (R), admittance (Y) and conductance (G). The tests were carried out with an HP 4263B gauge. Correlation coefficients were calculated between the physicochemical features of purée juice quality and their electrical parameters.

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Results: The results of electrical parameters measurements of the tested pomaces showed that their values varied depending on the type of fruit and frequency of test voltage. The highest impedance and resistance values at a frequency of 100 Hz (approx. 204 Ω) were noted in pear pomace, and the lowest values in plum pomace (approx. 147 Ω). High values of correlation coefficients (0.61 – 0.98) between the physicochemical attributes of cherry, plum, apple and pear pomaces, such as: TSS, ash, insoluble fibre content, acidity, pH and Z, R, Y and G values, were also obtained.

Conclusions: The obtained results provide grounds for further research on developing methods for rapid assessment and quality control, authenticity and chemical composition of stone and pome fruit using electrical parameters measurements.

Keywords: (maximum 5): fruit pomaces, electrical properties, quality

149/190. The effect of modified starch addition on Polycyclic aromatic Hydrocarbons content in grilled meat products

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Introduction: In available literature, there is data concerning the possibilities of reducing the concentration of polycyclic aromatic hydrocarbons (PAH) in grilled meat products by using technological modifications. Data shows that modified starches used as an additive to minced meat products effectively reduce PAH contamination by bonding tissue fluids released during heat treatment.

Objectives: The aim of the research was to define the effects of using modified starches in liquid marinades on the content of PAH in grilled meat products.

Method / Design: The research material consisted of grilled pork neck, portioned into steaks of 180 g ± 1 g of weight and marinated for 12 h. The control sample was a commercial marinade and 100 ml of rapeseed oil. In three other marinades, a modified starch (C-Tex 06214) of various mass content in respect to the commercial marinade was used, i.e.: 14, 20 and 30%, respectively. A charcoal grill was utilized. The samples were heated to a temperature of 70°C. The PAHs were analysed by an internal standard method with the use of the HPLC/FLD technique. Nine compounds from the PAH group were analysed. Supported by the European Union within the European Social Fund.

Results: The highest content of PAHs was found in pork neck with the highest percentage of starch. The content of PAHs in this sample was 114.8 µg kg-1, and the BaP level exceeded the limit set by food law (5 µg kg-1). The lowest content of PAHs was found in a marinated sample with a 14% starch additive; however, this value did not differ significantly from the control sample. The content of PAHs in pork neck with a 20% starch addition in the marinade was over 60% higher than in the control sample.

Conclusions: Using modified starch in liquid marinades, to decrease heat leakage in the grilling process, increase PAH content in grilled meat products.

Keywords: (maximum 5): PAHs, grill, pork neck, starches

149/191. Mineral composition of Finger millet and Pearl millet varieties

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Introduction: Finger millet (Eleusine coracona) and pearl millet (Pennisetum glaucum) are underutilized cereals in sub-saharan Africa. These small annual resilient crops adapt well to climate change conditions. Independence on rainfall secures their survival through the various seasons. These crops can be optimized for meeting the ever growing demand for food globally thereby addressing the issue of food insecurity. This can be achieved through the development of baked food and breads aside porridge; the usual form of consumption. Prior to this, there is need to assess the mineral composition of these cereals.

Objectives: This study determines the mineral composition of farmer's preferred finger millet (FM) and pearl millet (PM) varieties grown in Africa as a prospective raw material for baked foods.

Method / Design: Ten varieties each of FM and PM were obtained from ICRISAT, Nairobi. The grains were cleaned and milled to a particle size of <53µm using a Mortar Mill RM200, Retsch, Germany. Macro minerals (K, S, P, Ca, Cl, Mg, Na) and trace minerals (Fe, Zn, Se, Cu, Mn, Fl) were determined using Total X-Ray Flourescene Spectrometer, S2PICOFOX, Bruker, Germany.

Results: The occurrence of all the macro and trace minerals in the twenty analysed species was observed. The highest mineral present in the two grains was Na followed by P. FM had a greater value of Ca ranging from 1165.15 - 1862.51ppm compared to PM which ranged from 100.63 - 263.44ppm. Fe; essential for transportation of oxygen in the red blood cells fell within 22.24 - 54.71ppm.

Conclusions: Finger millet and pearl millet are rich in essential minerals; consequently their usage for the development of new baked foods could be a strong vehicle to combatting mineral deficiency and food insecurity.

Keywords: (maximum 5): Essential minerals, Pearl millet, Finger millet, mineral deficiency, food security

149/199. The effect of frying on folate content in chicken liver

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Introduction: Animal liver is supposed to be a good source of minerals, mostly zinc, iron, selenium and vitamins such as folate. The liver is commonly eaten after cooking treatment, frying, roasting, boiling. This may cause loss of valuable compounds, including folate, which are sensitive to exposure to high temperature.

Objectives: The aim of the study was to determine the possible loss of folate in samples of chicken liver after frying.

Method / Design: The tested material were chicken livers acquired from five different shops. The folate content was analysed, in both raw and fried samples, with the use of HPLC method. Frying was performed with the domestic method (sliced samples of the liver were fried in hot oil within approximately 10 min).

Results: Two folate forms were identified in the tested samples: tetrahydrofolate and 5-methyltetrahydrofolate. The folate content in raw liver was high and ranged from 870,3 to 1288,8 μg/100g of the product. The loss of folates caused by frying was of about 2,46-34,71%. In most of studied livers samples, with one exception only, the frying process had a statistically significant ($p<0,05$) impact on the decrease in these vitamins content.

Conclusions: Folate deficiency in the diet is common all over the world. Based on obtained results, the consumption of chicken liver may be a good supplementation in folate shortage in the human's diet. Especially, when considering the very high folate bioavailability of this product, which, according to some researchers, may be as high as 85%. However, because of high amount of cholesterol and heavy metals, dieticians recommend eating chicken liver no often than once a week.

Keywords: (maximum 5): KEY WORDS: FOLATE, CHICKEN LIVER, FRYING, HPLC

149/208. Importance of different nutrition & health topics according to the Dutch food industry

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Introduction: The food industry has been criticised for being irresponsible when it comes to pushing unhealthy products on the market causing the obesity epidemic and related diseases. Being part of the problem, the food industry should also be part of the solution. Through improving product composition (reformulation) and responsible labelling should the healthy choice become the easy choice. We have asked the Dutch food industry about the relative importance of different nutrition & health topics.

Objectives: To study the importance of different nutrition & health related topics according to the Dutch Food Industry

Method / Design: 51 Food companies filled out an online structured questionnaire. They were asked about the importance of the following topics: sustainability, innovation, consumer and nutrition & health. We will only report results for nutrition & health related questions.

Results: When ranking the nutrition & health related topics on importance, food companies indicated that reduction of E-numbers (clean label) was most important (88%), followed by general health (79%) and salt reduction (71%) Carrying a health logo was least important (27%) as well as carrying health & nutrition claims (28% and 31%, respectively).

How to monitor progress in government-stimulated reformulation (less salt, saturated fat, sugar) was another topic: 69% preferred monitoring of the nutrition panel on food labels (Global Food Monitoring protocol), against 31% preferring self-supplying own data to the Dutch monitoring database.

Conclusions: Improvement of product composition was regarded by the food companies as more important than carrying claims or health logo's. Nutrition labelling was preferred by the majority as tool for monitoring reformulation. It must be noted that the "clean label" trend is mostly based on consumer fear than the urge to make products healthier.

Keywords: (maximum 5): foodindustry, nutrition labelling, reformulation, cleanlabel

149/211. High-pressure homogenization and lecithin addition with respect to quality of milk

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Introduction: The aim of homogenization is to limit the layer of fat in products during storage, and when carried out under high-pressure, this provides an option for thermal preservation methods. Due to the fact that the process affects milk components, another option may be separate homogenization of cream, as well as enrichment of dairy products with a lecithin emulsifier.

Objectives: The aim of the research was to determine the effect of high-pressure homogenization, conducted collectively and separately

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and the addition of lecithin on the stability of emulsion and the colloidal phase of milk.

Method / Design: Evaluation of the stability of the emulsion phase of milk was conducted based on characterization of size of fat globules and creaming. Evaluation of the stability of the colloidal phase of milk involved the determination of the heat and enzymatic coagulation time of milk.

Results: An increased fat dispersion in milk was demonstrated resulting from collected homogenization and, to a lesser degree, from separate homogenization. The use of lecithin contributed to a further reduction in the diameter of fat globules. This was reflected in reduced creaming. High-pressure homogenization was associated with reduced heat and rennet coagulation time. Prolongation of its resulting from the addition of lecithin was more apparent in milk that was homogenized using the separate rather than collective homogenization.

Conclusions: The use of separate homogenization makes it possible to limit the process to cream only, and when using lecithin as an emulsifier, it allows for achieving stability factors for the emulsion and colloidal phase. In the strive towards meeting consumers' expectations, and with increasing consciousness, it is necessary to improve food processing methods. The above-mentioned findings may be used in the technology of various dairy products, where homogenization is a necessary step due to product quality during storage.

Keywords: (maximum 5): milk, high-pressure homogenisation, lecithin

149/217. Objective understanding of front-of-pack nutrition labels in nutritionally at-risk individuals

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Introduction: In the ongoing debate about front-of-pack (FOP) nutrition labels, there is little data on how nutritionally at-risk populations understand these labels although they are important target in prevention programs.

Objectives: In this study, we aimed at comparing the impact of FOP nutrition labels on the ability of ranking products according to their nutritional quality in different subgroups potentially at risk to have a diet of lower quality.

Method / Design: An objective measure of nutrition labels' understanding was performed in 14,230 participants from the NutriNet-Santé study. We tested four label formats: Guidelines Daily Amount (GDA), Multiple Traffic Lights (MTL), 5-Color Nutrition Label (5-CNL), Green Tick (Tick) and included a reference situation without label. Participants were asked to rank three products of the same food family, according to their nutritional quality. Mixed models for correlated data were used to assess how individual characteristics and FOP label formats are associated with the ability of ranking products.

Results: Older participants and those with lower education level, income, nutritional knowledge and frequency of reading nutrition facts were less performing at ranking foodstuffs according to their nutritional quality. Compared with individual characteristics, nutrition labels had more impact on the foodstuff ranking ability. Overall, 5-CNL outperformed, followed by MTL, GDA and Tick ($p<0.0001$) with similar trends in all targeted subgroups. The strongest impact of the 5-CNL compared with the no label situation was observed in individuals with no nutritional knowledge (OR=20.24 (95%CI: 13.19-31.06)).

Conclusions: A 5 color-coded and graded summary nutrition label, such as the 5-CNL appears to be efficient to enlighten consumers, including those nutritionally at-risk, about nutritional quality of foodstuffs. Thus, it holds promise in public health strategy aiming at promoting healthier food choices.

Keywords: (maximum 5): Food labeling, Front-Of-Pack nutrition label, Objective understanding, Population at risk

149/219. Impact of different front-of-pack nutrition labels on consumer purchasing intentions: results of a randomized controlled trial

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Introduction: Despite growing evidence supporting the ability of Front-Of-Pack (FOP) nutrition labels to enable consumer evaluation of products healthiness, research on food choices is scarce.

Objectives: We aimed to compare the impact of four FOP nutrition labels on consumers' purchasing intentions.

Method / Design: We performed a 5-arm randomized controlled trial in 11,981 participants from the NutriNet-Santé study. Purchasing intentions were evaluated via a virtual web-based supermarket between Dec 14, 2014 and March 14, 2015. Participants were eligible if they were involved in grocery shopping in their household. Participants were randomly assigned, using a central computer system, to be exposed to one of the labels: Guideline Daily Amounts (GDA), Multiple Traffic Lights (MTL), 5-Color Nutrition Label (5-CNL), Green Tick (Tick) or to receive no intervention (control). Randomisation was stratified by sociodemographic characteristics to allow comparable purchasing habits across groups. The primary outcome was the nutritional quality of the shopping cart, estimated by the Food Standard Agency (FSA) nutrient profiling system. Secondary outcomes included energy and nutrients content of the shopping cart. This trial is registered with ClinicalTrials.gov (NCT02385838).

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Results: The 5-CNL label on foodstuffs allowed a higher overall nutritional quality of the shopping cart (FSA mean score: 8.72±2.75) followed by MTL (8.97±2.68) and Tick (8.99±2.71) compared with the control (9.34±2.57) ($p<0.0001$). The 5-CNL was the only format which led to lower content of lipids, saturated fatty acids and sodium in the shopping cart compared with control (all $p<0.014$). Finally, the impact of FOP labels was similar across subgroups based on sex, age, educational level, income, body mass index and perceived nutrition knowledge.

Conclusions: Our results highlighted that the 5-CNL, a color-coded and graded label indicating overall nutritional quality is efficient to promote healthier food choices in all groups of individuals including those at higher nutritional risk.

Keywords: (maximum 5): Food labeling, Front-Of-Pack nutrition label, Choice Behavior, Randomized controlled trial

149/222. Analyzing everyday eating practices – Social and ecological impact of daily routines in eating out practices

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Introduction: This study investigates everyday routines and how the structure of daily life influences the way consumers use food offers while away from home. This is done due to the fact that the field of nutrition is one of the most relevant action fields for a future sustainable transition (Brunner, 2007).

Objectives: In parallel, the number of meals eaten away from home is constantly rising. Thus, the idea of understanding the way consumers make their decisions on eating out is vital for finding ways to support more sustainable choices. As suggested by the theory of social practices, everyday routines are neither only influenced by social norms nor only driven on individual, rational considerations. Instead, everyday doings and sayings are influenced by a multitude of factors.

This explorative study focused on finding out about the connection between daily routines and eating out.

Method / Design: Data was collected via problem-centered interviews. 10 people from varying age groups and household types were interviewed twice in 45 minute sessions. During the two weeks between both interviews, interviewees were called every three days and asked about their past acts of eating out. This gave insight into the interviewees' actual behavior as opposed to their self-perception.

Results: First findings indicate that mobility and accessibility are main drivers for food consumption away from home, which also influences the ecological footprint of food choices. Eating out choices are mainly made when already on the road. Such arrangements are purposely used to minimize ways and efficiently use open time slots between appointments.

Conclusions: Food consumption away from home is thus strongly linked to 'busy' lifestyles. Singles of all age groups are especially responsive to food offerings underway. Interestingly, costs and personal health concerns seem to have only little influence on consumption decisions.

Keywords: (maximum 5): Eating out, social practice, food consumption, consumer behavior

149/225. Dietary exposure of heavy metals, minerals and trace elements through fruits consumed by urban population

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Introduction: The essential micronutrients need to be consumed in adequate amount to maintain normal physiological functions while exposure to heavy metals has been associated with toxic and adverse health effects. All micronutrients may also be toxic when taken in excessive amount.

Objectives: To estimate the dietary exposure of heavy metals, minerals and trace elements through fruits commonly consumed by Dhaka city residents.

Method / Design: Three hundred and eighty fruit samples were collected and composited into 19 samples to determine element contents. The elements were analyzed by inductively coupled plasma mass spectrometry (ICP-MS) and atomic absorption spectrometry (AAS) after microwave digestion. A total of sixteen elements– Pb, Cr, Cd, Hg, As, Sb, Ca, Na, K, Mg, Fe, Zn, Cu, Co, Mn and Ni were estimated.

Results: The ranges of Pb, Cr, Cd, Hg, As and Sb in fruits were 9.77-789.3μg/100g, 3.64-97.23μg/100g, 0.20-27.55 μg/100g, 0.12-13.13 μg/100g, 0.10-1.69μg/100g and 0.12-0.29μg/100g respectively.The average concentrations of elements in fruits fall within the safe limit established by regulatory organizations except for Pb (112.8μg/100g), Zn (7969 μg/100g) and Mg (150.4μg/100g) which exceeded the safe limits. Pineaple (789.3 μg/100g), water melon (97.23μg/100g), lukluki (27.55 μg/100g) and aonla (13.13μg/100g) were mostly contaminated with Pb, Cr, Cd and Hg respectively. The daily intake of elements were determined using fruit consumption data and concentrations of elements in fruits, and compared with provisional maximum tolerable daily intake. The daily intake of Cd (1.9μg), Hg (0.75μg), As (1.8μg) and other elements through fruits were below the risk level except for Pb (56.9μg), Cr (11.6μg), Zn (4.1 mg) and Mg (17.1 mg).

Conclusions: Our findings indicate that the residents of Dhaka city are at high risk from Pb, Cr, Zn and Mg contamination. Poten-

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tial health risks from exposure to heavy metals in fruits need more attention.

Keywords: (maximum 5): Dietary exposure, Heavy metals, ICP-MS, Toxic health effects

149/227. Jackfruit seed flour: a potential adjunct for preparing sustainable food for future

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Introduction: Supply of nutritionally balanced food is of fundamental importance. More than 800-million people in the world today are under-nourished. Proteins in particular are of primary concern in this context. There is a loss of about 3-million young lives a year in South-Asia, East and West-Africa because of malnutrition. The seeds of Jackfruit, an agro-waste, can combat this malnutrition with its high protein, carbohydrate and phytonutrients. Utilization of such agro-waste as the source of low-cost proteins to supplement human diets in food formulation would be worth exploring.

Objectives: Seeds are seasonal and cannot be stored for a longer period because of its high moisture level. They are subjected to drying operation to achieve a shelf-stable useable form. Characterization of seed proteins when subjected to heat treatment needs to be focused more on nutritional ground.

Method / Design: Nutritional evaluation of the heat treated flours was done with respect to Essential-Amino-Acids (E) to total amino acids (TEAA). The in vitro digestibility of protein isolate using sequential pepsin and trypsin digestion have been studied. Blending trials for the supplementation of wheat flour in making bread and cookie were tried starting from 10% upto a level of 50%, with sensory, instrumental and nutritional evaluation.

Results: TEAA in seed flour goes on diminishing upon heat treatment whereas sulphur-amino-acids remained unchanged. The protein band of 195-127 KD released immediately during enzyme digestion, became fade with time on SDS-PAGE. Protein enrichment could be achieved with a blend (15%) upto 12.24% comparing the control (11.06%) bread, where as 37% (w/w) blend is satisfactory in developing cookies with protein 5.04 %.

Conclusions: Jackfruit seed protein is a good source of digestible protein with essential amino acids, for the development of staple and sustainable food products which could address malnutrition problems.

Keywords: (maximum 5): Jackfruit seed protein , supplementation, in-vitro digestibility, blened cookie, food formulation

149/228. Video lesson for cooks as education strategy nutritional distance within the Bahia-Brazil

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Introduction: Introduction: The cook who prepares food at school and serves students is called "Merendeira". She has crucial importance, because during the period when the child is in public school, all the food she will receive will be produced by her. For the cooks produce good nutritional quality, they need to know the food groups, the nutritional needs of each age group and the proper techniques to prepare. Thus, the training should be performed frequently to enable them, however, when the school is located in regions far from urban centers, in areas of difficult access, alternatives that enable these capabilities need to be implemented.

Objectives: Objective: In order to provide training for school cooks to hard to reach areas in cities in the interior of Bahia-Brazil, one video lesson was created addressing aspects of nutritional education.

Method / Design: Method: The video lecture was recorded in a studio and lasted 18 minutes, with the theme: "The importance of school feeding and the role of the Merendeira." Each school received the video lesson and at the end of the presentation cooks answered a questionnaire about the topics discussed, the media used and issues of personal impressions of the material.

Results: Results: 210 cooks watched video lesson and 98% got all the technical issues of the subjects covered. 91% considered that healthy eating at school resonate positive effects on children's health; 100% wrote that the video class was a great way to "learn more about healthy food", 98% suggested other themes to be worked using video lessons.

Conclusions: Conclusion: The use of video lesson had a great acceptance and was an effective strategy to educate the cooks distance of places of difficult access in Bahia-Brazil.

Keywords: (maximum 5): Keywords: Cooks. Health. Food. Children. Education.

149/237. Compensatory beliefs and eating styles of consumers of meal-replacement products

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Introduction: Meal-replacement products (MRP) are widely used for weight management purposes. However, there is little scientific research on the eating motives and beliefs relating to MRP consumption. MRPs are marketed as beneficial for weight reduction and control. It is plausible to assume that people who want to diet or who have a tendency to overeat are more likely to consume MRPs. Moreover, the latter category may assume that MRPs may compensate for overeating.

Objectives: The present study takes a new look at MRP consumers. Dietary restraint, the overeating tendencies of emotional and external eating as well as compensatory beliefs were assessed among MRP consumers and non-MRP consumers.

Method / Design: The study is based on an online survey of 455 women (218 MRP consumers and 237 non-MRP consumers) conducted in Switzerland. Participants answered questions relating to their eating styles (restrained, emotional and external eating) and their compensatory beliefs in relation to MRP consumption (e.g. 'If I consume a meal replacement product now, I can eat a calorie-dense snack later').

Results: The results showed that MRP consumers were more likely to be restraint or emotional eaters and tended to overeat. Moreover, compensatory beliefs were much more pronounced in MRP consumer than in non-consumers. Additionally, MRP consumers reported a higher cross-behaviour regulation relating to overall dietary control and physical activity.

Conclusions: MRPs seem to be seen as a means to compensate for eating high-energy and palatable foods. These products may help restrained eaters to maintain their dietary goals by replacing potentially tempting meals that may activate eating enjoyment and inhibit their dietary goals.

Keywords: (maximum 5): Meal replacement, emotional eating, dietary restraint, overeating, compensatory beliefs

149/243. Training for use tilapia (Oreochromis niloticus) fillets in school meals

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Introduction: The Brazilian school feeding program, called "Merenda Escolar", is the oldest and largest school meal program in the world, with universal coverage and generous in offering meals during the stay of students in public schools. In 2014 were attended on average 43 million students. With such a high volume of production, it is important to reflect on sustainability in the production of these foods and their impact on local society. The more place for the purchase of food, tends to be more sustainable production and improved income distribution.

Objectives: The study aimed to empower multipliers of school feeding Santo Antônio de Jesus - BA, Brazil to make the cut in Tilapia (Oreochromis niloticus) fillet produced in the region for use in school meals, replacing fillet Hake "Merluza" (Merluccius hubbsi) imported from Argentina and currently used.

Method / Design: The team met in Dietetics Technical Laboratory of the University Federal of Recôncavo da Bahia and attended a theoretical training followed by practice. In the theoretical part, was discussed about the importance of school feeding and its impact on the environment. In the practice, each participant received 5 units of Tilapia and proceeded to cut into fillets extracting all the thorns. As school feeding is intended for most children, the thorns need to be completely eliminated.

Results: All participants understood the importance of creating sustainable alternatives for the production of food in school meals.All participants were able to cut the fish fillets properly and no thorns was found, with the possible use of Tilapia produced in the region, making it unnecessary to import "Merluza" fillet.

Conclusions: The training concluded that the use of Tilapia fillet produced locally is possible, produced more sustainably and distribute the income in the region, promoting greater local development.These data can be used throughout the national network.

Keywords: (maximum 5): Fish. Students.Sustainability.

149/283. Perception of the quality of poultry meat vs. consumer choices

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Introduction: Due to high nutritional and dietetic values, beneficial functional properties and low price, poultry meat is characterized by a high demand on the Polish and global market. In turn, increasing supply and consumption of this type of meat enforces producers to provide meat of increasing quality that would correspond to the growing requirements of consumers.

Objectives: The objective of this study was consumer assessment of the quality of poultry meat offered on the Polish market and determination of correlations between socio-economical factors of respondents and their preferences and quality evaluation of the purchased meat.

Method / Design: The consumer assessment of poultry meat and preferences of its consumption was determined with a questionnaire method in a group of 150 respondents. A direct questionnaire and photos presenting meat defects were used in the study.

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Results: The quality of poultry meat was assessed by most of consumers as good. The most frequent meat defects perceived by consumers were: slimy surface, improper odor, as well as bruises and bloody spots. Over 90% of the respondents preferred meat with uniform light-pink color. Over 50% of the respondents declared that if the meat they purchased had a small bloody spot they would cut off the faulty part of meat, whereas in the case of occurrence of large bloody spots in meat, they would exchange it.

Conclusions: There is a need for the improvement of the general appearance of poultry meat by reduction of bruises and bloody spots occurrence and for obtaining uniform light-pink color on the entire surface of meat. Preferences and attitudes of respondents regarding meat with bloody spots were significantly influenced by: sex, educational status of the respondents and by average monthly income in their household.

Keywords: (maximum 5): poultry meat, quality, consumer preferences and choices

149/284. Total phenolic compounds in some kinds of commercially available teas and their changes during storage

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Introduction: Phenolic compounds are widely distributed in foods of plant origin and are regarded as effective antioxidants. Their antioxidant effect has been studied in relation to the prevention of coronary diseases and cancer, as well as age-related degenerative brain disorders. Tea is one of the most consumed beverages in the world and is considered to be important source of polyphenols. Since tea leaves are processed differently to produce black, green, red and white teas, it is of interest to know which tea could potentially be more beneficial in terms of antioxidant activity.

Objectives: The objective of this study was to determine total phenolic compounds in some kinds of commercially available teas as well as their changes caused by storage (12 months) at room temperature.

Method / Design: Total phenolics was determined spectrophotometrically using Folin-Ciocalteau method. Extraction of phenolic compounds from dry leaves was performed using 96% ethanol while hot tea infusions were prepared by adding 100 ml of boiling distilled water to 0.5 g of loose tea leaves.

Results: Total polyphenols ranged from 0.78% to 24.90% in dry leaves and from 28.05 to 143.75 mg/100 g in tea infusions. The highest content of these compounds was found in all kinds of green tea in both dry leaves and infusions and the lowest in red tea. 12 months storage of tea caused a significant ($p=0.05$) decrease in phenolic content. The highest decrease (60% of the initial amount) in these components was observed for all types of green tea.

Conclusions: Green tea was a richer source of phenolics than were black, red and white tea. Storage process causes a decrease in the content of polyphenols in all teas.

Keywords: (maximum 5): PHENOLICS, TEA, STORAGE

149/288. Preferences of young consumers regarding table spreads

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Introduction: On the market of fat spreads, a consumer has to choose between butter, margarine and fat mix. Large assortment of these products allows consumers to purchase a preferred product and simultaneously enforces them to extend their knowledge concerning the quality, nutritional prophylaxis and safety of food.

Objectives: The aim of this study was to determine preferences of young consumers regarding purchase criteria and intake of table spreads, evaluation of the significance of declared attributes of their quality and to determine correlations between socio-economical factors of respondents and their preferences as well as quality attributes of food products.

Method / Design: The survey was carried out among 150 respondents with a questionnaire method, whereas correlations were determined with the use of statistical analysis.

Results: It was demonstrated that 90% of the respondents were consuming fat spreads and 50% of them declared everyday consumption of these products. The most frequently (70%) selected table spread, acknowledged as the most healthy one, was butter, whereas the choice of margarine was declared by 20% of the respondents. The most important quality attributes were fat content and flavor for ca. 40% and 27% of the respondents, respectively. Approx. 60% of the respondents seemed to purchase butter, but after careful checking the chemical composition provided on product's package it turned out it was a fat mix. A significant factor which affected respondents' preferences regarding butter consumption was their sex, whereas preferences at purchase were mainly determined by the number of persons in a household.

Conclusions: Diversified hierarchy of choice and expectations of respondents regarding table spreads points to the necessity of continuing investigations on the adaptation of the market of fat products to the needs and preferences of consumers in the aspect of public health.

Keywords: (maximum 5): table spreads, consumers, preferences, quality

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149/290. Benefits of corn snacks enrichment in amaranth, pumpkin or Jerusalem artichoke flour

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Introduction: Amaranth, called the twenty-first century grain, pumpkin and Jerusalem artichoke characterized by high nutritional and health values.

Objectives: To determine the effect of the addition of amaranth, pumpkin or Jerusalem artichoke tissue flours on the content of polyphenols, carotenoids and antioxidant capacity of extruded corn snacks.

Method / Design: In corn snacks received in the high-temperature extrusion process, with 10% addition of organic amaranth, pumpkin or Jerusalem artichoke tissue flours, in the above flours and snacks without additives (reference sample) carotenoid content (HPLC method), polyphenolic content (spectrophotometric and HPLC method) and antioxidant capacity (DPPH, ABTS and FRAP methods) were determined.

Results: Jerusalem artichoke flour and snacks with its addition were characterized by the highest content of polyphenols, in which the dominant compound was chlorogenic acid hexoside. The lowest amount of polyphenols was determined in amaranth flour. The dominant phenolic compound in this sample was luteolin C-hexoside-C-pentoside. Flour addition to snacks recipe, increased polyphenol content in all variants or carotenoids in corn snacks with pumpkin flour. The highest antioxidant capacity was determined in pumpkin flour and snacks with pumpkin, what was associated with a high content of carotenoids in raw material.

Conclusions: Intake of 100 g of corn snacks with 10% of amaranth, pumpkin or Jerusalem artichoke flour can provide about 0.5-1.0 gram of dietary polyphenols, ie, the daily intake of these compounds present in Poland.

This study was prepared under the project EUREKA No. E! 6855. ECORAW/2012-2013.

Keywords: (maximum 5): Corn snacks; Enrichment; Amaranth; Pumpkin; Jerusalem artichoke.

149/293. Fatty acid composition of fried, steam and microwave oven cooked barramundi (Lates calcarifer)

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Introduction: In human nutrition fish is a source of valuable polyunsaturated fatty acids, which beneficially affect human health. However, the way fish is prepared before consumption, influences not only its sensory properties but also the chemical composition. The most commonly, fish is fried, but other ways of thermal treatment, such as cooking in microwave oven or steam cooking, are also used.

Objectives: The aim of the study was to assess the effect of thermal treatment method on fatty acid composition of fish.

Method / Design: The material for the study constituted barramundi (Lates calcarifer) from a polish aquaculture. The fish was subjected to steam, microwave cooking or frying on a pan using rape-seed oil. To determine fatty acid composition, lipids were cold extracted, methylated and separated using gas chromatograph. Fatty acids were expressed as % of total determined.

Results: Thermal treatment method significantly affected saturated (SFA), monounsaturated (MUFA), polyunsaturated (PUFA), n-3 and n-6 fatty acids content and n-3/n-6 ratio ($p < 0.05$). The highest SFA (53% of total fatty acids) and the lowest n-3 (1.3%) and n-6 (0.5%) contents were noted in microwave cooked fish compared with other treatments. The highest MUFA (51%) content was noted in fried barramundi. Steam cooked and fried fish had higher PUFA (26.4% and 27.0%, respectively) content than microwave cooked samples (5.8%). In steam cooked samples the highest n-3 (17.7%) and n-6 (2.0%) contents were noted. The highest n-3/n-6 ratio was noted in fried (14.6), followed by steam cooked (8.9) and microwave cooked (2.3) barramundi.

Conclusions: Fatty acid composition of cooked fish depends on the method of thermal treatment. The most favourable fatty acid composition had steam cooked fish, whereas the least favourable microwave cooked samples.

Keywords: (maximum 5): fish, fatty acids, cooking, microwave

149/295. Monitoring food reformulation in the Netherlands: Sodium, saturated fat and sugar levels of foods in 2011 and 2014

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lands; (4) 1Centre for Nutrition, Prevention and Health Services, National Institute for Public Health and the Environment (RIVM). Bilthoven. The Netherlands.

Introduction: Since the early 2000s, food sectors in the Netherlands are working on improvement of food composition. The Dutch government encourages these activities, based on voluntary pledges. In January 2014, the minister of Health and representatives of the food industry, hospitality, and catering sector agreed to gradually lower the levels of salt, (saturated) fat, and calories (from sugar and fat) in foods up to 2020. RIVM monitors the (changes in) food composition. In 2012 we performed a monitor on salt and saturated fat, and in 2014 the monitor was extended with sugars.

Objectives: To monitor salt (sodium), saturated fat, and sugars (mono- and disaccharides) levels in processed foods on the Dutch market between 2011 and 2014, for foods contributing more than 3% to respective daily intakes.

Method / Design: Food composition data supplied by manufacturers and food sectors on a voluntary basis were combined with data obtained from independent monitoring by the Netherlands Food and Consumer Product Safety Authority until July 1st, 2014. This dataset was compared with data from the Dutch Food Composition Database (NEVO) version 2011.

Results: The salt level of bread was 21% lower in 2014 compared to 2011 ($p<0.05$). The salt level of cheese was approximately 11% lower, although not statistically significant. In meat cold cuts, the salt level in the 2014 and 2011 data was similar. The salt level of vegetables and pulses in glass and tins was significantly lower in 2014 compared with 2011. For saturated fat and sugar, we observed no major changes in food compositions.

Conclusions: In some food categories such as bread and vegetables/pulses in glass and tins lower salt levels were observed, whereas for saturated fat and sugar this was not (yet) the case. Based on current consumption patterns, a lower daily salt intake can be expected.

Keywords: (maximum 5): sodium, sugars, saturated fatty acids, food reformulation, food composition

149/296. Hens' feed fortified with pectin, xanthan gum, and guar gum to reduce cholesterol in muscle and yolk

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Introduction: Soluble fiber can accelerate the metabolism of cholesterol. Pectin and gum has been used in the form of substance additive for material stabilizer and emulsifier. Pectin supplementation in laying hens can decimate the cholesterol content in egg yolk and muscle.

Objectives: Therefore, this laying hens' feed is regular feed chickens enriched with soluble fiber (Pectin, Xanthan gum, and Guar gum) to produce eggs and muscle with lower cholesterol than usual.

Method / Design: The ingredients are mixed in the ratio of concentrate 45%, corn flour 25%, soybean meal 20%, and extract of soluble fiber 10%. Once all the ingredients are mixed and then evaporated with temperature <80 °C. Then put in the grinding machine resulting in a circular shape with holes 2-3 mm in diameter, after it dried up the water content in the feed is less than 14%.

Results: Eggs from laying hen with soluble fiber fortification feed intake will have lower cholesterol levels in eggs than regular feed. So even with the cholesterol content in the muscle, it is because chicken feed fortified with soluble fiber will accelerate the metabolism of cholesterol and cause cholesterol deposits in the chicken less.

Conclusions: The use of this kind of laying hens feed is produce eggs with high protein content can be consumed more for people who have hypercholesterolemia.

Keywords: (maximum 5): pectin, Xanthan gum, Guar gum, laying hen, Cholesterol, Yolk

149/298. Content of bioactive compounds in cereal products

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Introduction: There are many ways to create a healthy eating pattern, but they all start with the three food groups: grains, fruits and vegetables. Cereals are main food consumed in the world. Consumption of wholegrain cereal foods are associated with a lower risk of common diseases such as obesity, type 2 diabetes, cardiovascular disease, cancer. Healthy properties of grains resulting from bioactive compounds presence.

Objectives: The aim of the study was to determine the content of selected bioactive components (dietary fiber, zinc, phenolic compounds) in flakes and bran (rye, wheat, oats) as well as wheat and rye germ.

Method / Design: The content of dry matter was determined by PN-ISO 712/2002 method, dietary fiber by AOAC 991.43. method, zinc by AAS method according to PN: EN14084: 2004 and phenolic compounds by Poly-Swain and Hillis method.

Results: The dry matter content ranged from 87.4 to 93.3 g 100 g-1. The total dietary fiber content in the tested products were significantly different. The highest content of this components were determined in wheat (42.8 g 100 g-1) and rye bran (24.3 g 100 g-1). Significantly less fiber was found in other products. Wheat germ contained the lowest amount of fiber (9.6 g 100 g-1). Among the examined products the most richest source of zinc were germ, meanwhile flakes contained the smallest amount of this element. In rye germ 16.33 mg of zinc was determined. Wheat germ were characterized by the highest level of phenolic compounds (216.8 mg / 100 g-1). The significantly lower

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amount of this compounds was determined in oat bran (41.5 mg 100 g-1) and oat flakes (37.8 mg100 g-1).

Conclusions: 1. The study showed that the cereal products such flakes, bran and germ contained considerable amount of fiber, zinc and phenolic compounds.

2. The richest source of bioactive components were germ.

Keywords: (maximum 5): dietery fiber, polyphenols, cereals

149/302. Assessment of dietary cadmium intake by vegetarian

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Introduction: Cadmium is one of the most often occurring contaminants in food. Dietary intake of cadmium depends not only on the amount of this element in products, but also on the degree of its absorption. Some of diet's components can perform a protective role against the harmful effects of heavy metal. Although vegetarian diets are typically defined by the exclusion of animal foods, a good-balanced vegetarian diet is one in which a variety and abundance of plant foods are emphasized. On the other hand pplants and plant products are particularly exposed to contaminants such cadmium and pesticides.

Objectives: The aim of this study was to assess the dietary intake of cadmium by vegetarian.

Method / Design: The study was carried out in two stages. The first one was the survey study (Eeating habits questionnaire, 24-hours recall) conducted in group of 100 vegetarians. In addition, the respondents were asked to indicate the places/stores of foods purchasing. In the second stage products which may be the source of cadmium were selected and bought. The cadmium content was determined by atomic absorption spectrometry validated method, and obtained results were compared with amounts defined in Commission Regulation (EU) No 488/2014 as well as Provisional tolerable weekly intake (PTWI).

Results: The most frequently consumed plant products were potatoes (57 % of respondents). The Respondents daily eat 0,19 kg of potatoes, slightly less wheat bread (0,16 kg), tomatoes (0,14 kg) and rye bread (0,12 kg). Cadmium content in products listed above depended of place where they were purchased. In any examined products the content of cadmium was not higher than acceptable amount. Cadmium intake calculated on the basis of survey data as well as results of AAS analysis not exceeded PTWI.

Conclusions: It was found that cadmium intake of vegetarian diet was not exceed PTWI.

Keywords: (maximum 5): cadmium, vegetarian diet, PTWI

149/305. Effectiveness of icheckTM device in the quantification of Beta-Carotene in yellow fleshed Cassava genotypes

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Introduction: Beta-carotene, the most potent and widespread form of pro-vitamin A is the predominant carotenoid in cassava (Manihot esculenta Crantz), breeding for enhanced beta carotene levels is important to combating vitamin A deficiency in sub saharan Africa. Biofortification uses the conventional breeding method to develop cassava genotypes with increased levels of pro vitamin A with a resultant positve impact on human nutrition and health security.

Objectives: To reduce the time taken to determine amount of carotenoids present in yellow fleshed cassava roots and cost without reduction in the quality of result.

Method / Design: The IITA cassava breeding unit has employed the use of iCheckTM device. This is a portable digital photometer for determining the carotenoid levels in cassava. 169 yellow fleshed cassava genotypes harvested from the genetic gain experiment maintained at two IITA research sites belonging to different agroecological Zones (AEZ), Ibadan and Ubiaja in Nigeria in 2013/2014 breeding season were used for this analysis. Samples for analysis for both iCheck and spectrophotometer were processed and taken from the same pile.

Results: Results showed strong correlation of above 80% between the iCheckTc and SpecTc. The iCheck device is cheaper and faster and more than 50 samples can be analyzed in a day.

Conclusions: Analysis using icheck device is timely, reduces cost and data are comparable with other methods. For effective and quick screening of large number of genotypes for carotenoids analysis iCheckTM device is more advisable especially when outside of the laboratory environments.

Keywords: (maximum 5): betacarotene; genetic gain, iCheckTM; spectrophotometer

149/308. Discriminating nutritional quality of foods using the 5-Color Nutrition Label in the French food market

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Introduction: The introduction of a nutritional label on the front-of-pack of foodstuffs is currently under consideration by health authorities in France. The 5-Color Nutrition Label (5-CNL) has been proposed for this label. It is based on the Food Standards Agency (FSA) nutrient profiling system and includes five different categories of nutritional quality (from 'Green' to 'Red').

Objectives: To assess the ability of the 5-CNL to discriminate nutritional quality of foodstuffs currently on the French market and its consistency with French recommendations, proposing adaptations whenever necessary.

Method / Design: Foods available in the French market from the web-based collaborative project Open Food Facts were allocated to the 5-CNL according to their nutritional composition (N=7777). Foods were categorized according to a consumer's point of view, as arranged in supermarket shelves. Distribution of food groups in the 5-CNL categories were assessed against French Nutritional recommendations, and adaptations of the original score were considered in case of discrepancies. Discriminating performance of the 5-CNL was considered good if at least three color categories were present for each food group.

Results: Overall, the distribution of food groups in the 5-CNL categories were consistent with French recommendations: 95.4% of 'Fruits and vegetables' were classified as 'Green' or 'Yellow' whereas 86.0% of 'Sugary snacks' were classified as 'Pink' or 'Red'. Adaptations to the original FSA score computation model were proposed for dried fruits and nuts, beverages, added fats and cheese in order to be consistent with French official nutritional recommendations. For all food groups, at least 3 color categories were present.

Conclusions: The 5-CNL label allowed for a discrimination of the nutritional quality of foods across food groups and within a food group. Adaptations from the original model were necessary for four groups to maintain consistency with French recommendations and high performance of the system.

Keywords: (maximum 5): Nutrient profiling system; nutritional quality; nutritional label; discriminant performance.

149/323. Effect of sweet basil (Ocimum basilicum L.) leaves powder on properties and oxidative stability of catfish emulsion sausage during storage

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Introduction: Fish meats have been used as a raw material for emulsion sausage production, particularly in Asian countries. However, fish sausages prepared from freshwater fish meat can rapidly develop oxidative rancidity flavors during storage. To retard such a quality loss, antioxidants have been used to decrease lipid oxidation during storage of fish products. Nevertheless, little information about the use of natural antioxidants, especially sweet basil leaves in preventing the lipid oxidation and quality maintaining of fish sausages has been reported.

Objectives: This research was aimed to evaluate the effect of sweet basil leaves powder (SBP) on the qualities of emulsion sausages prepared from catfish meat during refrigerated storage.

Method / Design: Qualities of catfish (Clarias macrocephalus) emulsion sausages containing SBP (0.1-0.4%) during storage for 21 days were monitored by proximate compostion, color value, peroxide value (PV), thiobarbituric acid-reactive substances (TBARS) and sensory evaluation.

Results: Control sample had lower fiber content than samples added with SBP ($p<0.05$) at day 0 of storage. SBP samples (0.1-0.4%) had lower L* value but higher b* value, compared to the control samples ($p<0.05$). With the addition of SBP, PV and TBARS value in the sausages were retarded effectively, compared to control sample ($p<0.05$), especially when the SBP at high contents were used. Addition of SBP were also effective in retarding the formation of fishy odor in the samples, compared to control sample ($p<0.05$). SBP had no detrimental effect on the sensory attributes of sausages.

Conclusions: SBP was able to prevent lipid oxidation of emulsion sausages and to lower rancidity in dose-dependent manner. Addition of SBP had no detrimental effect on the organoleptic properties. Thus, SBP at least 0.1% can be used as an effective natural antioxidant in the fish emulsion sausages during refrigerated storage for 21 days.

Keywords: (maximum 5): Sweet basil leaves, fish sausage, catfish, oxidative stability

149/329. Acrylamide in bread - The study on the exposure risk

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Introduction: In 1994 International Agency for Research on Cancer (IARC) has classified acrylamide (AA) as an average dangerous substance, potentially carcinogen for humans. International studies have confirmed neurotoxic and carcinogenic effects of acrylamide. AA is formed by the reaction of asparagine and a reducing sugar in a temperature above 120- as part of the Maillard reaction. Acrylamide is present in all types of food that have been or will be subjected to heat treatment such as potato products, coffee and cereal products, in that, particular attention should be paid to the bread.

Objectives: The objective was an assessment of acrylamide in selected types of bread and the exposure estimation on the example of the Polish population.

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Method / Design: The study was conducted on different types of bread samples available in the local market. To determine the average consumption of bread in Poland, statistical data of Central Statistical Office about Houshold budget survey in 2012 were used. Acryamide content was determined by RP-HPLC-DAD.

Results: The study showed that acrylamide was present in all tested types of bread. The highest amount of acrylamide in the crumb was found for pumpernickel (835.89 µg/kg), the lowest in rye crisp bread (10.14 µg/kg). In the crust the highest average acrylamide was determined in wholemeal bread with OMEGA 3 fatty acids (217.18 µg/kg), the lowest in gluten-free butter bread (24.00 µg/kg).

Conclusions: The estimated exposure analysis showed that the statistical Pole takes about 1.5 – 127 µg acrylamide per day (depending on the type of bread consumed). When compared to the level of recommended limit of this compound in the human diet, only systematic pumpernickel intake can be dangerous and give rise to cancer. Consuming other types of bread does not pose a direct threat neurotoxic or carcinogenic activities.

Keywords: (maximum 5): ACRYLAMIDE, BREAD, MAILLARD REACTION, HPLC

149/330. The study on relations between the intensity of color and HMF content in toasted bread

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Introduction: For most Polish consumers bread remains a fundamental part of everyday diet. IT provides appropriate dose of energy and is a source of nutrients such as protein, fiber, minerals and biologically active compounds. During the bread production a series of chemical reactions between free carbonyl group of reducing sugars, and free amino group of amino acids, peptides or proteins, take place. During baking in specified conditions, potentially harmful to human health compounds, including HMF (hydroxymethylfurfural), can be formed.

Objectives: The objective of this study was to determine relations between the intensity of color expressed in CIEXYZ model, and HMF content in bread subjected to the toasting process.

Method / Design: The content of HMF was determined by RP-HPLC-DAD. Measurement of color intensity consisted on a mathematical determination of color components in the CIEXYZ model. The measurement was performed using a spectrophotometer MiniScan EZ.

Results: During toasting, a significant change in color of bread was observed. All the components of color (X, Y, Z) decreased during the various stages of toasting (with the duration of toasting). The study showed a statistically significant relationship between the level of toasting (toasting time) and the growth of HMF content in the analyzed bread. Moreover, a negative correlation between the change in the color component values in the model CIEXYZ and HMF content was shown.

Conclusions: Considering the obtained results, it can be concluded that the toasting time (level of browning) has a negative effect on health safety of bread consumers. The color of bread can be a simple indicator facilitating selection of food intake and having substantial impact on its safety.

Keywords: (maximum 5): HMF, COLOR, TOASTED BREAD, MAILLARD REACTION, HPLC

149/331. Effect of dry spices and herbs on the survival of S. aureus at different temperatures

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Introduction: Dried culinary herbs and spices (DCHS) are known to have inhibitory effects on microorganisms. Nevertheless, microbial quality testing revealed that DCHS also showed partially high contamination levels of up to 10^8 cfu/g. Among the detectable microorganisms are also pathogenic species, like Staphylococcus (S.) aureus, but until now it was rarely detected. While it is known that S. aureus survives a long time in dry environments, its survival in low moisture food with possible inhibitory effect, like DCHS, is currently unknown.

Objectives: This work intends to investigate the effect of DCHS on the survival of S. aureus at two different temperatures.

Method / Design: Therefore, three different DCHS matrices (black pepper, paprika, oregano) were chosen for the investigation of the survival of S. aureus over a time period of ten weeks. Using sand as carrier, fluid bacteria cultures were dried and then indirectly spiked to ground DCHS (~10^8 cfu/g final matrix) and stored either at room temperature (RT) or at 37°C. The experiment was conducted in triplicates. Microbial testing according to ISO 6888-1 was performed weekly.

Results: When stored at 37°C, the number of bacteria went below the detection limit (10 cfu/g) after three weeks in all three DCHS with paprika showing the strongest inhibitory effect, followed by oregano and pepper. At RT, survival of S. aureus in paprika was prolonged until eight weeks after spiking, whereas in pepper and oregano it was comparable to that of the pure sand control (detectable up to ten weeks).

Conclusions: In summary, S. aureus showed a generally rapid death kinetic and the survival at 37°C was markedly shortened in contrast to the storage at RT. Beside specific effects of the individual DCHS matrix, the inhibitory effect of DCHS on S. aureus seems to depend also on the storage temperature.

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Keywords: (maximum 5): Staphylococcus aureus, survival, temperature, food safety, spices and herbs

149/332. Nutritional changes of fermented amaranth biscuit and subsequent improved glycaemic index

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Introduction: Amaranth belongs to the gluten-free pseudocereals, which overall usage and popularity increases worldwide. Amaranth has high protein content, and the amino acid composition of amaranth is considered to be close to the optimum as suggested by WHO/FAO.

Objectives: The aim of our study was to develop fermented amaranth biscuit and compare biochemical properties as well as to measure glycaemic index of these new developed fermented product.

Method / Design: Amaranth biscuit was prepared according to our invented recipe. Fermentation took place in autoclaved amaranth substrate (10 g of amaranth flour + 100 ml of distilled water), which was inoculated by overnight culture of Lactobacillus plantarum. Fermentation process took for 24 hours at 37 °C in thermostat. Nutritional compositions of prepared biscuits were determined in non- and fermented amaranth biscuit.

Results: Fermentation by lactic acid bacteria caused a significantly reducing of proteins (from 9.23 to 5.63 %), lipids (from 14.01 % to 9.28 %) and reducing sugars. Increasing amount after fermentation was determined only in starch. Energy value dropped from 1347.08 kJ/100g in non-fermented to 1241.68 kJ/100g in fermented amaranth biscuit. The glycaemic index of prepared amaranth biscuits was 62, and after fermentation significantly decreased to 52.

Conclusions: Both amaranth biscuits (non-fermented and fermented) have an acceptable glycaemic index. However, amaranth biscuit prepared from fermented flour can be classified as a food with low glycaemic index (GI < 55). Therefore fermentation represents a novel approach in development of functional food with the properties that are recommended for prevention and treatment of obesity and diabetes.

Keywords: (maximum 5): amaranth, fermentation, nutritional properties, glycaemic index

149/333. Contribution of organic foods to the diet of French adults

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Introduction: In developed countries and in France in particular the demand for organic products continues to substantially increase each year (+10% in 2014 in France). However, only little information is available regarding the actual level of consumption of organic food and its relative share in the whole diet.

Objectives: Our aim was to provide, using individual consumption data, an overall and thorough description of organic food consumption in French adults.

Method / Design: Conventional and organic intakes were assessed using an organic food frequency questionnaire administered to 28,245 French adults participating in the NutriNet-Santé study.

Results: Less than 12% of the respondents reported never consuming organic food over the past year. Women consumed on average 20% of organic food in their whole diet per day while men consumed an average of 18%. The proportion of vegetables consumed that came from organic sources was 31% among women and 28% among men. The percentage of egg consumers with at least 50% of eggs from organic origin was 41.7%. Regarding individual foods, the most popular organic food was apple in terms of weight (g/d). Overall the contribution of organic food to products of plant origin was higher than the one to products of animal origin.

Conclusions: Our study provides a framework for the exploration of organic consumption and its correlates and can serve as a basis for future studies investigating relationships between the level of organic food consumption and health outcomes.

Keywords: (maximum 5): organic, organic consumption, dietary intakes, quantitative data

149/337. What works in the workplace? A systematic review of systematic reviews of diet interventions at work.

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Introduction: Systematic reviews have suggested that workplace setting interventions are potentially effective in promoting diet-related

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behaviour change in large numbers of people. However, most reviews have included interventions addressing multiple health behaviours, making it difficult to draw conclusions about effective diet-related strategies.

Objectives: This systematic review aimed to determine the effectiveness of dietary components in workplace interventions on diet behaviour, biological markers, workplace-related and study evaluation outcomes by examining previous systematic reviews, also assessing their quality.

Method / Design: The following scientific databases were systematically searched with predefined search criteria: Medline, EMBASE, CINAHL, Web of Science and Cochrane Library. Systematic reviews that clearly described the contribution of diet-related behaviour change techniques in a workplace setting to a change in outcome were included. Data were extracted by the primary reviewer and checked for accuracy by a second reviewer. AMSTAR criteria were used to assess the methodological quality of included systematic reviews.

Results: The search identified 1524 titles, of which 21 systematic reviews and 2 systematic reviews of reviews were included. Most systematic reviews were of moderate quality, and focused on dietary behaviour change outcomes and some health-related biomarkers. Few reported workplace-related and evaluation outcomes. Systematic reviews tended to conclude that workplace diet interventions could be effective in achieving dietary change. Potentially successful intervention components included environmental changes to the workplace (e.g. increased access to healthier options) and group education, as well as tailored, individual advice and feedback.

Conclusions: Evidence for the effectiveness of diet workplace interventions and particular intervention components is often not clearly presented, making it difficult to draw conclusions. Future interventions and reviews should (1) fully report process evaluation outcomes to elucidate successful intervention components and (2) measure work-related, including cost-effectiveness, outcomes, which will be important for broader implementation of such interventions.

Keywords: (maximum 5): systematic review, workplace, diet, healt

149/338. An evaluation of a free lunch initiative in a Northern Irish workplace.

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Introduction: The workplace has been identified as a potentially effective environment for interventions to promote diet and health in large numbers of people which ultimately may benefit the company as a whole. Initiatives at work allow factors related to healthy eating, such as knowledge and skills, as well as external factors, such as the availability of healthy food and support from others to make healthy choices, to be addressed.

Objectives: The aim of the Ulster Carpets study was to evaluate a change in eating environment in the workplace (the introduction of free, healthy lunches) on employees' overall health, diet and job satisfaction.

Method / Design: In this controlled pilot study, employees from worksite A (n 19) received, healthy, free lunches for six months whereas employees from the control worksite B (n 21) received no intervention. Quantitative baseline data was collected in September 2014 in the form of two 24h diet recalls, a health and lifestyle questionnaire and a health assessment. Semi-structured interviews were conducted with stakeholders and employees as part of qualitative data collection to allow the identification of barriers to and drivers of dietary change.

Results: Preliminary baseline results indicated that the employees' mean BMI falls into the overweight category (27.65 kg/m2, SD: 5.71) and employees have a diet high in saturated fat (13.2% of total energy /day, SD: 4.6) and consume less than five portions of fruit and vegetables per day (2.4 portions/day, SD: 1.8). Thematic analysis of the interviews revealed that it was important to employees that lunches would be seasonal (i.e. warm dishes in the winter), that an appropriate meal size would be provided and that a variety of food would be offered.

Conclusions: The workplace offers a setting in which to change diet behaviours by altering the eating environment, making healthy diet choices easier to access.

Keywords: (maximum 5): workplace, environment, diet

149/356. Perception of dairy products safety

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Introduction: Perception of dairy products safety has become a major issue of food industry concern, since consumers are more confident of wide variety of health hazards occurring in food.

Objectives: The aim of the study was to assess the differences in consumers perception of the effect of selected risk factors related to dairy products.

Method / Design: Internet surveys were conducted in 2015 among 206 respondents in northern regions of Poland. Respondents were asked to indicate their opinion about level of selected risk factors on five-points scale (where 1 meant that factor has no negative impact on health, while 5- characterized high negative impact on health).

Results: Among fourteen factors affecting perception of dairy products safety, respondents selected as the most important three, which were related to chemical contaminations (average 4.30 points), animals diseases such BSE (average 4.25 points) and environmental pollutions (average 4.19 points). On the other hand an addition of

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genetically modified ingredients (average 3.31 points), addition of preservatives (average 3.37 points) and addition of artificial colourings (average 3.36 points) were indicated by consumers as the least significant factors affecting perception of dairy products safety.

Statistically significant differences were observed in consumer perception of the effect of selected risk factors depending on the respondents gender. The highest ranges between female and male were observed in the opinions regarding the effect of animals diseases (0.64 points) and regarding the effect of storage conditions of raw material and product (0.54 points).

Conclusions: The research results showed that consumers are mainly afraid of chemical contaminations of dairy products. In their opinion artificial additives to dairy products are important, but less than factors mentioned before. Conducted study confirmed that women's perception of dairy products safety is higher than male respondents.

Keywords: (maximum 5): DAIRY, SAFETY, CONSUMER, PERCEPTION

149/357. Boredom test of an innovative product – creamy dessert with strawberry – apple jam with probiotics

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Introduction: Most consumer assessments are carried out once. Such results do not provide the information, what happens to the desirability of the product when it is evaluated (or consumed) repeatedly.

Objectives: The aim of the study was to investigate the changes in desirability of sensory attributes of a new product, which was the creamy dessert with strawberry - apple jam with probiotics.

Method / Design: This study was carried out in 2014 on a group of 5 persons in a period of 8 weeks, making 16 ratings of 10 sensory attributes. Ratings were made on 100 mm scales.

Results: The average hedonic ratings were at a similar level (from 91.9 to 71.8). Only two analyzed attributes were significantly different from the others, it was a taste of the cream with jam (61.6) and the color of the cream with jam (60.1). The taste of the cream with jam achieved the highest range of average scores in 8 weeks period (40.8). On the other hand the lowest difference between the highest average rating and the lowest was observed regarding the color of the cream (3.6).

Conclusions: The boredom test showed that the color of the cream was the highest-ranked, and the color of cream with jam and the taste of the cream with jam got the lowest marks. The taste of the cream with jam was an attribute with the largest change in the desirability assessment in time.

Keywords: (maximum 5): BOREDOM, TEST, INNOVATION, DAIRY

149/358. Plant protein intake and dietary diversity are independently and additively associated with dietary quality

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Introduction: The source of protein in diets (plant vs animal) is central to their eco-environmental sustainability. Plant protein intake, which is favorably associated with the intake of many nutrients, has been shown to be a strong, robust marker of a healthy diet. However, it remains unclear if this association could also be explained by a higher dietary diversity, which usually favors nutrient adequacy. It is unknown if the intake of plant protein vs animal protein could relate to dietary diversity.

Objectives: Our main objective was to determine if the relation between plant protein intake and nutritional adequacy could be explained, at least in part, by the association with dietary diversity.

Method / Design: We used data from 1330 adults participating in the French Nutrition and Health Survey (ENNS, 2006-2007). We evaluated the plant and animal protein sources and intakes. Using global, integrative approaches, we assessed nutrient adequacy (using the probabilistic PANDiet scoring system) and dietary diversity (using a 100-point score that account for the number of consumed subgroups in each food group).We used linear multivariate modelling with adjustment for potential confounders.

Results: As expected, plant, but not animal, protein intakes were significantly associated with the PANDiet score. We found a positive association between dietary diversity and nutrient adequacy, and between dietary diversity and plant protein intakes, but not total of animal protein. In a full model adjusted for potential confounders (total energy, energy density, sex, income, occupational status, educational level, region and smoking status), nutrient adequacy was positively associated with dietary diversity ($\beta = 0.13$) and plant ($\beta = 0.27$) and animal ($\beta = 0.05$) protein intakes.

Conclusions: Plant protein intake is associated with nutrient adequacy of the diet independent of the relative dietary diversity of French adults.

Keywords: (maximum 5): Plant protein, diet quality, dietary diversity.

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149/359. Risk perception of genetically modified food

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Introduction: Genetically modified food is affected by economic, health, and social factors. Behavior in relation to GMO are inextricably linked to socio-demographic characteristics and consumers' knowledge.

Objectives: The aim of the study is to examine the consumption of genetically modified food and the perception of risk of consuming such foods among people with knowledge on the subject and those who haven't got any knowledge.

Method / Design: The face-to-face surveys were conducted in 2014 among 50 respondents, who have knowledge about the effects of GMO on health and 50 laymen in this field.

Results: More respondents with knowledge about GMO eat such a food (76%), while the majority of those without such knowledge (68%) do not know if it eat this kind of food, because they can not identify. Genetically modified food is not very accepted among respondents who do not have knowledge about GMO.

Negative opinion included: GMO can cause cancer (74% of responses), allergies (70%), is a threat to health (82%). Consumption of such foods is risky because the effects are not known for a long time of consuming (84%).

Consumers with knowledge about GMO have less worries for the consumption of genetically modified food. Fear related mainly to: cancer (32% of responses), allergies (22%) and the lack of documented effects of GMO on health (80%).

Conclusions: Low consumer awareness and high risk perception of consumption genetically modified food may result in nutritional neophobia. In the future, a market more than science, will determine the direction for new technologies and use GMO in the food production.

Keywords: (maximum 5): GENETICALLY MODIFIED FOOD, RISK PERCEPTION

149/362. Differences in functional foods perception

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Introduction: An important element of the functional foods development is consumer research based on the factors that determine the behavior regarding such foods.

Objectives: The aim of the study was to determine the types of functional foods most frequently consumed and consumer opinions about the impact of such foods on health depending on socio-demographic features.

Method / Design: The face-to-face surveys were conducted in 2013 among 100 respondents, who were chosen using random selection.

Results: The most commonly consumed types of functional foods by respondents were: low energy products, energizing and probiotics products. The least popular were low sodium and low cholesterol products. Is relationship between the choice of the type consumed functional foods and age, education and social status. There is no effect of gender on the consumer choice.

Functional foods health aspects were the most important to women, aged between 26-35 years, with higher education. A significant proportion of respondents aged over 55 years, with primary education and pensioners, stated that the functional foods has a small impact on health or has no effect. Analysis confirmed only the impact of gender on the opinions regarding functional foods effect on the consumers health. There was no impact of other independent features. Age structure, level of education and social status do not affect the perception of the impact of functional foods on the health of consumers.

Conclusions: Consumer ignorance about the types of consumed functional foods creates urgent need for information about the types of such foods and their impact on health. Worrying is a very negative perception of the impact of functional foods on health expressed by seniors.

Keywords: (maximum 5): FUNCTIONAL FOODS, HEALTH, CONSUMER PERCEPTION

149/363. Acceptance of innovative products on the corn snacks market

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Introduction: Corn snacks are often chosen by consumers. Expectations of current consumers expecting the health benefits derived from the food they eat, including gluten-free, lead the search for innovative products on the snacks market. Examples of such products are manufactured with the addition of amaranth, Jerusalem artichokes or pumpkin flours.

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Objectives: Assess the level of consumer acceptance of innovative corn snacks produced with the addition of amaranth flour, Jerusalem artichoke and pumpkin.

Method / Design: In 2014 qualitative study was carried out in which the testing method was focus group interview with 60 consumers.

Results: The main reasons for eating corn snacks was expecting certainty as to their low calorie level. More than three-quarters of the respondents after hearing information that a company intends to produce snacks using innovative extruder which are enriched amaranth, pumpkin or Jerusalem artichokes flours, showed interest in these products. It has been observed that women often expressed interest for the health and dietary reasons, but the men declared their greater willingness to try these products. After trying the new snacks, which the manufacturer has also dipped in white chocolate, milk and bitter, consumers are highly appreciated their palatability, general appearance, aroma and color.

Conclusions: Consumers have shown a high level of interest in these innovative snacks. Positively evaluated their appearance and taste, and expressed their desire to acquire and consume in the future. This publication was prepared under the project EUREKA No. E! 6855.ECORAW/2013.

Keywords: (maximum 5): snacks, innovative products, consumer acceptance

149/364. Is it possible to reach nutritional adequacy without increasing the exposure to food contaminants?

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Introduction: Existing dietary guidelines, improving notably the consumption of fish, fruits and vegetables, and whole cereals, do not explicitly or quantitatively take into account food safety considerations.

Objectives: The aim of the present study was to assess whether a nutritionally adequate diet would be compatible with food safety recommendations.

Method / Design: By crossing dietary data from the French national survey (INCA2) and toxicological data from the total diet study (EAT2), we estimated for women the mean intakes of 205 representative food items and mean exposures to 45 contaminants including pesticides, heavy metals, mycotoxins, non-dioxin like PCBs (NDL-PCBs) and dioxin-like compounds (DLCs). Non-linear optimization was used to design two modeled diets as close as possible to the observed diet and respecting i) the French Recommended Dietary Allowances (FRDA)(NUT model) or ii) the FRDA and the Toxicity Reference Values (TRV) while not exceeding the observed exposures (NUTOX model).

Results: In the NUT model, the main dietary changes were increases of fruits, vegetables, unrefined starches and fish/seafoods and decreases of meats, sweetened products, mixed dishes and refined starches. Respecting FRDA induced an increase in some contaminant exposures, noticeably for NDL-PCBs (from 25 to 56% of the TRV) and DLCs (25 to 38%) found in fish, and cadmium (22 to 33%) mainly from vegetables, while remaining below the TRV. Different food choices were made in the NUTOX model, with more intra food-group substitutions explained by the nutritional and toxicological characteristics of each food. For instance, vegetables increased to the same extent with both models, but spinach, nutrient-dense but high in cadmium, was not increased as much with the NUTOX model than with the NUT one.

Conclusions: Improving nutritional quality might increase exposure to toxicants. However, making specific choices within food-groups would allow reaching nutritional adequacy without increasing the contaminant content of the diet.

Keywords: (maximum 5): Diet-modeling, food safety, contaminants, nutritional recommendations, France

149/387. Risk assessment of plants and plant preparations

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Introduction: In the last years and decades more and more new plants came to the market as food or old crops have been rediscovered. Based on the presence of secondary plant metabolites specific effects are often attributed to these plants and/or derived preparations. Depending on the amount and the accompanying substances in extracts and preparations these substances can also be toxic. In many cases, plants and plant preparations are not adequately tested for their safety before marketing. In the European Union, authorization procedures and health assessments are only required for foods that are considered novel foods or produced from genetically modified organisms.

A working group of federal and state governments, the BfR has worked with, has drawn up a list of nearly 600 plants and plant parts, which should facilitate the assessment of these plants (or plant parts) and derived preparations by food inspection bodies and food industry.

Objectives: 18 plants or parts of plants were selected for an evaluation because of their known pharmacological or psychotropic effects or due to possible health risks.

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Method / Design: The risk assessments of these plants or parts of plants, including for example goji berries and yohimbe bark, were performed using the "Guidance on Safety assessment of botanicals and botanical preparations intended for use as ingredients in food supplements" of the European Food Safety Authority (EFSA).

Results: Nine of the 18 plants or parts of plants pose a risk to consumers and should not be used in food. Five plants or parts of plants might pose risks when used in food. For four plants or plant parts, no risks were seen.

Conclusions: The health assessments are intended to be a first step in the process of harmonization at European level. The opinions are published in a booklet and accessible on the web.

Keywords: (maximum 5): Risk assessment, plants, harmonization

149/388. Dutch consumers on meat reduction and meat substitutes: indications of a sustainable transition to a healthier diet

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Introduction: In order to achieve a more healthy and sustainable diet the Dutch Health Council advises to consume a less animal-based and more plant-based diet, containing fewer meat products.

Objectives: To identify habits in meat consumption and substitution in the Dutch population and differences in habits between subgroups.

Method / Design: Consumer research among a representative sample of Dutch adult consumers (18-75 years, n=1249) through a 15 minutes online questionnaire with 72 questions about actual consumption and behaviour. The population is segmented into the following background characteristics: gender, age, ethnicity, education, income, urbanisation, household composition, and value & lifestyle classification ('Mentality Milieu').

Results: Average meat consumption is around 83g per day, which is about 26g lower than in 2010. 3% is vegetarian. Vegetarism is more common among higher educated (6%), low income (5%), single households (6%) and post-materialists (10%). On average, Dutch eat meat at diner 3-4 times/week. 60% can be labelled 'meat reducer' (in 2010 40%): They eat meat only 4 times/week or less. The percentage of meat reducers is higher among post-materialists (71%; eating av. 60g meat/day). Four in 5 consumers do not eat meat every day, and most often replace it with fish (38%), eggs (33%), mushrooms (20%) and legumes (15%) or do not replace the meat in their dinner (21%). Post-materialists have the most healthy and sustainable diet. A part of the Dutch population –especially young, urban, high educated consumers- is prepared to sometimes replace meat for new protein sources in the next 5 years, such as seaweed (18%), cultured meat (12%), algae (11%) and insects (10%).

Conclusions: Food consumption patterns which include meat reduction and meat substitutes are becoming regular among Dutch consumers. Our empirical results indicates that a transition towards a recommended diet lower in meat consumption is sustaining.

Keywords: (maximum 5): vegetarians
meat reducers
sustainable diets
meat substitutes

149/392. Bifidobacterium lactis 420 and fish oil enhances intestinal epithelial integrity in vitro

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Introduction: Increased intestinal permeability has recently been associated with metabolic disorders, such as obesity and type 2 diabetes. Intestinal barrier integrity is maintained by tight junction proteins between adjacent epithelial cells. Certain dietary components, including probiotics and fish oil fatty acids may induce beneficial changes in intestinal tight junction integrity.

Objectives: To measure the impact of dietary compounds, probiotics Bifidobacterium lactis 420 and Lactobacillus rhamnosus HN001, and fish oil, separately and in combination, on intestinal permeability in CaCo-2 cell model.

Method / Design: Transepithelial electrical resistance TEER was used to determine the effects of Bifidobacterium animalis ssp. lactis 420 and Lactobacillus rhamnosus HN001 cell free culture supernatant CFS and fish oil on intestinal permeability in CaCo- 2 cells. Quantitative PCR was used to measure the mRNA expression of tight junction (TJ) proteins and myosin light chain kinase (MLCK), a critical regulator of epithelial paracellular permeability.

Results: B. lactis 420 CFS and fish oil increased significantly TEER, whereas L. rhamnosus did not. The TEER increase with B. lactis 420 CFS was observed to be dose dependent. No change in TEER was discovered when B. lactis 420 CFS and fish oil were used as a combination. Real time-qPCR revealed no altered expression of TJ protein's mRNA, but increase in MLCK protein's mRNA expression upon fish oil treatment was discovered.

Conclusions: B. lactis 420 CFS and fish oil induced individually beneficial changes on intestinal barrier integrity. However, co-administration of probiotics and fish oil induced no added beneficial effects. This study calls for further investigations into the mechanisms behind modification of intestinal permeability by dietary means and in particular the effect that combinations of active ingredients may have.

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Keywords: (maximum 5): intestinal permeability, probiotic supernatant, PUFA, TEER

149/394. Characterization of African Leafy Vegetables with regard to underestimated secondary plant metabolites

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Introduction: African indigenous leafy vegetables (ALV) play a significant role in food security of smallholder farmers in rural and urban/peri-urban areas in Eastern Africa.

Although consumed by millions of people, the quantities of minor nutrients in those ALVs relevant for a healthy human nutrition (e.g. vitamins, minerals, and secondary plant metabolites) are largely unknown. For the secondary metabolites even the exact chemical nature of the substances present in ALV has not been investigated, so far.

Objectives: One major aim of the HORTINLEA project consortium (Horticultural Innovations and learning for improved Nutrition and Livelihood in East Africa) funded by the BMBF initiative "GlobE - Global Food Security" program) is the identification and quantification of relevant health-related nutrients present in fresh ALV, and their presence after traditional and improved food cooking and processing conditions. These will be determined as a prerequisite of recommendations for an improved human nutrition situation.

Method / Design: Some of the most common ALV (i.e. amaranth, African nightshade, cowpea, and African kale) have been cultivated under different (European and African) conditions. After harvesting, samples were freeze dried and analyzed for their profile and content of phenolic compounds and saponins by HPTLC and HPLC-MS analysis.

Results: The results show that the basic phenolic substances present in many ALVs are cinnamic acid and flavonoid derivatives. However, they are bound to less common, underestimated carbohydrates. For the saponins, the presence of novel derivatives could be shown in several Amaranthus species. The quantities of the secondary metabolites are equal to common European vegetables, but depending strongly on growth conditions.

Conclusions: ALV such as Amaranth or African nightshade contain a multitude of potentially health promoting substances. In order to evaluate nutritional effects, substances characterized will be subjected to various biochemical in vitro assays.

Keywords: (maximum 5): African indigenous leafy vegetables; Amaranth; Sustainable Production; Secondary Plant metabolites; Food Analysis

149/400. Early educators' perceptions of barriers and facilitators of healthy eating in preschools – A qualitative study

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Introduction: Majority of the Finnish 3–6-year-old children are cared for at preschools, where children are served three fixed meals daily; breakfast, warm lunch and afternoon snack. Thus, food intake at preschool plays a significant role in the overall diet of preschoolers. Preschool could be an important setting for promotion of healthy eating.

Objectives: The aim of this study was to define facilitators and barriers for a healthy eating among preschool children by interviewing early educators.

Method / Design: Four semi-structured focus group interviews were conducted in October 2014 (n=14, mean age 45.6). A deductive thematic analysis was conducted using NVivo10 qualitative data analysis software. A data framework to code the data, which was based on the major themes of the questioning route and socioecological model, was used by two independent researchers.

Results: Early educators found several factors in the preschool environment that acted as barriers for children to eat fruit and vegetables. Such barriers were that fruits were not available daily, vegetables were mixed as salads that the children did not like, and there were no possibilities for the children to serve themselves when sitting at the tables. Overall, the served food contained little sugar and most sugar rich foods were served as the afternoon snack. Especially early educators who had much work experience perceived themselves as important role models. They also considered having enough skills to encourage children to taste and eat the served food.

Conclusions: Early educators see themselves as important role models for children forming their eating habits. Many of the barriers for a healthy eating were seen at the physical level; lack of fruits, salads not suitable for preschool children, and several restrictions in how and when the food is to be served.

Keywords: (maximum 5): qualitative study, preschools, healthy eating, barriers, facilitators

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149/401. Effective nutrition education for behavioral and policy change among rural households in Nigeria

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Introduction: All over the world, nutrition faces two major challenges: first is that of insufficient intake relative to nutritional needs and secondly that of excessive and unbalanced intake of food or a specific dietary component. Nigeria and Africa as a whole suffer much from the first category of challenges. Therefore, nutrition education must provide poor rural people with adequate information, skills and motivation to procure and to consume appropriate diets.

Objectives: The general objective was to examined the challenges of effective nutrition education for behavioral and policy change in Nigeria. Other specific objectives include: identifying the components of nutrition education, examining the purposes of nutrition education and identifying the constraints to effective nutrition education

Method / Design: The design of this study is a review of critical literature related to nutrition education.

Results: This study found that nutrition education has three components- (a) increasing the nutrition knowledge and awareness of the public and of policy-makers, (b) increasing the diversity and quantity of family food supplies and (c) promoting desirable food behaviour and nutritional practices while the purposes of nutrition education include providing people with correct information on the nutritional value of foods, food quality and safety, methods of preservation, processing and eating to help them make the best choice of foods for an adequate diet and motivating beneficiaries to develop skills and confidence for the adoption of positive and lasting best practices. The constraints were lack of inter-sectoral collaborations, lack of well-planned community strategy; lack of political will and government support and inadequate local managerial and community capacities.

Conclusions: Nutrition education should be well-planned and implemented using the social marketing approach which entails the promotion of socially responsible behaviour and ideas based on strategies to change human behaviour through the application of commercial marketing principles.

Keywords: (maximum 5): Behavioural, household, nutrition education, policy and rural

149/408. The 'Opticourses' intervention, or how to improve nutritional quality of food purchases despite financial barriers

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Introduction: The 'Opticourses' intervention aims at improving the nutritional quality-for-price ratio of food purchases of low-income individuals through participative educational workshops.

Objectives: Assessing the impact of the Opticourses intervention

Method / Design: Individuals were recruited as part of the Opticourses project conducted for two years (2012-2014) in poor districts of Marseille, France. The intervention and evaluation tools and protocols were co-constructed with a pilot series of 108 individuals. Then, 77 adults were enrolled to participate in the standardized intervention (i.e., five nutritional education workshops based on actual food purchases, including monthly till receipts). Evaluation of the impact of the intervention on food purchases was performed using experimental economics: controls (n=23) and workshop-participants were asked to buy foods for two days (virtual purchases using a food brochure) for their household, before (baseline) and after 2 months (endline) of intervention. Monetary incentives were used to limit social desirability bias. Food-group contributions (to total weight and total energy) and energy density (ED, kcal/100g) were compared between baseline and endline, as well as the energy cost (€/2000kcal) of food purchases.

Results: Thirty-five workshop-participants completed the evaluation at baseline and endline. Both controls and workshop-participants purchased a high amount of calories at baseline (4523 vs 4711 kcal/d. pers, NS). This amount significantly decreased between baseline and endline for workshop-participants only (-1729 kcal/d.pers.). In workshop-participants, the nutritional quality of food purchases increased: ED decreased, weight and energy contributions of fruit and vegetables increased and that of sweet products decreased, while cost/2000kcal remained unchanged. Differences were not significant in the control group.

Conclusions: The more rational amount of kilocalories bought at endline suggests that the intervention helped workshop-participants to better plan their food purchases. Moreover, they increased the nutritional quality of their food purchases at no additional cost, suggesting a positive effect of the intervention on the nutritional quality-for-price ratio

Keywords: (maximum 5): intervention-evaluation, low-income, diet-cost, nutritional-quality, food-purchases

149/425. One step at the time: nudging reduces energy intake in buffet

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Introduction: Thanks to large public campaigns, most Danes know the recommendations about healthy eating, yet few comply with them. Epidemiological data shows that small changes towards healthier eating have positive effects on later morbidity and mortality. Education and information are necessary but not sufficient to promote food-related behavioural modifications. Hence, engaging with the automatic path of choice making (experience, repetition, habit), would yield desirable changes from a public health nutrition perspective.

Objectives: To evaluate the effect of altering food choices on total energy intake for ad libitum lunch, using environmental cues that require no or little reflective decision-making.

Method / Design: Cross-over designed controlled intervention study with three experiments (E). E1 primed vegetable choice; E2 gave a fixed portion size of salad as default and E3 offered salad components separately.

Results: The intervention significantly reduced total energy intake (-83kcal;p<0.001), mainly due to a total decrease in the intake of chili con carne (-67g;p<0.001) and no significant increase in vegetables (11g;p=0.34). E1 and E3 successfully decreased meat and total energy consumption, whereas experiment E2 successfully increased vegetable consumption.

Conclusions: Nudging interventions could be a way to enhance the achievement of public health nutrition recommendations. Vegetable intake can be increased by changes in default options, while energy intake can be reduced without changing the total amount of food eaten.

Acknowledgements: Thanks to Pernille Møller Andersen. This work is part of EU/FP7 Funded VeggiEAT project (Grant Nr PIAP-GA-2013-612326).

Keywords: (maximum 5): Nudging, Vegetables, Healthy Eating, Nutrition Recommendations, veggiEAT

149/426. Nutritive propeties and identification of Inulin in pasta by 13CMAS NMR spectroscopy

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Introduction: The daily intake of ditary fibres in highly industrialized countres is usually at low level and therefore, is adversely affecting human health. The importance of dietary fiber in achieving, maintaining and improving the health of people in order to prevent mass non-infectious diseases is caused by the consequences of inappropriate nutrition in highly developed societies is preseted. Inulin HPX is one type of dietary fiber with high molecular weight with more than 10 glucose units in side chains.

Objectives: Investigation of the effect of inulin on technological pasta quality, investigation of possibility of inulin indentification by 13 CMAS NMR and investigation of nutritional properites of enriched pasta.

Method / Design: Inulin HPX replaced spelt farina in the quantity of 0, 5 or 10 %.

Textural properties of cooked pasta were measured with Texture Analyzer TA.HD plus.

The 13C MAS NMR spectra were recorded at 100.627 MHz using a Bruker MSL 400 NMR spectrometer Tecmag console.

Basic chemical analyses of pasta and total dietary fibers were determined according to official methods of AOAC, 2000 and AOAC, 1990.

Results: Data point that addition of inulin HPX influenced the decrease of pasta hardness (about 20% and 22%) and toughness (28% and 54%) parameters, with increasing the adhesiveness (about 3 times).13C MAS NMR spectroscopy proved to be a useful tool for clear distinguishing inulin HPX in pasta from other polysaccharides in area of peaks positioned at 81, 74, and 64 ppm. Spelt pasta with 10 % inulin HPX is attributed with decreased content of digestible carbohydrates and reduced energy of 18.8 % and 8.4%, respectively

Conclusions: Pasta with inulin HPX is a new functional product with modified nutritional properties and good techological quality and 13C MAS NMR spectroscopy is a usefull tool for its control.

Keywords: (maximum 5): inulin HPX, 13C MAS NMR, pasta nutrition, pasta quality

149/428. The effect of enzymatic modification on palatability of reduced fat twarogs

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Introduction: Twarogs are fresh, white cheeses obtained only as a result of coagulation of acid milk under the influence of lactic acid bacteria. They are very popular both in Poland and in the countries of Middle and Eastern Europe. They are classified mostly by fat content as: creamy (more than 16% fat), fatty (approx. 8%), semi-fat (approx. 4%) and lean (below 0.5%) twarogs.

Objectives: The aim of the research was to determine the possibility to increase palatability of reduced fat twarogs (lean twarogs) through their enzymatic modification.

Method / Design: In the industrial-scale process of twarog production transglutaminase (TG) enzyme was used – in accordance with the patent application PCT/PL2011/000122. In experimental and control twarogs the basic composition, particle size and selected rheological properties were determined and the sensory profile was evaluated.

Results: As it is known, fat considerably determines the perception of palatability of dairy products. Resulting from the use of TG, modification of sensory and rheological properties of the obtained twarogs was achieved, without any changes in their chemical composition. A significant increase in particle size of cross-linked proteins

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was observed. Their size was close to the size of fat particles. Moreover, increased retention of the whey proteins in twarog contributed to more acceptable reduction of the acidity of the product. Twarogs with TG participation were characterised by a more full taste and smooth texture.

Conclusions: The use of transglutaminase enzyme in twarog production process makes it possible to improve the evaluation of palatability with considerably reduced fat content.

Keywords: (maximum 5): twarog, reduced fat, transglutaminase, flavor

149/431. Technological capabilities of twarog enrichment in calcium

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Introduction: Twarogs contain less calcium than rennet cheeses. In twarog production process, at pH 4.6, most of calcium ions that form bonds in casein micelles dissociates and migrates to whey.

Objectives: The aim of the research was to determine the possibility to increase calcium content in twarog cheeses through the addition of selected calcium salts at various stages of the technological process.

Method / Design: In twarog production at pilot plant stage, 6 various calcium salts and their mixtures at various concentrations were introduced at various stages (raw milk and processed milk, processing of slurry, twarog forming). In experimental and control twarogs the basic composition, calcium and phosphorus content and selected rheological properties were determined and the sensory profile was evaluated.

Results: Twarogs enrichment in calcium through addition of various calcium salts to slurry (at the stage of both processing and forming) usually disqualifies a product due to significant changes in texture and negative sensory evaluation. However, the introduction of calcium salts before milk coagulation makes it possible to obtain twarog that does not differ from a classical product, in terms of both structure and taste. The greatest storage stability was demonstrated for twarogs with the addition of calcium chloride, citrate and carbonate mixture.

Conclusions: The use of up to 0.5% addition of selected calcium salts in twarog production process makes it possible to increase calcium content without any detectable changes in sensory evaluation of twarogs.

Keywords: (maximum 5): twarog, supplementation, calcium, quality

149/436. "Our school cafeteria" - Evaluation of the initiative

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Introduction: "Our school cafeteria" is a nationwide public health nutrition initiative of the Federal Ministry of Health to improve the food offered in Austrian school cafeterias. The long-term objectives of the initiative are the sustainable optimization of the food offered in school cafeterias in accordance with the "Guideline for School Cafeteria", the promotion of client satisfaction and the maintenance of economic efficiency.

Objectives: The aim of the evaluation was to continuously monitor the quality of the measures rolled-out during the phases of planning and implementation as well as to monitor the overall efficacy of the initiative.

Method / Design: The methodical approach was based on a combination of quantitative and qualitative research methods.

Results: During the evaluation period 273 school cafeterias participated in the initiative and nearly 200.000 students were able to benefit from the improved offer of food. The evaluation of the initiative showed that the optimization of the food offered in the cafeterias was well accepted by the students and that it resulted in a larger variety and a better visual positioning of healthy food. The majority of the participating cafeteria companies welcomed the initiative as well as the supporting measures (e.g. free of charge on-site coaching, marketing material, website www.unserschulbuffet.at). Cafeteria owners agreed that the initiative lead to an improvement of consumer satisfaction without negatively impacting economic efficiency. The supporting of cafeteria owners using standardized yet individually adjusted on-site coaching was identified to be the key success factor.

Conclusions: The initiative "Our school cafeteria" contributed to a significant improvement of the food offered in Austrian school cafeterias.

Keywords: (maximum 5): school, food, evaluation, guideline, public health program

149/438. Reformulation of food products: evaluating a framework with food companies

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Introduction: In 2014, the Dutch Government has made an agreement with the food sector to lower the amounts of salt, sugar, saturated fat and energy in food products. To reformulate, different perspectives are important for companies: Nutrition and health (relevant nutrients), Food technology (optimal product quality), Legislation (food law, claims) and Consumer science (taste, marketing). These four perspectives are combined into a "Framework for Reformulation" which we evaluated in a qualitative study

Objectives: To evaluate a "Framework for Reformulation" with food companies.

Method / Design: Seventeen food companies, 9 (sweet) bakeries, 5 meat producers and 3 companies from the convenience sector, were selected based on their interest and activities in reformulation. Interviews were held with a semi-structured questionnaire.

Results: Interviews showed that the combination of the 4 perspectives was important for all companies to reformulate their products. This is illustrated by some examples: Companies mentioned many opportunities to improve products by reducing salt, (saturated) fat and sugar (nutrition); There were however barriers to replace functionality of these ingredients in the bakery- and meat sector (technology). Remarkable was that nutrition claims were used sparingly, except for fibre claims on bakery products (legislation). Meat producers assumed that consumers considered meat as a traditional product which should not be reformulated, while sweet bakery products were positioned mostly as luxury products (consumer). New mentioned aspects, not yet in the framework were: the push to reduce E-numbers, indicated by almost all companies. Also retail plays a key role in reformulation, especially determining price and sensory aspects.

Conclusions: The four perspectives: Nutrition and health, Food technology, Legislation and Consumer science play an important role in reformulation. The retailer, price and the push to reduce E-numbers (clean label) are also important and have to be added to the Framework.

Keywords: (maximum 5): REFORMULATION, FOODCOMPANIES, FOODTECHNOLOGY, LEGISLATION, CONSUMER

149/453. Identifying the sustainability and health impact of diets in Dutch population subgroups

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Introduction: From previous research, we know the parallels between Health and Sustainability Scores of theoretical diets. For effective sustainable diet policies, it is necessary to develop a target group specific approach.

Objectives: To identify the health and sustainability impacts of diets in Dutch population subgroups. Actual subgroups with low health scores are expected to have low scores on sustainability as well.

Method / Design: Consumer research among a representative sample of Dutch consumers (18-75 years, n=1249) through a 15 minutes online questionnaire with 72 questions about actual consumption, based on a combination of two existing validated questionnaires. The population is segmented into background characteristics: gender, age, ethnicity, education, income, urbanisation, household composition, Body Mass Index, and value & lifestyle classification ('Mentality Milieu'). We calculated for each subgroup in the population the diet composition, the Dutch Healthy Diet-index (diet score), and indicators for the sustainability score, especially Greenhouse Gas Emissions (GHGE).

Results: The GHGE of the population is 2710g CO2eq/day, probably without 14% underestimation. Most determining characteristics for a high climate impact are (highest versus lowest): sex (male +22%), high income (+14%), work (+12%), countryside (+9%), high education (+8%), age (<30y +5%) and ethnicity (indigenous +4%). Consumers who belong to lifestyle classifications 'new conservatives' and 'post-modern hedonists' (17%) have a 10% higher impact than 'traditionals' and 'post-materialists'. Low climate impact is correlated with indicators of a healthy diet: high consumption of fruits, vegetables and water and low consumption of meat and alcohol. We found no significant correlation between GHGE and obesity. The score indicating self-reported healthy diet is correlated with the score for self-reported sustainable diet.

Conclusions: A fifth of the Dutch population has a low score unhealthy and unsustainable diet, which can be targeted by stimulation of a higher water, fruit and vegetable consumption and a lower meat and alcohol consumption.

Keywords: (maximum 5): sustainable diets
consumer research
greenhouse gas emissions
diet score

149/460. Health and environmental food choice motives: a source of dilemma?

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Introduction: Dietary guidelines in France recommend daily intake of meat, fish and dairy products whereas consumers are increasingly concerned by their environmental impact at production and consumption. This potentially leads to consumer dilemmas when purchasing food products.

Objectives: We aimed at investigating the sociodemographic profiles of individuals reporting health and environmental motives dilemmas when purchasing meat, fish and dairy products, and comparing diet quality of these individuals with those reporting no dilemma.

Method / Design: A total of 22,936 individuals participating in the NutriNet-Santé study were included in this cross-sectional analysis. Participants completed a questionnaire assessing motives when purchasing meat, fish and dairy products, including health vs. environmental dilemmas. Socio-demographic and lifestyle data as well as dietary intake using 24h-records were collected. We assessed the association of dilemma with individual characteristics using logistic regression models and with intake of meat, fish, dairy products and with a score estimating adherence to French nutritional guidelines (mPNNS-GS), using analysis of covariance.

Results: Among participants, 13% were torn between buying meat for health reasons and to avoid buying it for environmental reasons, 12% for fish and 5% for dairy products. Older participants and women were more likely to report dilemma when purchasing meat and fish, while age only was important for dietary products. Participants reporting dilemmas showed higher scores of mPNNS-GS (all $P<0.0001$) and those with dilemmas for meat specifically consumed less of this food group ($P<0.0001$), compared with those without dilemma.

Conclusions: A number of individuals were torn between buying food for health reasons or avoid buying it for environmental reasons. Women and older individuals showed more dilemmas. Individuals reporting dilemmas when purchasing food were shown to have a higher diet quality than those having not dilemma suggesting that these individuals attach more importance to nutrition than to environment.

Keywords: (maximum 5): food motives, sustainability, dilemma, dietary intake, cross-sectional study

149/493. The positive impact of Crunchy Wednesdays on HappyMeal™ fruit orders in McDonald's French restaurants

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Introduction: The Crunchy Wednesdays (CW or "Mercredis à Croquer™") campaign in France started in 2010, and offers a free fruit bag with every Happy Meal sold on the first Wednesday of the month. Since program inception, McDonald's France has distributed over 12,000,000 free fruit bags.

Objectives: The goal was to determine whether the provision of free fruit bags (typically apple slices or a pineapple spear) would spur additional fruit bag orders sold as the Happy Meal dessert.

Method / Design: Transactions data for over 350 million Happy Meals from 2009 to 2013 for 1,296 McDonald's restaurants in France were analyzed. The four dessert choices in the French Happy Meal are yogurt, apple purée, bag of apple slices, or seasonal fruit bag. The seasonal fruits rotate between ready-to-eat pieces of pineapple, cantaloupe melon, orange, kiwi, or watermelon.

Results: Frequency of choosing a fruit bag as dessert was 13.4% in 2009, rising to 14.5% in 2010. Following the launch of CW in September 2010, fruit desserts increased to 18.0% ($p<0.001$) in 2011 and to 19.4% in 2013 (+45% versus 2009). The provision of a free fruit bag did not decrease fruit orders for dessert on CW as compared to regular Wednesdays. Orders of fruit bags for Happy Meal dessert were consistently higher on Wednesdays as compared to the whole week. The provision of free fruit bags and higher orders of fruit bags for dessert had minimal impact on the other components of the Happy Meal. The choices of French fried potatoes relative to cherry tomatoes and Happy Meal beverage options were virtually unchanged.

Conclusions: The study demonstrates the value of analyzing business transactions data to assess the positive impact of menu innovation programs on consumer behaviors. Transactions data and support for data analyses were provided by McDonald's France.

Keywords: (maximum 5): Fruit, behavior, children meal, restaurant

149/501. Canarium ovatum Engl. ("Pili") exocarp crude extract as functional food colorant incorporated in yogurt developed product

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Introduction: Canarium ovatum Engl. is one of the most prized nut-producing, endemic trees in the Philippines. It has gained popularity in the market industry due to a variety of products made from its fruits. However, the fruit's skin (exocarp) which turns from green to dark purple when fully ripe is often discarded as waste.

Objectives: Owing to the many nutraceutical properties of natural pigments, this research study focuses on the functional properties of the dark pigmented exocarp extract and its possible application as natural food colorant in yogurt.

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Method / Design: The pigment was extracted with ethanol from dried exocarp and screened for phytochemical components using thin layer chromatography. Antioxidant, antibacterial and colon cancer cell inhibitory activities were also studied using DPPH, disk diffusion, and MTT assays, respectively. Yogurt-infused with the extracted pigment was subjected to color stability tests and sensory evaluation to determine consumer acceptability.

Results: TLC profiling revealed the presence of flavonoids and phenolic compounds. The pili extract had high total phenolic content (8.8 mg ascorbic acid/g dry weight of sample), total flavonoid content (2.2mg catechin equivalent/g DW of sample), and anthocyanin content (17.5 mg cathechin/g DW of sample). The pigment extract also exhibited 82.1% radical-scavenging activities (RSA) at 1.0 mg/ml concentration with IC50 value of 7.1 mg/ml and FRAP value of 32.0 mmolFeSO4/gDW. The presence of these phytochemicals showed the potential nutraceutical value of the pili pigment. The pigment extract did not show any inhibitory activity against Escherichia coli, and thus, indicated a lesser toxicity against gut normal bacterial flora, but failed to exhibit cytotoxic activity against HCT116 colon cancer cell line. Stability tests showed decreased in redness with increasing temperature/pH. There is a slight difference in over-all acceptability between natural and synthetic-colored yogurt.

Conclusions: Pili exocarp extract can be a natural food colorant in yogurt.

Keywords: (maximum 5): anthocyanins, antioxidants, functional food, natural colorant

149/507. The effect of thermal treatment method on fatty acid composition of pike fillets

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Introduction: Heat treatment of food products protects them against the development of micro-organisms, increases the digestibility and produces appropriate sensory attributes. This treatment can also change the chemical composition of the product. The most commonly used thermal methods are frying, steaming or cooking in microwave ovens.

Objectives: The aim of the study was to determine the effect of thermal treatment method (frying, microwave and steam cooking) on fatty acid composition of pike fillets.

Method / Design: Research material comprised of 18 samples of pike (Esox lucius) fillets. Six fillets were fried using rape-seed oil, six were microwave cooked and six were cooked by steaming. Fatty acids composition was determined after the cold extraction of muscle lipids and their methylation according to Folch et al. (1957) and Peisker (1964) methods. Chromatographic separation was performed on an Agilent Technologies 7890A gas chromatograph with a flame-ionization detector.

Results: The sum of saturated fatty acids accounted for 16.88% (of total fatty acids) in fried pike, while in microwave cooked and cooked by steaming fillets for 42.28% and 53.73%, respectively. Significantly higher value of the sum of monounsaturated fatty acid was noted in fried pike (59.63%) compared with other treatments (24.22% and 25.96%). Higher average content of sum of polyunsaturated fatty acids was observed in microwave cooked pike (33.49%) than in fried and cooked by steaming (23.49% and 20.31%, respectively). The highest n-3/n-6 ratio was found in fried pike (2.66), compared with microwave and steam cooked fillets (1.05 and 1.77, respectively).

Conclusions: Thermal treatment method significantly affected sum of saturated, monounsaturated and polyunsaturated fatty acids content and n-3/n6 ratio. Due to the content of polyunsaturated fatty acids in pike fillets the microwave cooking was the most preferred method of heat treatment.

Keywords: (maximum 5): pike, fatty acids, frying, cooking, microwave

149/512. The importance of brand consciousness and sustainability orientation for lactose-intolerant consumers purchasing "lactose-free" foods

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Introduction: Lactose intolerance is a prevalent food intolerance, characterized by a lack of the lactase enzyme. The consumption of foods containing lactose is accompanied by health complaints. Besides foods that are naturally without lactose or lactase supplements, "lactose-free" food products are an alternative for lactose-intolerant individuals. "Lactose-free" labeled food products naturally contain lactose, but the lactose was extracted by chemical processes or broken down into its molecular components to have an end product free from it. Although the variety of "lactose-free" foods and thus their relevance on the food market are steadily increasing, there are only few studies analysing determinants for purchasing "lactose-free" foods by lactose-intolerant consumers.

Objectives: The present exploratory study aims at identifying different segments among lactose-intolerant female consumers based on their brand consciousness and sustainability orientation regarding the consumption of "lactose-free" food products

Method / Design: 211 lactose-intolerant German female consumers (mean age: 30.9 years) were surveyed using an online questionnaire dealing with different aspects of consumer behavior concerning "lactose-free" foods. The participants were recruited through internet forums and portals.

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Results: Different dimensions of consumer behavior concerning "lactose-free" foods were extracted by a factor analysis. To define consumer groups, a subsequent cluster analysis with the cluster building variables "brand consciousness" and "sustainability orientation" was carried out. We obtained the following four-cluster solution: (1) Brand- and sustainability-conscious consumers (2) Indifferent consumers (3) Sustainability-oriented brand-skeptics and (4) Brand and sustainability disinterested consumers.

Conclusions: Concerning sustainability orientation and brand consciousness, four different target groups of female lactose-intolerant consumers were identified. The results provide indications for the development and marketing of "lactose-free" foods.

Keywords: (maximum 5): consumer behavior, lactose intolerance, lactose-free foods

149/517. Negative emotions promoted by events can increase energy and sweet intake

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Introduction: Studies suggest that emotions affect food consumption.

Objectives: To investigate the influence of emotions in energy intake and healthy and unhealthy food consumption in overweight and eutrophic women.

Method / Design: The sample consisted of 43 adult women, 20 eutrophic (EW) and 23 overweight (OW) with ages between 24 and 41 years. The groups were submitted to two video interventions: one that evokes emotions related to life dramas, considered negative emotion interventions (NEI), and one that shows common daily scenes, considered neutral emotion interventions (NNEI). Emotions evoked by the two interventions were analyzed by an analog scale. After the interventions the groups were served an ad libitum meal with several food types: healthy sweet (HS), healthy salted (HSa), unhealthy sweet (US), and unhealthy salted (USa) food. For both groups, after NEI and NNEI were measured the total energy intake and consumption of healthy and unhealthy food provided at the meal.

Results: For the NNEI group, the mean energy intake and US consumption of OW women were, respectively, 39% and 47% greater than of EW women. Both groups displayed significant increases of energy intake and US consumption after NEI: these increases were of 82% and 51% for EW women, and of 48% and 39% for OW women. After NEI there was no difference in USa consumption between the groups but OW women consumed more HSa. This group also had a larger consumption of USa after NNEI. These data suggest that NEI promoted consumption of US in both groups and this was higher for EW women. NEI acted as a trigger to increased food consumption.

Conclusions: Energy intake and unhealthy sweet consumption increased under negative emotions independently of the nutritional status.

Keywords: (maximum 5): Emotion; sweet; comfort food; hedonic intake.

149/519. How accurate is media reporting on nutrition research across Europe?

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Introduction: The media is one of the main disseminators of scientific information for the public and can shape or change public's perceptions and behaviour. However the way the media interprets research varies and it can be selective regarding the information it provides particularly when it comes to food/nutrition research findings. Research published on health claims reported in UK national newspapers found that misreporting is widespread (Cooper et al., 2011). This may contribute to public misconceptions about food and health.

Objectives: To identify dietary health statements, in national newspapers across Europe, and compare these to the health claims in the European Food Safety Authority's (EFSA) Register of Questions (ROQ).

Method / Design: The research was conducted over 8 European countries: UK, Spain, Germany, Belgium, France, Poland, Sweden and Italy. Newspapers were selected based on circulation and readership figures and were sampled daily over two weeks in September 2011 and two weeks in March 2012 (n= 667 newspapers). This research looked at i) the content of the statements (e.g. food type, causative and health impact), ii) the source of the information (e.g. scientist, health authority) and iii) the accuracy of the reporting.

Results: A total of 376 dietary health statements were identified. The top food categories mentioned were fruit & vegetables, followed by dairy, and fish & seafood. The main health benefit addressed in the statements was cardiovascular disease, followed by skin, hair & nails, gastrointestinal health, cancer and mental health. Fats (particularly Omega 3), vitamins and minerals were the most frequently mentioned ingredients. Comparison of the statements against the EFSA's ROQ, showed that 75% of reported dietary health statements would not be substantiated by EFSA.

Conclusions: The majority of dietary health statements made, in a large representative sample of European newspapers, are not supported by strong evidence.

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Keywords: (maximum 5): Newspaper; Health claims; Food; Europe; EFSA.

149/523. Mercury levels in sashimi commercialized in Japanese restaurants from Brazil

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Introduction: A traditional food in Japanese cuisine, fish is usually related to healthy aspects for presenting proteins of high biological quality, polyunsaturated fatty acids, vitamins and minerals in its composition. However, fish could present mercury (Hg), especially in a toxic form: methylmercury (MeHg).

Objectives: Due to the lack of Brazilian data, the objectives were to determine the Hg level in sashimis purchased in restaurants in Campinas (SP, Brazil) and to estimate the Hg intake from the consumption of this product.

Method / Design: Thirty samples of sashimi were acquired in Japanese restaurants: tuna (10), salmon (10) and octopus (10). The total Hg content was determined by atomic absorption spectrometry and thermal decomposition amalgamation (TDA AAS) and the MeHg concentration was estimated assuming 90% of total Hg is in this form. Total Hg and MeHg values were evaluated by the FAO/WHO, USA/FDA, Japanese, European Union (EU) and Brazilian regulations. The provisional weekly intake value (PTWI) considered the weekly consumption of 340g of sashimi by a 70kg adult, as indicated by the US EPA.

Results: The highest level of total Hg was achieved by tuna sashimi samples and some of them presented values above the PTWI for inorganic Hg (i-Hg) and MeHg (20% and 70%, respectively). Salmon and octopus samples presented both i- Hg and MeHg values below the PTWI. Regarding to the regulations, 20% of tuna sashimi samples presented levels above the maximum tolerated. For Japanese standard, this value increased up to 30%.

Conclusions: In some sashimi samples, Hg levels were found above the maximum limits from several world regulations. This indicates the need for efforts to reduce those levels.

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Keywords: (maximum 5): Mercury; Seafood; Japanese food; sashimi; food safety, fast food

149/527. Effectiveness use of soapstone (steatite) for adsorption of inorganic contaminants from Brazilian spirits

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Introduction: Contamination of alcoholic beverages with inorganic elements is an unresolved problem. Soapstone (steatite) has being used in food and beverage contact, and its interaction can impact these levels.

Objectives: Evaluate the effect of the contact between Brazilian spirits and soapstone cups on the contaminants concentration.

Method / Design: As, Cd, Cu, Ni and Pb levels were measured in 8 Brazilian spirits and in an alcoholic simulant. Measurements were performed at initial time and after 4 cycles (24h/each) of contact between the beverages and the raw soapstone cups. The results were compared to the levels established by Brazilian and German regulations: Cu (5.0 and 2.0mg/L); As (0.10mg/L), Cd (0.020 and 0.010mg/L); and Pb (0.200 and 0.250mg/L), respectively. For Ni, only Brazilian limit was considered (3.0mg/L). Statistical analyzes were performed in R and Sisvar software.

Results: Prior to contact with soapstone, the contaminant levels were measured: As (0.011–0.085 mg/L); Cd (0.003–0.004 mg/L); Cu (1.113–4.598 mg/L); Ni (0.003–0.020 mg/L) and Pb (0.006–0.074 mg/L). Although all levels were in agreement with Brazilian regulation, 62.5% of the spirits presented Cu levels higher than the established by the German regulation (6.6–129.9%). The contact between the spirits and the raw soapstone was able to reduce the Cu content by up to 50.6% and to increase Ni content by up to 601.3%, especially in the first cycle of contact. The exposure of spirits to the soapstone exhibits a linear reduction in the Pb content (14.1–60.0%) while As and Cd levels remained unaltered throughout the experiments.

Conclusions: Contact with raw soapstone cups impacts the inorganic contaminant levels in the alcoholic beverages, with reduction in Cu and Pb content and increases Ni levels observed. Acknowledgements: Thanks to FAPEMIG-Brazil for the financial support (APQ-01558-09 and APQ-02246-14) and to CAPES-Brazil for the grant to Louvera Silva KA.

Keywords: (maximum 5): Inorganic contaminants, alcoholic beverages, chemical adsorption, nickel, copper, lead.

149/545. Sausages with 10% fat and added dietary fiber have market potential

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Introduction: The nutritional profile of sausages is improved by the addition of dietary fiber and a reduction in fat. Hereby, sausages live up to the criteria for the Nordic Keyhole label and a nutritional claim for dietary fiber. We have previously shown that the addition of rye bran to sausages maintain the sensory quality and increase satiety however, its market potential has not been investigated.

Objectives: The aim was to market-test rye bran sausages with 10% fat w/w and 3% dietary fiber w/w and investigate purchase intention and consumer liking.

Method / Design: The sausages were market-tested at two retail shops in Denmark that agreed to sell the sausages. The experimental design included: a taste session with consumers to evaluate liking and characterize the sausages from a list of terms (n=218); a semi-quantitative questionnaire to sausage buyers addressing argument for purchase and perception of the nutritional information on the package (n=103). Moreover, a consumer test was conducted to compare the fiber sausage to two commercial sausages (n=41).

Results: The sausages were well liked by the customers and 80% wanted to buy them. The sausages were characterized as "healthy", "palatable", "quick and easy" and "satiating" whereas "trendy", "traditional" and unhealthy" were mentioned seldom. Arguments for purchase were related to the nutritional properties with emphasis on the reduced fat content but not the fiber content. In addition, curiosity and taste were drivers of purchase. Customers who bought the fiber sausage cared about healthy eating. The nutritional claim for dietary fiber was perceived as healthy but only ~20% of the customers related fiber to satiety. Compared to commercial sausages, the fiber sausage was perceived significantly less traditional and unhealthy and more healthy and trendy.

Conclusions: A healthy alternative to traditional sausages have the potential to be marketed to Danish retail stores.

Keywords: (maximum 5): Sausages, dietary fiber, nutritional claim, consumers

149/547. Protein enriched meals for healthy ageing in the 65+ segment

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Introduction: Life expectancy is increasing and the 65+ population is growing. A sufficient protein-intake plays a central role in relation to healthy ageing and good maintenance of muscle function. A protein intake of 1.2 g per kg/BW for people aged 65+ is recommended by the Nordic Nutrition Recommendation. However, reduced appetite and energy intake may hinder optimal nutrition in this segment. Therefore, product innovation must combine high quality protein with well-liked products.

Objectives: The objective was to design a well-liked meal, high in protein, based on the addition of hydrolysed beef or pork, aiming at 65+ consumers.

Method / Design: Two different soups with meatballs were developed – a tomato soup and a pumpkin soup. Hydrolysed beef protein was added in 4 different concentrations of 0%, 7%, 11 % and 15 % (weight %) to the meatballs in the tomato soup and likewise hydrolysed pork protein was added to the pumpkin soup. Both soups were evaluated in a consumer test (tomato soup: n = 52, pumpkin soup: n = 51, mean age 66 years). Each consumer evaluated either the four tomato soups or the four pumpkin soups and assessed liking on a 15 cm scale and rated how appropriate they found the soups as a meal concept.

Results: Consumer liking did not differentiate between soups with 0% and 15 % added hydrolysed protein from pork and beef. Furthermore the majority of the consumers perceived the soup with meat balls as practical, nutritional, healthy, a good choice for extra protein and suitable for people aged 65+.

Conclusions: Pumpkin and tomato soup with meatballs successfully combines a high protein intake and convenience in a well-liked meal. Addition of up to 15% hydrolysed beef and pork protein in the meatballs did not affect overall liking.

Keywords: (maximum 5): Healthy ageing, protein enriched meals, product innovation

149/562. Children's hydration status and its relation to school policy

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Introduction: Dehydration has been related to several aspects of health and children are especially vulnerable.

Objectives: Because of the long time children spend at school and the role-model of schools, the current study examined children's hydration status at the school.

Method / Design: In 451 Belgian primary school children (8-13y), urine was collected at the start of school and over the remaining toilet visits during the school to analyse osmolality as hydration marker. School drink and toilet policy was reported by the school and by the child's opinion. Regression analyses were adjusted for sex, age, parental education and region.

Results: 75.3% was badly hydrated based on the morning sample and 53.3% based on the over-day sample. Hydration was highest in girls and low BMI but not related to age, parental education or diet quality. Only in half of the school, the topics drinking and peeing were

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introduced in the curriculum. Only 8% of the children reported to like visiting the school's toilet. A possibility to go to the toilet or drink water during class was indicated by 65%. Children's hydration was higher in schools (1) that make water available during sports, at playground or during lunch, (2) that introduce the topic drinking in the curriculum, (3) that allow children to drink during class. Children's toilet visit frequency was higher in schools (1) that introduce the topic of toilet visits in the curriculum, (2) that have an official policy on toilet visits, (3) that make toilet visits more pleasant e.g. clean toilets that can be locked and with sufficient toilet paper or an attached toilet seat.

Conclusions: Dehydration at school was frequent. Since some of the school policy items were related with children's hydration, more related resources and attention are needed by school management and governmental organizations.

Keywords: (maximum 5): policy, hydration, children, urine, school

149/563. How much sugar is added to plain yogurts? Insights from behavioral study with French consumers

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Introduction: In France, half of plain yogurts (PlainYog) are sweetened by consumer before consumption.

Objectives: The objective of this study was to measure the quantity of sugar added in PlainYog under naturalistic conditions of consumption.

Method / Design: A study was conducted on 199 French adults, regular consumers of PlainYog with sweetener agent. At the end of a standardized meal, participants were asked to consume a PlainYog corresponding to their usual yogurt type (set, stirred, health segment) and were free to use their usual type of sweetener agent: sugar, honey or jam. The added quantities of sweetener agent were measured indirectly by weighting the package before and after use. These quantities were then converted into equivalence of added sugar quantities. Questionnaires on perception of food & health and behavior were administered afterwards.

Results: Participants added in average 13.6g of sugar equivalent per cup of yogurt, which is higher than industrialized pre-sweetened yogurts with 10.2g/cup. Quantity was higher when consumers used jam (24.4g/cup, n=36) than sugar (11.0g/cup, n=134) or honey (12.1g/cup, n=29) and also at diner (15.5g/cup, n=101) compared to lunch (11.6g/cup, n=98). Age, socio-professional category and BMI were positively correlated with higher quantities. Three terciles were identified: "low users" (n=67, median=6.1g/cup), "medium users" (n=66, median=11.4g/cup) and "heavy users" (n=66, median=19.9g/cup). Added sugar quantities matched behavioral data: "low users" who tend to control their food and "heavy users" who rather seek immediate satisfaction. Moreover, consumers add twice the quantity they estimated (6,85g/cup), although they were able to correctly estimate whether they were sweetening more or less than already sweetened commercial yogurts.

Conclusions: To our knowledge, this study provides for the first time robust and quantified data on the quantity of sugar added by the consumers to a plain yogurt, which is twice the quantity they estimate.

Keywords: (maximum 5): Added sugar, plain yogurts, consumption behavior, contextualized test, France

149/604. The Nutritional Footprint: discussing several health indicators and the practical usability in out-of-home-catering

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Introduction: The out-of-home-catering market is defined as an important field of action in the context of social transformation towards sustainability. The sector is responsible for a number of health and environmental effects in the production, processing, consumption and disposal of food (von Koerber, 2014). Considering these effects, the Wuppertal Institute developed an instrument called "Nutritional Footprint" (Lukas et al., 2015), which allows companies engaging in the out-of-home-catering market to monitor the sustainability of their product offering. It also serves customers to choose more sustainable and healthy dishes by providing a kind of label.

Objectives: The thesis evaluates the significance of the core health indicators used in the instrument with regard to their health value. The usability of the instrument for companies and customers in the out-of-home-catering market had been discussed critically.

Method / Design: Expert interviews (n=6) are used as research method for a qualitative analysis of the topic.

Results: The closer inspection of the core health indicators applied in the Nutritional Footprint instrument reveals that there are significant deficits concerning the number and choice of indicators. The number of four indicators on nutrient level is slightly not enough to evaluate a menu sufficient. Micro-Indicators such as e.g. vitamins and phytochemicals are missing. Further, the practical application of the instrument in the out-of-home catering has to be evaluated crucially. While the instrument helps companies to offer a more sustainable product range, the complex labeling may hinder consumers in the out-of-home-catering setting to take the Nutritional Footprint into account when engaging in a purchase decision.

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Conclusions: Finally proposals to modify the ranking level and to redesign the health core indicators of the Nutritional Footprint should be considered in the future.

Keywords: (maximum 5): Sustainable Nutrition, Nutritional Footprint, labelling, out-of-home-catering, consumer communication

149/613. The effects of nudging in coffee machines on two types of companies in Denmark

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Introduction: Coffee consumption in Denmark is very high. Thus, coffee machines are very popular in workplace. On these machines, different types of drinks are available, and many workers can unintentional increase their calorie intake due to their lack of knowledge about calorie content of them.

Objectives: Assess the impact of one nudge coffee machine intervention in blue and white- collar companies in Copenhagen, Denmark.

Method / Design: Longitudinal cohort follow-up study was conducted from February 21st to April 30th, 2013. Two companies were selected: one blue-collar (1 machine acting as control and intervention) and one white-collar (5 machines: 3 machines for intervention and 2 machines for control). In each machine, 14 types of drinks were available and the number of cups purchased was evaluated at baseline and in the end of the study. The drinks were classified in low, medium and high-calorie and the proportion of cups purchased in each category was calculated. After a 1-month baseline period, a display with hot drinks calorie information was posted on the coffee machines. In the blue-collar company, after a nine-month period, the long-term effect was evaluated.

Results: Black coffee is the most consumed drink in both companies (>50%). The two companies presented an increase of low-calorie drinks consumed, especially for intervention group in the white-collar company (10%), which also showed a statistically significant reduction of 8% in the proportion of medium and a reduction of 2% in high-calorie drinks. In the blue-collar company, there was a not significant decrease of high-calorie drinks and no-statistically significant changes after the long-term effect period were observed.

Conclusions: The proposed nudge intervention, calorie labeling in coffee machines, showed better results in white-collar company, which has higher education level. The use of a second nudge might contribute to better results.

Keywords: (maximum 5): nudging, choice architecture, coffee consumption

149/614. Quality of nutritional information available in popular sites on the internet about infant feeding

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Introduction: The early years of a child's life are important for the creation of good feeding practices. Inadequate infant feeding may contribute to the development of eating disorders. Among network users there is a significant percentage of women who use the Internet to learn about breastfeeding and complementary feeding.

Objectives: Define the quality of nutrition information for two years of old children there are available in popular sites on the internet according to the reference of the Brazil Health Ministry.

Method / Design: This is a cross-sectional study carried out between August and October 2014, in which a search was conducted on Brazilian and Portuguese popular websites (facing the lay public), which contained information on nutrition of children under two years . The search engine used was the "Google" and the information found were compared with the food guide for children under two years of the Health Ministry (2010). It was selected only sites containing information related to infant feeding. The last step of the analysis was to check on all the sites, if the information presented was in accordance with the Guide.

Results: 50 sites were analyzed, including blogs, food companies websites and websites specializing in child nutrition. Only 10% of these websites had correctly descripted all the steps contained on the Food Guide. The recommendations were: exclusive breastfeeding up to 6th month of life (80%); complementary feeding from six months of life (36%); encourage the consumption of fruits and vegetables daily (60%). On the health and safety of complementary feeding, 26% contained correct information. Only 36% correctly warned which foods should be avoided in the first years of life.

Conclusions: The information contained in sites display, largely disagreement with what is recommended by the Health Ministry, which may result in errors in nutritional care to children under two years.

Keywords: (maximum 5): Infant Nutrition, Internet, Food Guide.

149/631. Production of aronia melanocarpa powders from aronia "herbal dust" using spray drying technique

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Introduction: Aronia melanocarpa has gained a huge interest due to its unique composition of health-promoting bioactive compounds. Positive effect of aronia on human health was subject of numerous studies. It showed favorable effect in prevention of diabetes mellitus, protective effect on colon cancer, hepatoprotective activity etc.

Objectives: The main objective of this research was to transform, in usable form, by-products of aronia fruits obtained in food industry. During the production of aronia juice aronia cake is produced. Such cake is than dried, milled, fractionated, and used in fruit filter tea factory for production of filter tea. During processing certain amount of material of particle size lower than the particle size of pores of filter tea bag is produced. As such it can't be further use in production.

Method / Design: Using optimized solid-liquid extraction process followed by spray-drying process "herbal dust" can be transformed in usable aronia powder. In this research influence of operating conditions and composition of feed solution on powders properties (moisture content, bulk density, hygroscopicity, flow properties, content of phenolic compounds etc.) was investigated. SEM analysis was provided to.

Results: Moisture content of all powders was in range from 2.11% to 6.35%. In general, content of total phenols in powders was high (178.51 to 325.06 mg GAE/g). Content of total monomeric anthocyanins was from 6.91 to 55.00 mg /g. Bulk density of powders with maltodextrine DE 5.9, DE13.1 and DE19.7 was 459.4, 478.7 and 510.5 mg/ml, respectively. The lowest hygroscopicity (11.85 g/100 g) was detected for sample with highest concentration of maltodextrine MD 5.9.

Conclusions: Low moisture content of powders will ensure prolonged shelf life. Good flowability properties will provide easy processing in industry. High concentration of phenols of will enable production of quality healthy powder-containing products for food or supplement production.

Keywords: (maximum 5): Aronia melanocarpa, spray drying, powders

149/632. Nutritional education program to promote a healthy diet in Barilla employees: A pilot study

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Introduction: Health promotion programs in worksites improve eating habits of employees and reduce cardiovascular disease.

Objectives: To evaluate the effectiveness of a nutritional education program, based on a single and low-cost intervention promoting the Mediterranean diet, on the eating habits of the employees.

Method / Design: A pilot worksite intervention was performed on 750 employees of the Barilla-Company,Parma-Italy, who consumed daily their lunch at worksite canteens. Habitual dietary habits were evaluated by a self-administered 24-h-recall-questionnaire at baseline and at the end of the intervention; follow-up was performed after 6-month. An educational campaign lasting four weeks was developed focusing the intervention on beneficial effects of wholegrain, legumes and fish consumption and the detrimental effects of excessive red meat and animal fat intake; the Mediterranean Diet was proposed as a model of healthy dietary pattern. Panels, totems, table mats, handout leaflets on each topic were exhibited in the canteens weekly. To encourage people's consumption of the healthier Mediterranean dishes, nutritional information was provided on the menu to emphasize nutritionally adequate dishes.

Results: The analysis of food items selected day-by-day by the employees shows that the intake of wholegrain cereal, legumes and white meat increased at the end of intervention (+58%,+135% and +35%, respectively). This result persisted up to 6-month after the intervention. The analysis of 24-h-recalls showed that the consumption of wholegrain cereal products (+17.2g/day), legumes (+14.8g/day) and fish (+13.4g/day) was significantly higher at the end of intervention. This finding was confirmed up to 6-month after the intervention. No difference was observed for vegetables and fruit consumption.

Conclusions: This pilot study shows that an educational program performed in the workplace, based on a short and not expensive intervention promoting the Mediterranean diet, is able to improve the eating habits of the employees, also in the long term.

Keywords: (maximum 5): WORKPLACE NUTRITIONAL EDUCATION PROGRAM: FOOD CHOICE

149/638. Acrylamide concentration in human milk and infant formulas from the Polish and German market

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Introduction: Food is the major source of extraneous compounds for humans. The diet of the breast-feeding mothers impacts the quality of the infant's food. Acrylamide was found in various fried, deep-fried

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and oven-baked foods which are regularly consumed throughout the years, like chips (French fries), crisps and bread, but also biscuits, crackers and breakfast cereals. Acrylamide has been identified as carcinogenic, neurotoxic, genotoxic and a category 3 reprotoxicant in animals and as probable carcinogen to humans (Group 2A, IARC, 1994).

Objectives: The aim of the study was to determine the concentration of acrylamide in human milk samples and infant formula samples from the Polish and German market.

Method / Design: The experimental material included 101 human milk samples which were collected from residents of the North-Eastern region of Poland. The research material also included 50 samples of the most popular brands of infant formula which were bought in the Polish and German market. Infant formulas are designed for feeding in the early period of life.

Results: Acrylamide was detected in of 19 % human milk samples and, in 42 % of infant formula samples. The highest concentration of acrylamide was found in human milk (3.1069 ng/ml). Higher concentrations of acrylamide were noted in milk from young (age 18-25), smoking women, the residents of cities, with elementary education, and in milk from women who gave birth to 3 or more children. In infant formulas acrylamide was estimated in 3 kinds of products. The average content of acrylamide was between 0.1124 to 0.1600 ng/ml.

Conclusions: Taking into account the detrimental effect of acrylamide on human health, special attention should be paid to the level of this compound in food for infants. The education of women regarding diet during pregnancy and breastfeeding is very important.

Keywords: (maximum 5): acrylamide, human milk, infant formula

149/641. Vitamin A fortified cooking oil reduces vitamin a deficiency in infants, young children and women-results from a program evaluation in Indonesia

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Introduction: This pilot program, coverage and impact evaluation presented here aimed to measure the retention of vitamin A in fortified oil through the distribution chain, and effects offortification on vitamin A intake and retinol status of pre-school and school-age children, women of reproductive age and lactating mothers.

Objectives: To assess consumption of fortified oil, vitamin A intake and retinol status, before and a year after fortification of unbranded palm oil with retinyl-palmitate started.

Method / Design: Pre-post evaluation between 2 surveys.

Setting: Twenty-four peri-urban villages in two districts on West Java.

Subjects: Poor households were randomly sampled. Serum retinol (adjusted for sub-clinical infection) was analyzed in cross-sectional samples of lactating mothers, their infants 6-11 months, children 12-59 months, and cohorts of children 5-9 years and women 15-29 years, alongside food consumption from 24-hour dietary recall.

Results: Fortified oil improved vitamin A intakes, contributing an average 26%, 40%, 38%, 29% and 35% of daily Recommended Nutrient Intake (RNI) for children 12-23 months, 24-59 months, 5-9 years, lactating and non-lactating women, respectively. Serum retinol was2-19% higher at endline than baseline ($p<0.001$ in infants 6-11 months, children 5-9 years, lactating and non-lactating women; on-significant in children 12-23 months; $p=0.057$ in children 24-59 months). Retinol in breast milk averaged 20.5 μg/dL at baseline, 32.5 μg/dL at endline ($p<0.01$). Deficiency prevalence (serum retinol <20μg/dL) was 6.5-18% across groups at baseline, and 0.6-6% at endline ($p\leq0.011$). In multivariate regressions adjusting for socio-economic differences, vitamin A intake from fortified oil predicted improved retinol status for children 6-59 months ($p=0.003$) and 5-9 years ($p=0.03$).

Conclusions: Although this evaluation without comparison group cannot prove causality, retinyl contents in oil samples, RNI contributions and relationships between vitamin intake on serum retinol across groups provides strong plausibility of oil fortification impacting vitamin A status in Indonesian women and children.

Keywords: (maximum 5): Fortification, Vitamin A, palm oil

149/661. Impact of optimized diet patterns at a macro-level: the case of Tunisia

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Introduction: Mediterranean countries have lost their traditional dietary patterns and face emerged diseases linked to a non-balanced diet associated to excessive energy consumption. Tunisia is confronted to the triple burden linked to the coexistence of undernourishment (reduced to 5% but still remaining), nutrient deficiencies and obesity. Food security was insured by Tunisian social policies based on direct subventions to families and indirect ones by lowering the prices of essential food products (wheat, milk, seed oils, sugar and tomato paste).

Objectives: Our objective was to assess the impact of optimizing the Tunisian dietary pattern at a macro-level.

Method / Design: Non-linear programming approach, as described by Srinivasan (Agric. Economics 2007), was used to minimize the square deviations between the actual diet and the optimal diet under a set of constraints related to the French dietary recommendations, for

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a subset of 34 nutrients, 400 g of fruit and vegetables and an increase of 10 g of olive oil. Three sources of data were used: the food balance sheets from FAO and two French databases of nutrient food composition.

Results: We showed that the main needs in macro- and micronutrients are already covered by the food supply in Tunisia. However, the energy intake equivalent to 3329 Kcal per capita and per day, represented an average excess of 1000 Kcal for an adult. The adherence to all the dietary nutritional recommendations would induce an imperative shift to a less consumption of sugar, fats (except olive oil) and products from the milling industry (particularly wheat-based product). Conversely they should increase the share of vegetables and red meat in their overall consumption.

Conclusions: Using a static model applied on the food context of Tunisia, optimizing sustainable diets induced the reduction of the imports of cereals, sugar, and plant oils other than olive oil.

Keywords: (maximum 5): food, consumption, production, modelling, Tunisia

149/664. Validation of an aggregated food dataset based on nutritional quality-prices relationships

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Introduction: In order to assess and improve the sustainability of food consumption, indicators are needed for all the diet sustainability dimensions defined by the Food and Agriculture Organization i.e., nutritional adequacy and safety, environment, cultural acceptability, and financial affordability. Comprehensive data are available for cost and nutrient contents but limited for toxicological and environmental dimensions. Therefore, sustainability analyses must be conducted on an aggregated database.

Objectives: To estimate the validity of aggregating foods, by testing whether the relationships between cost and nutritional quality are similar when estimated either on the complete or the aggregated database.

Method / Design: The energy, nutrient contents and cost of 1250 foods were collected from the national French Food composition database (CIQUAL) and the 2006 Kantar World Panel database respectively forming the complete database. From a selection of 212 food items (representing 86% of the total weight of French adult consumption) used in the second French total diet study, weighted nutritional content and cost were estimated forming the aggregated database. The energy density (ED), the nutritional adequacy of individual foods scores (SAIN) and the scores for disqualifying nutrients (LIM) were estimated to evaluate the nutritional quality of foods in both databases. The relationships between the nutritional dimension and price were assessed by Pearson correlations, and compared between aggregated and complete databases using Fisher's Z-transformations.

Results: The SAIN was negatively associated to the ED, but positively associated to price/100kcal. Opposite associations were observed with the LIM. These relationships were not significantly different between the aggregated and complete databases.

Conclusions: The relationships between nutritional scores and price remains in the aggregated database, suggesting that it can be used to estimate the sustainability of French food consumption and to simulate and model the impact of public policies.

Keywords: (maximum 5): Sustainability, nutritional profile, food database

149/671. Young eater's diet: A complex situation making difficult the match with classical growth development models

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Introduction: Beyond nutrition, food has hedonic, social and cultural functions. Few studies exist on the socio-cultural dimensions of French babies' feeding practices.

Objectives: Analyse the material dimension of young children's eating habits (industrialised or "homemade", textures, portion size, quantity of nutrients, etc.), along with the different children's phases of development and socialization; explore the immaterial dimension by understanding parental activities around children's food as the result of a triple process (material, cognitive, emotional); capture the social norms and the cognitive discrepancies between norms and practices.

Method / Design: A qualitative study was performed to understand eating practices and representations related to 0 to 3 year old babies. Semi-directive interviews (54 parents) were performed in two French towns and their surrounding areas. Each family was interviewed in depth twice. Additionally, parents were asked to take pictures in between the two interviews in order to prompt discussion and exchange during the second interview. A netnography was added to go into lines of research in depth.

Results: This study brings elements on 1) children's eating practices and the link with children's nutritional and psychosocial needs, 2) caregivers' eating practices and their impact on children's co-socialization and co-education dynamics. Results show that material, cognitive and emotional burdens weigh unequally on parents, leading

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to the development of organisational adaptive strategies (delegation, ritualization, routinization) to reduce daily dietary tasks but without necessarily being compatible with children's health, sensory awakening and masticatory development.

Conclusions: This socio-anthropological study allows considering 0 to 3 year old baby's feeding practices beyond classical theoretical growth development models and highlights the importance of young eaters' socialization and its consequences. It demonstrates that young eaters are plural with complex eating habits requiring constant re-adjustments from their caregivers.

Keywords: (maximum 5): childhood, food, socialization, nutrition, caregivers

149/683. Nutritional knowledge and nutritional behaviour of primary school pupils in Germany

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Introduction: Nutritional educational measures are aimed at the improvement of knowledge and behaviour. The effects of measures on knowledge and behaviour have to be evaluated, and if necessary modified.

Objectives: To investigate nutritional knowledge on food items for morning breaks, the behaviour of pupils, and to assess differences between both.

Method / Design: During the project "Focus on schooI milk" (2008/09) self-administered questionnaires were completed by pupils and their parents. Information on nutritional knowledge ("If eating and drinking in breaks: What do you think is especially good for pupils?") and behaviour ("What do you take to school for eating and drinking?") originate from pupils' questionnaires. Additionally, a teaching unit concerning "a healthy breakfast with milk" was conducted. Data analyzed refer to 7,921 pupils. Chi2 tests were applied to reveal differences and logistic regression models to confirm influencing factors.

Results: Fruit (63%), bread/rolls (47%), vegetables (44%), bread/rolls with cheese (25%) and with sausage (23%) were most frequently seen as especially "good food for breaks". Pupils having attended the teaching unit named more frequently vegetables, bread/rolls with cheese and less frequently sweets than pupils not having attended the teaching unit. Gender, migration background and class level are of greater importance to knowledge than the teaching unit. There is a gap between knowledge on healthy food items and the items actually taken to school. So e.g. fruit and vegetables are estimated as "good food for breaks" of 63% resp. 44% of the pupils, but taken to school of 49% resp. 24%.

Conclusions: To close the gap between knowledge and behaviour nutritional educational measures for pupils have to consider factors like gender and migration background. As parents are responsible for the food choice, more importance should be laid on nutritional educational measures for parents.

Keywords: (maximum 5): Educational measure, nutrition, knowledge, behaviour, pupils

149/686. Ochratoxin a, a food contaminant modulate inflammation in the liver of weanling piglets

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Introduction: Ochratoxins are fungal secondary metabolites produced by fungus during food/feed storage. OTA has a multiple toxicity, being nephrotoxic, genotoxic and immunotoxic. According to the EC 576/2006 concerning the presence of OTA in feed, the maximum level of OTA recommended for complementary and complete feeding stuffs for pigs is 50 ppb. For OTA, there are no regulation concerning the maximal admitted level issued by the EC, but only recommendations, and recently the EFSA has recommended in-depth studies.

Objectives: In the present study we have investigated the effect of 50 ppb OTA (CE/576/2006 recommendation), as maximum admitted dose in complementary and complete feeding stuffs for pigs on the liver inflammation in weanling piglets.

Method / Design: A feeding trial was conducted to evaluate the effect of a OTA-contaminated diet on inflammation (cytokines: TNF-α, IL-1β, IFN-gamma, IL-8, IL-4, IL-10) and other molecules involved in inflammatory processes (Nf-kB, COX2 and iNOS) in weaned pigs. They fed on a corn-soybean meal basal diet and were randomly assigned to either a control (diet without mycotoxin) or OTA (50 ppb). In order to evaluate effects of OTA on the above gene expression and synthesis in liver, real-time PCR and respectively ELISA assays were used.

Results: The toxin doesn't affect the expression of the cytokines genes or the genes involved in inflammatory processes. However, 50 ppb of OTA tend to decrease the COX2 and IFN-gamma expression and significantly reduced the expression of IL-6 cytokine.

Conclusions: Even the recommended level of 50 ppb OTA intoxication resulted in low modifications of the expression of inflammatory cytokines and genes involved in inflammatory processes, it alters IL-6 and IFN-gamma synthesis and this may arise some questions concerning the safety of the CE recommendation for the maximum admitted level of OTA in the pig feeding stuff.

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Keywords: (maximum 5): ochratoxin, pig, inflammation, liver

149/692. Fusariotoxin Zearalenone affects genome-wide expression at local and systemic level in pig

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Introduction: Zearalenone (ZEN) is a mycotoxin produced by mould of Fusarium species which could contaminate the human foods and animal feed worldwide.

Objectives: The aim of the present study was to assess whether the in vivo exposure of growing pigs to low concentration of ZEN (100ppb) for 30 days generates changes in wide genome expression in spleen and small intestine (duodenum), as crucial organs for the systemic and local immune response.

Method / Design: Growing pigs were fed for 30 days with a control or a ZEN contaminated diet. The effect of ZEN on wide genome expression was assessed by using a DNA microarray.

Results: The microarray analysis showed that ZEN contaminated diet induced significant changes on global transcriptome in spleen and intestine of intoxicated pigs. The microarray data identified 4023 genes significantly ($p<0.005$) differentiated expressed in duodenum of pigs fed ZEN contaminated diet compared to control; of these 39.2% (1576 genes) were up-regulated and 60.8% (2447 genes) down-regulated. ZEN caused for instance the over expression of STAT5B gene involved in the survival and function as well as in modulation of the NF-kB activation. By contrast, the number of genes differentially expressed was lower in spleen of pig fed ZEN (1489 genes). The over expression was the predominant altered profile, 1175 genes (78.9%) been up-regulated and only 314 down-regulated (21.1%). It up-regulated (Fc=5.13) for example, IL10RA (the receptor for interleukin 10) expression, which was reported to promote the survival of progenitor myeloid and to mediate the immunosuppressive signal of IL-10.

Conclusions: In summary, these results suggest that ZEN can alter at low level the wide genome expression of growing pigs in spleen and especially in duodenum as a first organ exposed in an oral intoxication.

Keywords: (maximum 5): zearalenone; pig; duodenum; spleen; microarray

149/717. Body image and quality of life of primary-school children with German and Turkish background

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Introduction: Little is known about the association between body image, BMI and health-related quality of live (QOL) in younger children living in Germany.

Objectives: To determine the association between perceived body image and BMI with QOL of primary-school children with German and Turkish background.

Method / Design: 2,500 pupils (aged 5-9 yrs.; 2,172 German/ 328 Turkish background) who participated in the German prevention model project `Eat better. Move more´ completed a short form of the KID-KINDL® QOL questionnaire. To determine the body image, children indicated whether they estimated themselves as underweight, normal or overweight. Height/weight were measured and BMI classified according to German references. Chi²-tests and ANOVA were applied.

Results: One-third of children estimated themselves as not having the "right weight": 22% believed that they are „too thin", 12% „too heavy". Children with German and Turkish background estimated their body image significantly different (German/ Turkish background: 19%/ 41% "too thin"; 12%/ 18% "too heavy"). Body image and measured BMI don't match well. Only 12% of children feeling "too thin" were underweight, 57% of children feeling "too heavy" were overweight. QOL was higher for children with German than Turkish background, girls with Turkish background had the lowest score: German: 75.3 (boys)/ 75.8 (girls); Turkish background: 73.3 (boys)/ 68.6 (girls). Children feeling "too thin" and "too heavy" show a significantly lower QOL than children estimating to have "just the right weight". No association could be shown between BMI and QOL.

Conclusions: Regarding their body image children often have a distorted perception: even though being within normal range of the actual BMI they considered themselves as being above/below this range. The self-estimation of not being "normal", independent of actual BMI, is related with a lower QOL.

Keywords: (maximum 5): children, body image, quality of life, BMI, Migration Background

149/721. High Hydrostatic Pressure Extraction of Flavonoids from Freeze-Dried Red Grape Skin as Winemaking By-product

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Introduction: Winemaking by-products, such as grape pomace, are an inexpensive and rich source of phenolic compounds with well recognized health benefits. Aside from sample preparation, extraction procedure has a significant impact on the recovery of phenolic compounds from plant material. Recent studies showed that innovative technologies, such as high pressure processing, has the potential to enable the greater yield of target phenolic compounds compared to existing technologies. Hence, high hydrostatic pressure extraction (HHPE) has proven to effectively shorten the extraction time, improve the mass transfer rate, and enhance solvent permeability in cells as well as secondary metabolite diffusion.

Objectives: The optimal operating conditions for the HHPE of flavonoids from freeze-dried red grape skin pomace (cv. Teran) have been investigated. The aim was to obtain extracts with high flavonoid recovery and high antioxidant capacity.

Method / Design: Extractions of were carried out in methanol at different polarity (30,50 and 70%,v/v), under various pressures (300,400 and 500 MPa) during 3, 6.5 and 10 min. The total flavonoids (TF) were measured spectrophotometrically by using the aluminium chloride colorimetric assay and quercetin as calibration curve. FRAP method were used for assaying the antioxidant capacity (AC) and ascorbic acid as calibration curve.

Results: Parameters such as time, pressure, and solvent polarity showed remarkable effects on TF yields. Grand mean value for flavonoids was 160.63±2.81 mg quercetin equivalents/100g. Flavonoids extraction was not influenced by HHPE while with increased polarity increased amounts of this compounds in the extracts.

Conclusions: HHPE provided effective method for TF extraction from red grape skin as winemaking by-product thus could have potential application benefits in industry.

Keywords: (maximum 5): High hydrostatic pressure extraction, total flavonoids, antioxidant capacity, grape skins, winemaking by-products

149/722. Folic acid down regulates the tumor suppressive micro RNA hsa-miR-146a in colon cancer cells

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Introduction: A low nutritional folate intake is considered as a risk factor for a variety of cancers. However, there is evidence from human intervention studies that folic acid supplementation leads to an enhanced development of preneoplastic lesions in the colon.

Objectives: To determine the molecular effects of folic acid on cancer pathways in normal and malignant intestinal cells ....

Method / Design: ..... we cultivated the non-malignant immortalized colon epithelial cell line HCEC and the colon cancer cell line HT29 under five physiologically relevant folic acid concentrations (1nM, 10 nM, 20 nM, 50 nM, 200 nM) over six weeks and analyzed the expression of 53 micro RNA's using real-time PCR. The micro RNA's were selected according to their association with cancer signaling pathways like the wnt/β-catenin pathway, the epithelial-mesenchymal-transition (EMT), the p53 pathway as well as with methylation pathways.

Results: The main result of the study is the dose-dependent down-regulation of the micro RNA hsa-miR-146a in HT29 colon carcinoma cells by folic acid, which results in an up-regulation of the chemokine receptor CXCR4 – a prognostic marker for migration and metastasis in cancer cells. The down-regulation of hsa-miR-146a occurs only in the HT29 cell line and not in the non-malignant HCEC cell line. This micro RNA is regarded as tumor suppressor, which is down-regulated in cancerous tissues. Besides the CXCR4 gene expression, the hsa-miR-146a inhibits the translation of additional genes, which are relevant for tumor promotion (EGFR, KLF4/ UHRF1) and inflammation (FAS, TRAF6, IRAK1/2).

Conclusions: The influence of folic acid on this key regulator of inflammation and carcinogenesis very well agrees with data from human studies, which found a deregulation of inflammatory parameters in colon tissues and blood plasma after folic acid supplementation. Therefore, its down-regulation may have an overall tumor promoting effect.

Keywords: (maximum 5): folic acid, micro RNA, colon cancer risk

149/724. Winery by-products: anthocyanins recovery from red grape skin by high hydrostatic pressure extraction (HHPE)

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Introduction: The major residues from wine-making industry are represented by organic wastes such as grape pomace, containing seeds, skins and stems. Grape skin has been reported as a rich source of phenolic compounds (e.g. anthocyanins), even though the final recovery is highly dependent on the vinification process and the extraction method used. Anthocyanins present a very high thermal sensitivity thus extraction under lower temperatures is recommended. In this case, high hydrostatic pressure extraction (HHPE), as a novel extraction technique, has been reported as an appropriated method to improve the extractability of bioactive compounds from plant materials under

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lower temperature. Advantages also include shorter extraction times, higher yields, extract purity, and lower energy consumption.

Objectives: The aim of this study was to investigate the effect of HHPE on the anthocyanin content in freeze-dried red grape skin pomace (cv. Teran). Optimization was carried out to obtain high extraction yields using varying high pressures (300, 400 and 500 MPa), time (3, 6.5 and 10 min), solvent type (ethanol vs. methanol) and solvent polarity (30,50 and 70%,v/v).

Method / Design: Experiments were designed as a full factorial randomized experimental design. Dependent variable was total anthocyanin content (TAC), while independent variables were high pressure, time, solvent type and polarity. Individual anthocyanins were analysed by HPLC UV/Vis and expressed as malvidin-3-glucoside equivalents with an external calibration.

Results: Higher solvent polarity and higher pressure resulted in higher recovery of TAC, while the optimal time for extraction of TAC was 3 min.

Conclusions: HHPE has been shown to be an efficient method for TAC recovery from red grape skin and could have potential benefits for the use in different industries.

Keywords: (maximum 5): High hydrostatic pressure extraction, anthocyanins, grape skins, winery byproduct.

149/727. Nutritional quality of marine and freshwater fish species from Bulgaria

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Introduction: Many studies suggest that marine and freshwater fish are one of the most important dietary sources of essential polyunsaturated fatty acids (PUFA) and fat soluble vitamins (E, D3 and A). It is well known that the nutritional benefits of sea food consumption are mainly attributed to several potential cardio protective effects of omega-3 (n-3) PUFAs. Fat soluble vitamins are essential components of marine lipids and they control a variety of biologically important processes in the human body.

Objectives: The aims of the presented study were to compared the nutritional quality based on PUFA, fat soluble vitamins content; and lipid quality indices of three Black Sea fish: shad (Alosa imaculata), goby (Neogobius melanogaster) and turbot (Pseta maxima) and three freshwaters species: Common carp (Cyprinus carpio), catfish (Silurus glanis) and brown trout (Salmo trutta fario).

Method / Design: Total lipid (TL) content was determined according to Bligh&Dyer. Fatty Acid Methyl Esters were performed by GC/MS system. Vitamins A, D3 and E were analysed simultaneously using RP-HPLC system.

Results: Black Sea fish showed SFA>PUFA>MUFA distributions, while freshwater fish presented species-specific FA patterns. Marine fish contained higher omega-3 PUFA levels compared to freshwaters. All analyzed fish contained over than 0.250g.100g-1wet weight EPA+DHA n-3.

The fat soluble vitamins content were in range: 3.1±0.2μg–41.3±1.6μg.100g-1ww (vitamin D3); 1.9±0.07μg–30.8±2.1μg.100g-1ww (vitamin A) and 461.5±0.07μg-3293.7±140.7μg100g-1ww (vitamin E). Black Sea shad provides eight times higher amounts of vitamin D3 RDI.

Conclusions: All species are valuable sources of EPA+DHA n-3 and fat soluble vitamins. Marine fish and brown trout have better nutritional quality than common carp and catfish.

Keywords: (maximum 5): fatty acids, fat soluble vitamins, human health, lipid quality indices

149/729. Optimizing microwave-assisted extraction parameters for polyphenols recovery from sage (Salvia officinalis L.)

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Introduction: Medicinal and aromatic plants (MAPs) contain bioactive compounds (BACs) (e.g. polyphenols, carotenoids, organosulphur compounds) that can positively affect the nutritive, chemical, microbiological, and sensory quality of food products. Due to large structural diversity among different groups of BACs and their physical/chemical properties, it is important to identify/optimize the most effective extraction parameters required to isolate and/or separate BACs from other plant components. Sage (Salvia officinalis L.) is rich with polyphenols that are known for their antioxidative activity and positive influence on human health (e.g. risk reduction for: cardiovascular disease, diabetes, obesity, hypertension etc.). Innovative extraction techniques as microwave-assisted extraction (MAE) is a process that uses microwave energy, along with solvent, to extract target compounds from various matrices. Highly localized temperature can cause selective migration of target compounds from the material at a faster rate, thus providing enriched extracts compared to conventional extractions.

Objectives: Aims of this study were to identify optimal MAE parameters for extraction of total phenols (TP) from sage.

Method / Design: Study was full factorial randomized design with independent variables: (i) time (3,5,7,9,10 min); (ii) temperature (30,50,60,80°C); (iv) solvent (30% ethanol, 30% acetone, water); and (v) acidity (addition or not of HCl 10%). The TP content was evaluated by the Foin-Ciocalteu colorimetric method, calibrated against gallic acid calibration curve as the reference standard. Data were analyzed with multivariate analysis at α=0.05.

Results: Average amount of TP in study was 6945.81±121.03 mg/100 g d.m. Optimal extraction time was from 7-9 minutes, at

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T=80°C/500W, and with 30 % ethanol or acetone that yielded roughly two times more TP than water. Addition of HCl did not significantly increase amount of totally extracted polyphenols regardless of solvent.

Conclusions: Microwave-assisted extraction with aqueous solutes (ethanol or acetone) is appropriate approach for extraction of polyphenols from sage.

Keywords: (maximum 5): microwave-assisted extraction, medicinal and aromatic plants, sage, Salvia officinalis L., total polyphenols

149/732. Prevalence of health-related claims on pre-packaged foods: a five-country study in Europe

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Introduction: CLYMBOL (Role of health-related CLaims and sYMBOLs in consumer behaviour) is a European Commission supported project.

Objectives: This study aimed to determine the prevalence of symbolic and non-symbolic nutrition and health claims found on pre-packaged foods in five European countries.

Method / Design: Food and drink products were sampled based on a randomised sampling protocol, using store lists or a store floor plan. Data collection took place in 2013, across five countries (Germany, the Netherlands, Slovenia, Spain, and UK), in three types of stores (large supermarket/national retailer, discounter and neighbourhood store).

Results: A total of 2,036 products were sampled and packaging information was analysed. At least one nutrition or health claim was identified in 26% of the total products sampled (528/2,036 products). This was represented by 94% non-symbolic and 6% symbolic claims. The majority of all claims were nutrition claims (64%), followed by health claims 29%) and then health-related ingredient claims (6%). The most common health claims were nutrient and other function claims (47%). Disease risk reduction accounted for 5% and children's development and health claims 8% of identified health claims. The category of foods for specific dietary use (baby foods) had the highest proportion of both nutrition (78%) and health claims (70%).

Conclusions: The prevalence of symbolic and non-symbolic nutrition and health claims varies across European countries and between different food group categories. This study provides baseline data for regulators and food industry to monitor and evaluate the use of claims in food information to consumers. It is also the basis for subsequent phases of CLYMBOL involving consumer understanding and use of such information in purchase and consumption behaviour. Furthermore, the protocol designed and used in this study, particularly the addition of the health-related ingredient claim may assist future research in this area.

Keywords: (maximum 5): nutrition claims; health claims; health symbols; CLYMBOL

149/735. Protein profile and texture of fermented dairy products obtained by non-conventional starter culture

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Introduction: Novel studies have investigated the possibility of kombucha application, as non-conventional starter culture, and its interesting nutritional aspects in manufacturing of fermented dairy products. Different starter cultures may have influence on allergenic properties of final milk products due to their proteolytic activity. Consequently, biochemical changes of milk components during fermentation have a main role in texture, microstructure and nutritional quality of fermented milk products.

Objectives: The aim of this study was to investigate the protein profile, texture and microstructure of fermented dairy products obtained by kombucha starter.

Method / Design: Milk samples were fermented at 37°C (sample K37) and 42°C (sample K42) sample with addition of 10% kombucha inoculums (pH=3.17). During fermentation process, samples were taken at the pHs: 5.4, 5.1, 4.8 and 4.6 for texture and microstructure analysis.

Results: Sample K42 had shorter fermentation time than sample K37. During fermentation the relative content of lysozyme, lactoferrin (protein with antimicrobial activity), α- lactalbumin, (α-la) β- lactoglobulin (β-lg) and κ- casein decreased. Sample produced at 37°C had lower content of both allergenic fractions (α-la and β-lg) than in sample K42. Protein profile analysis revealed more stable α- and β- casein fractions compared to other protein fractions during milk fermentation. The analysis of the textural properties showed an increase in their values during fermentation and statistically significant differences ($P < 0.05$) among fermentation points, except between the pHs 4.8 and 4.6. The highest changes in microstructure at both temperatures were

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recorded between the pHs 5.4 and 5.1, while between the pHs 4.8 and 4.6 the differences were the lowest, which is correlated with textural properties of the samples.

Conclusions: These results indicate that fermented dairy products produced by kombucha at 37ºC and 42ºC have a good textural and microstructural quality and could be less allergenic compared to milk.

Keywords: (maximum 5): Fermented dairy products, kombucha, protein profile, texture, microstructure

149/737. Persistent organochlorine pollutants in fish from Danube River and from Black Sea, Bulgaria

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Introduction: Persistent organochlorine pollutants (POPs) like polychlorinated biphenyls (PCBs) and DDT residues (DDTs) are widespread, persistent and toxic organic environmental contaminants and can still be a problem for the human health. PCBs and DDTs were determined in three freshwater fish species: common carp (Cyprinus carpio), catfish (Silurus glanis), pike-perch (Sander lucioperca) and four marine fish: shad (Alosa pontica pontica), bluefish (pomatomus saltatrix), goby (Neogobius melanostsmus) and turbot (Psseta maxima maeotica). The fish samples were collected from Danube River and from Black Sea, Bulgaria in 2010.

Objectives: The POPs were analyzed in order to investigate the presence of PCBs and DDTs in freshwater fish species and to compare the results to the levels in marine fish species from Black Sea.

Method / Design: The fifteen congeners of PCBs, p,p'-DDT and its two main metabolites p,p'-DDE and p,p'-DDD were determined by capillary gas chromatography system with mass spectrometry detection.

Results: The DDTs were the predominant contaminants in investigated species, with the p,p'- DDE contributing to more than 67% to the total DDTs. The mean concentration of DDTs in freshwater fish was found 23.41 ng/g wet weight and mean PCBs concentration - 9.55 ng/g ww. In marine fish were determined the highest levels of PCBs (47.81 ng/g ww) and DDTs (217.00 ng/g ww) in shad.

Conclusions: The levels of DDTs and PCBs were determined lower than those found in similar fish species from other aquatic ecosystems. The sum of the six Indicator PCBs did not exceed the European maximum limit of 75 ng/g wet weight.

Keywords: (maximum 5): PCB, DDT, fish, Black Sea, Bulgaria

149/740. Young adults' knowledge and awareness of sustainable and healthy eating behaviour

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Introduction: Food, nutrition and health policy makers are poised with two pertinent issues more than any other: obesity and climate change. Consumer research has focused primarily on specific areas of sustainable food, such as organic food, local or traditional food, meat substitution and/or reduction. More holistic view of sustainable healthy eating behaviour has received less attention, albeit that more research is emerging in this area.

Objectives: Main objective of this study was to explore consumer attitudes, awareness and behaviour towards sustainable healthy eating. Additionally, individuals' openness to adopt sustainable healthy eating behaviour has been investigated.

Method / Design: Qualitative longitudinal research method has been applied. Twenty interviews were conducted with young Polish adults (aged 18-30) on three occasions over a one-year period. Principles of the "Livewell 2020" campaign have been introduced to the consumers at the first interview and then followed during the subsequent interviews.

Results: In general the term "sustainability" is not very well known and associated with concepts related to wellbeing rather than environmental aspects. Young adults are well aware of environmental impacts but they do not link sustainability to food and diet. They are enthusiastic about the six principles of the "Livewell 2020" campaign. The majority of participants tried to apply some principles in their daily life. Different motives and barriers to apply the sustainable and healthy eating behaviours have been identified.

Conclusions: The results of this study will be used to develop questionnaire for quantitative research and subsequently to develop a full randomized control trial that will measure the effects of two interventions aimed at increasing consumers' sustainable healthy eating behaviour.

Keywords: (maximum 5): sustainability, food, young adults, qualitative longitudinal research, awareness

149/749. Turkish consumers' intentions, beliefs and behaviours towards GMO foods and organic foods

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Introduction: An understanding of the relationships between consumer characteristics and GMO and organic foods buying behaviours is an important concern for health promoters.

Objectives: Aim of this study was to determine of consumers' intentions, beliefs and behaviours towards GMO and organic foods.

Method / Design: We undertook a questionairre, that was designed in order to meet the research objectives. In order to determine consumers' intentions, beliefs and behaviours, the questionairre consists of seven parts including environmetal protection, GMO, health, food taste, knowledge, labelling and organic food consumption intention. Consumers indicated their level of agreement on a 5-point scale that ranged from 1 ("strongly disagree") to 5 ("strongly agree"). Interviews conducted in a random selected sample consisted of 300 consumers (50% woman, 50% man) in Ankara in November and December of 2014. The questionnaires were analysed with statistical programme SPSS.

Results: Among all the participants 41.7% was agree that they prefer organic if they can choose between organic and conventional food products, 32.7% was neither agree nor disagree about genetic engineering should be more used in agriculture, 42.3% and 41.7% were agree and strongly agree respectively that for them it is important that food products contain no preservatives, 46.3% and 22.3% were agree and strongly agree respectively that organic food include less chemical residue than conventional food, 42.3% and 33.3% were agree and strongly agree respectively that they would like to buy organic food if they could find.

Conclusions: Since risk and benefit perceptions towards GM and organic foods are found to be depends on the individual, social, cultural, economic and environmental factors, identifying an effective strategy to improve consumers' behaviour is an important concern for health promoters.

Keywords: (maximum 5): GMO food, organic food, consumer behaviour

149/752. Turkish consumers' beliefs and attitudes about local farms and local food

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Introduction: Local farms can be considered as fresher, more environmentally and climate friendly alternative than imported food and can contribute the national economy. Many governments introduced programs to support small-scale local farmers and the marketing of stategrown products. Consumer beliefs and knowledge of local food influences their attitudes and transforms into purchase behaviour.

Objectives: The main objective of this study was to determine Turkish consumers' beliefs and attitudes about local farms and local food consumption.

Method / Design: We undertook a questionnaire in order to identify consumers beliefs and behaviours in the study area towards local farms, state grown products and local food. The questionnaire consists different statements about local farm and food. Consumers indicated their level of agreement on a 5-point scale that ranged from 1 ("strongly disagree") to 5 ("strongly agree"). Questions on demographic characteristics were also included. Field interviews conducted in a random selected sample consisted of 300 consumers (50% woman, 50% man) in Ankara in November and December of 2014. All statistical analyses were performed using the statistical programme SPSS.

Results: Among all the participants 52% and 29.3% of consumers were agree and strongly agree respectively that buying local foods support local farms. 47.3% and 22.4% of consumers were agree and strongly agree respectively that supporting local farmers are very important for national economy. 50.3% of consumers thought that payments that local farmers received aren't enough and 84.4% of consumers thought that government should pay more local farmers for environmentally friendly production. 40% and 52% of consumers were agree and strongly agree respectively that government should constitute environmental regulations and laws.

Conclusions: Since supporting local farms contributes to the national economy and help to protect the environment, consumers' beliefs and attitudes about local farms and intentions about local food purchasing are very important.

Keywords: (maximum 5): local food, local farms, consumer behaviour, consumer beliefs

149/761. Nutritive and market prospects of Kombucha fermented dairy products

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Introduction: Kombucha is a symbiotic association of yeast, acetic and lactic acid bacteria. Traditionally, kombucha is cultivated on dark and green tea. Novel researches have shown that kombucha inoculum can be cultivated as a non-conventional starter culture and used for the production of fermented milk beverages. The level of consumption depends on types, quality of products and cost of production.

Objectives: The objective of this study was to investigate the effect of kombucha starter culture- on nutritive characteristics, and viscosity of fermented milk beverages produced from milk with 0.9% and 2.2% (w/w) fat. Average cost structure of both beverages was analysed and compared with cost structure of plain yoghurt with 2.8% fat content.

Method / Design: Physicochemical characteristics were determined according standard IDF methods. Minerals were analyzed with atomic absorption spectroscopy (GBC 932 plus) .The content of vitamins was analyzed with reversed-phase liquid chromatography with a fluorescence detector-method HCTM-01, HCTM-02, HCTM-03 (Shimadzu C-R4A, CROMATOPAC).The fatty acids content examination was performed using gas chromatography (VARIAN, model 1400), with a flame-ionization detector - ISO 5509 2000 (19). Rheological properties of fermented milk samples were measured at 5°C using a viscometer HAAKE RheoStress 600HP (Karlsruhe, Germany) fitted with sensor PP60Ti (gap 1mm).

Results: The samples are a good source of minerals (Ca, K, Na, Mg, P) and vitamins (B1, B2 and B6). Low fat kombucha fermented milk contained 6.0% lower atherogenic index than beverage with 2.2 % (w/w) fat content. Low fat kombucha fermented milk beverage has lower average cost for both packaging types.

Conclusions: Both drinks can be classified as a high nutritive valuable and price competitive food that is intended for special consumers categories.

Keywords: (maximum 5): Fermented milk, kombucha, nutritive characteristics, rheology, market prospects.

149/766. The effect of Microwave Assisted Extraction (MAE) on the isolation of Polyphenols from Hawthorn

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Introduction: Many studies have confirmed high biological potential of the extracts from hawthorn leaves and flowers, and beneficial effects to the human health. In recent years, the focus of many researches is the application of new extraction techniques for isolation of bioactive compounds from plant materials. The isolation of bioactive compounds from plant material by use of microwave assisted extraction (MAE) has shown great potential due to its numerous advantages compared with conventional extraction methods: lesser amount of solvent required, shorter extraction time, higher extraction rate and improved amount of bioactive compounds in extracts.

Objectives: The objective of this study was to research the effect of MAE on the isolation of the total phenols (TPC) from hawthorn (Crataegi folium cum flore). The effect of microwave power, temperature of extraction, type and concentration of solvent (methanol, ethanol), and irradiation time were studied.

Method / Design: The extraction of TPC was performed using 30 and 50% aqueous solution of methanol and ethanol, at 50 and 65°C and microwave power from 200 to 400 W. The irradiation times were 3, 6, 9, 12 and 15 min. TPC were estimated spectrophotometrically using Folin Ciocalteu method and results were expressed as mg GAE /100g.

Results: Concentrations of solvent and irradiation time were the significant parameters for the extraction of total phenols ($p \leq 0.01$). Based on concentration of TPC, ethanol proved to be more effective solvents than methanol and amount of TPC increased till 6 minute of irradiation. Further increasing of irradiation time did not influence significantly on increasing of TPC.

Conclusions: The results demonstrated that MAE could be a highly effective, reliable and fast method for extraction of polyphenols in hawthorn. The main advantage of MAE has been showed in higher concentration of total phenols extracted in shorter time compare to conventional extraction.

Keywords: (maximum 5): hawthorn, microwave assisted extraction, total phenols

149/770. Income and food purchases-related GHG emissions: the French case

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Introduction: Taking into account income disparities is important due to the social gradient in health but also for designing sustainable food policies aimed at reducing GHG emissions. The environmental impact of food is a major concern since agriculture accounts for 30% of human greenhouse gas (GHG) emissions, with the main toll arising from animal products.

Objectives: The aim of this study was to estimate the CO2 emissions due to food purchases of French households and to analyse the emissions disparities between income classes. We want to explore whether the structure of purchases is a major determinant of GHG

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emissions disparities, by studying the animal or plant-based foods contribution, as well as the caloric content of foods.

Method / Design: Data on French food purchases came from a representative annual survey on household food-at-home: Kantar 1998-2010. The average quantities were computed on population subgroups using in particular 4 classes of family income corrected according to family composition. Food quantities were also converted in energy using the CIQUAL food composition database. From environmental data using Life-Cycle-Analysis, we computed CO2 equivalent emissions for 5 food groups. We adjusted levels of emissions by linear regression on income.

Results: We found that GHG emissions of food purchases for food-at-home amount to 3.9kgCO2eq/day/household. Lowest-income households emit 1.3 more CO2 compared to richest households, partly due to their higher share of food consumed at-home. However, we obtained the opposite result on a per calorie basis, evidencing that the environmental impact of a calorie is higher in richer households than in lower income ones. The relative contribution of animal-based vs plant-based foods is found to be constant by income classes.

Conclusions: The main structuring factor of income disparities in food-purchases GHG emissions does not lie in the structure of purchases, but rather in their caloric content

Keywords: (maximum 5): Income disparities, food purchases, GHG emissions, caloric content

149/774. Use of nutrition and health claims on pre-packed foods in the Slovenian market

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Introduction: Health-related information on food labels plays an important role in informing consumers and influencing their purchase decisions. Monitoring the use of such information on the market is important from public health perspective because, to support the scientific community, governments, the food industry and communities to develop strategies to fight against food-related non-communicable diseases.

Objectives: The study's main research questions were: (a) to assess consumers' exposure to nutrition and health claims on pre-packed foods in Slovenian market; (b) to identify food categories with the highest penetration of health-related information on food labels; and (c) to identify the most common nutrients and health relationships mentioned in health claims.

Method / Design: Over 6000 pre-packed foods available in four different food stores in Slovenia were examined and classified with respect to their health-related information.

Results: Nutrition and/or health claims were found on 37% and 13% of foods, respectively. Large differences were found between different food categories. The highest penetration of nutrition claims was observed on fruit juices and flavoured bottled water, breakfast cereals, yoghurts, and milk and yoghurt imitates. The most frequent were claims about the content of vitamins and minerals. Health claims were most commonly found on yoghurts, their imitates, and breakfast cereals. While children's development and health claims and reduction of disease risk claims were used very rarely, general non-specific health claims and function claims were found on 7% and 6% of foods, respectively. The most frequently targeted health relationships are digestive system functions (including weight maintenance and glycaemic response), immunological system functions and mental functions.

Conclusions: High penetration of health-related information on food labels is an indication to policy-makers that careful regulation of this area is appropriate, and that it is necessary to implement nutrient profiles.

The work was supported by the Slovenian Research Agency (P3-0395).

Keywords: (maximum 5): food labelling, health claims, nutrition claims, food supply

149/785. In-store intervention to promote healthy and inexpensive foods for French low-income populations

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Introduction: Low-income populations are often unreceptive to public health messages perceived as too complex and poorly adapted. In-store marketing strategies that draw attention to healthy and inexpensive foods may be effective for improving the diet quality of these populations.

Objectives: To develop and to evaluate an in-store intervention, using a social marketing approach to promote foods of good nutritional quality for their price.

Method / Design: Two urban supermarkets (Marseille, France) received an in-store intervention from January to June 2014 promoting the sales of healthy and inexpensive foods through labeling, placement and tasting booths. The purchases of members of the loyalty program were recorded in the two test stores and in two control stores during the intervention, as well as in the year preceding the intervention. Customer's awareness and usefulness of the program were assessed via an exit survey (n=259). Brakes and levers to purchase the targeted foods were investigated via individual interviews (n=133, member customers).

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Results: No significant differences were found between purchases of targeted foods compared with pre-intervention or with control stores. It is noteworthy that purchases of targeted foods were already rather high among members of the loyalty program (about 20% of total food purchases). Exit surveys revealed that 31% of customers had seen the intervention and 60% found it useful. These rates were higher at the end of the intervention and when comparing member and non-member customers. Interviews with member customers have shown that targeted foods are perceived as visible on stores' shelves (score=87/100) and easy to prepare (score=70/100), but unappetizing (score=53/100). Customers who have seen the intervention evaluate more accurately healthy and inexpensive foods.

Conclusions: A marketing intervention based on both price and nutrition seems to be relevant for low-income population, but a longer intervention may be needed to obtain significant effects on purchases.

Keywords: (maximum 5): nutritional quality, price, intervention, labeling, social marketing

149/797. Does consumption of locally produced food influence consumers' dietary exposure to environmental contaminants?

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Introduction: There is an increased popularity in many developed countries for different types of local food production, such as 'growing your own foods' and 'community supported agriculture'. Also owning private hens to produce eggs is increasingly popular. However, cultivation of crops and growing hens on contaminated soils can lead to an increased intake of contaminants when consuming these products.

Objectives: A literature-review was conducted to investigate if consumption of locally produced food influence consumers' dietary exposure to environmental contaminants.

Method / Design: Literature review using WebOfScience

Results: In total, 31 and eight papers were found discussing the presence of environmental contaminants in locally produced products of vegetable and animal origin (VO and AO), respectively. The studies investigating locally produced VO products focused on the presence of heavy metals (in 29 of the 32 papers), with Cd and Pb being most frequently investigated. In three of the 32 papers, the presence of organic contaminants (e.g. PAHs and dioxins) in locally produced VO products was investigated. The majority of the authors suggested that caution is needed when consuming locally produced VO food as it can increase exposure to environmental contaminants. However, many studies stressed the fact that contaminant concentrations varied substantially depending on the location making it difficult to generalize this conclusion. Considering locally produced AO products, all papers investigated eggs and only one study included also meat. Three papers described the presence of heavy metals, whereas six papers described the presence of organic contaminants. All these studies indicated that the consumption of locally produced eggs will increase the dietary exposure to contaminants.

Conclusions: Mitigation strategies to lower the contaminant concentration in locally produced foods are advisable, e.g. placing nets over the parcel, maintaining soil pH over the parcel, implementing raised beds, and feeding hens inside a paved henhouse.

Keywords: (maximum 5): contaminants, locally produced food, mitigation strategies

149/812. Comparison of the mineral content of tap water in Podgorica and natural bottled waters at Montenegrin market

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Introduction: Because some studies suggest a correlation between hard water and lower cardiovascular diseases mortality we compared mineral analysis reports from tap water of Podgorica with natural commercially available bottled waters at our market.

Objectives: We determined levels of calcium,magnesium,hardness and sodium in tap water and compared with published data mineral contents of commercially available natural bottled waters.

Method / Design: Samples of tap water were analyzed by complexometric,EDTA methods and by ICP-OES.

Results: Calcium concentration in tap water from Podgorica ranges 42,0-75,0 mg/l, magnesium 4,3 mg/l-7,8 mg/l,hardness 8,0-11,5°dH and sodium from 0,8 to7,0mg/l.In natural bottled content of calcium ranges from <3-83,0mg/l,magnesium 0,8-34,7mg/l and sodium 0,3-55,3mg/l.Water hardness of natural bottled water ranges 0,76°dH-18,02°dH.

Conclusions: The results of this investigation showed mainly low contents of magnesium.Bearing in mind the importance of magnesium and his protective role on cardiovascular diseases deficit of magnesium must be caught up through other food.

Keywords: (maximum 5): Cardiovascular diseases:mineral contents:natural bottled water:tap water

149/818. Comparison of the environmental impact of omnivorous, ovo-lacto-vegetarian, and vegan diet

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Introduction: The foods we produce and consume may affect our health and well-being, but for sure have a great impact on the environment. Plant-based foods have been described as protective against chronic diseases and, at the same time, share a remarkably lower environmental impact. In this framework, data are emerging on how dietary models may affect the environment, with plant based food diets clearly emerging as advantageous. However, there is a lack of information about the real impact of specific food choices on parameters associated to environmental impact.

Objectives: Determining the environmental impact of omnivorous, vegetarian, and vegan diets in the real-life context of an Italian small cohort of volunteers.

Method / Design: In an Italian observational multicentre cohort study, 153 volunteers were enrolled (51 omnivorous, 51 vegetarians and 51 vegans, matched for gender, age, BMI and smoking habits). Food intake was monitored with a 7 days dietary record. The European Institute of Oncology database was used to calculate nutritional values. The Barilla Center for Food and Nutrition database was used to evaluate environmental impacts, taking into account three indexes: carbon footprint, water footprint, and ecological footprint.

Results: The qualitative analysis of food patterns stressed the creation of well-matched diet groups based on their self-reported eating habits. Energy intakes were similar among the three diets. The omnivorous choice generated significantly worse carbon and ecological footprints ($p< 0.001$) than other diets, whereas the water footprint was significantly lower for the vegetarian choice ($p< 0.001$).

Conclusions: A plant-based diet, especially the ovo-lacto-vegetarian approach, represents a clear environmental advantage. To reach an environmentally sustainable scenario, animal-based foodstuffs should be partially replaced with legumes, cereals, fruits and vegetables, in particular in season and locally grown food, according to nutritional guidelines.

Keywords: (maximum 5): Environmental impact; Plant-based diet; Sustainable diet; Dietary record.

149/822. Mycological status of marama beans (Tylosema esculentum)

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Introduction: Marama bean (Tylosema esculentum) is a candidate for domestication in arid zones. Indigenous to Kalahari regions of Southern Africa, it thrives in low nutrient and low moisture soils. Seeds exhibit high oil (up to 48%) and protein (up to 42%) comparable to peanut and soybean respectively. Potential pathogens that affect leaf or grain production are of concern, particularly post-harvest contamination of grain.

Objectives: The aim of the project is a complete description of the fungal status of marama beans.

Method / Design: Previous work has shown the most important fungal contaminants belong to Alternaria, Penicillium and Fusarium, emphasis will be on these. Characterization of the fungal population of marama beans will give a complete picture about the mycological contamination of marama beans of different locations. Single spore colonies of the strains will be isolated and identified to the species level by morphological means and ITS sequencing. Matrix-assisted laser desorption ionization–time of flight mass spectrometry (MALDI-TOF MS) will also be applied. Gene expression studies will be applied to analyse the influence of external parameters by Real Time PCR with several mycotoxin biosynthesis genes. Analysis of the secondary metabolite profile of marama beans to determine influence on growth and biosynthesis of mycotoxins with emphasis on polyphenolic compounds will be determined by GC x GC/MS. Protein profiling will help to identify the changes induced by the potentially mycotoxigenic species.

Results: It can be expected a complete description of the mycological status of marama beans can be worked out. Furthermore, knowledge about the frequency of occurrence of potential mycotoxin producing species will be generated.

Conclusions: This information can be used to develop strategies for the prevention of mycotoxin biosynthesis in a HACCP context.

Keywords: (maximum 5): Marama bean, mycology, mycotoxins, pathogens

149/841. The effect of comercial starter culture addition on biogenic amines content in fermented sausage Petrovská klobása

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Introduction: Biogenic amines are organic bases which are produced in food by decarboxylation of amino acids caused by the activity of present and/or developed micro flora. Thus, due to high amount of proteins, dry fermented sausages could be a source of biogenic amines. It is important to monitor biogenic amines in food because of their toxicity and also because they could be a useful index of product's spoilage or ripening stage.

Objectives: The objective of this study was to determine the effect of comercal starter culture (Staphylococcus carnosus 25%, Staphylococcus xylosus 25%, Lactobacillus sakei 25%, Pediococcus pentosaceus 25%) addition on nine biogenic amines (tryptamine, phenylethylamine, putrescine, cadaverine, histamine, serotonin, tyramin, spermidine and spermine) content in traditional dry fermented sausage Petrovská klobása, at the end of drying period.

Method / Design: Two groups of Petrovská klobása, with (D2) and without (D1) addition of starter culture, were produced in traditional manner. Minced lean pork meat and fat were mixed with red hot paprika powder, salt , crushed garlic, caraway and sugar . The mixture was stuffed into collagen casings, smoked using cool procedure for 10 days, with pauses, and dried in traditional room for 90th day.

Analyses of biogenic amines were performed by HPLC-DAD on Eclipse XDB-C18 column.

Results: Phenilyethylamine, histamine, serotonin and spermidine were not detected in any sample, while putrscin (14.2 mg/kg) was detected in D2 group. Tryptamine (D1:40.3;D2:38.1 mg/kg), cadaverine (D1:12.3;D2:11.5 mg/kg), tyramine (D1:25.5;D2:29.7 mg/kg) and spremine (D1:12.3;D2:11.5 mg/kg) were detected in both groups. At the end of drying period total content of biogenic amines was 140 mg/kg in D1 group and 151 mg/kg in D2 group.

Conclusions: In both groups total content of biogenic amines was lower than recommended values and histamine was not detected.

Keywords: (maximum 5): fermented sausage; biogenic amines; starter cultures

149/842. Effect of an autochthonous starter culture on the oxidative stabilitty of traditional sausage (Petrovská klobása)

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Introduction: Petrovská klobása is a traditional dry fermented sausage that has been produced in the area nearby town of Bački Petrovac, Province of Vojvodina, Republic of Serbia. Due to the high lipid content, variability of the used meat, spices and other ingredients and different storage conditions, dry fermented sausages are subjected to lipid oxidation. Lipid oxidation leads to rancidness and accumulation of potentially toxic compounds that are harmful to human health. One way to slow down the lipid oxidation in dry fermented sausages is the addition of starter cultures.

Objectives: Therefore, the purpose of this paper was to evaluate the effect of the starter culture SC (Staphylococcus xylosus) addition on the oxidative stabilitty and sensory properties (odour and taste) of the traditional dry fermented sausage (Petrovská klobása). These parameters have been determined on the 1st, 30th, and 60th day of storage.

Method / Design: Lipid oxidation is expressed as mg malondialdehyde/kg (TBARS test). A panel consisting of eight trained members of different ages performed sensory evaluation of odour and taste. Evaluation was performed according to quantitative descriptive analysis (QDA), using a scale from 0 to 5.

Results: During storage period TBARS values in sausages produced with the addition of SC ranged from 0.13 mgmalondialdehyde/kg to 0.52 mgmalondialdehyde/kg, and these values were significantly lower ($P<0.05$), compared to ones determined for control. At the end of storage, sensory properties of odour and taste of sausages produced with the addition of SC (3.75) were better compared to those in control (3.18).

Conclusions: From the obtained results it could be concluded that the addition of autochthonous starter cultures (Staphylococcus xylosus) could contribute to better oxidative and sensory stability of traditional sausage (Petrovská klobása) during storage period.

Keywords: (maximum 5): Petrovskáklobása, traditional sausage, starter cultures, TBARS value, odour and taste

149/843. Determination of Turkish Consumers' Motivational Aspects of Food Choice

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Introduction: Food choice is influenced by many factors like social and cultural factors as well as physiological and nutritional needs. It is a complex human behaviour that reflects the perception of nutrition.

Objectives: This study has been planned with the object of determining Turkish consumers' motivational aspects of food choice in terms of animal rights, health, mood, convenience, sensory appeal, natural content, price, weight conrol, familiarity and ethical concerns.

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Method / Design: We undertook Food Choice Questionnaire (FCQ), that was designed to examine consumers' reasons while they are choosing foods to consume. The FCQ consists of different arguments about food choices. Consumers indicated their level of agreement on a 4-point scale that ranged from 1 ("not necessariliy") to 4 ("very necessariliy"). Questions on demographic characteristics were also included. Field interviews conducted in a random selected sample consisted of 300 consumers (50%woman, 50% man) in Ankara in November and December 2014. All statistical analyses were performed with statistical programme SPSS.

Results: Among all the participants, 58,3% of consumers agreed that whether "food production is respectful about animal rights" is very necessary. Fifthy percent of consumers choose foods which make them healthy. Furthermore, 74% of consumers indicated that good taste is very necessary for them while they are choosing foods to consume. In addition, 29,3% and 31% of them agreed that high fiber content and low energy content is "not very necessary" for choosing foods, respectively.

Conclusions: Since food choice underlies healthy nutrition, the role of motivational aspects are very important. However, the analyses of questionnaire shows that Turkish consumers do not consider important health aspects of foods very necessary.

Keywords: (maximum 5): motivational aspects of food choice, nutrition, Turkish consumers

149/866. Interesterification of a palm kernel/ palm stearin blend increases early phase postprandial lipaemia

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Introduction: Random interesterification of palm kernel and palm stearin (PK/PSt) is widely used by the food industry to create fats with desirable functional characteristics for applications in spreads and bakery products, without the use of trans fatty acids. Previous studies have reported reduced postprandial lipaemia, an independent risk factor for CVD, following interesterified palmitic- and stearic acid-rich fats. To date, the effects of commercially relevant PK/PSt interesterifed fats on postprandial lipaemia have not been investigated.

Objectives: To investigate the acute effect of test meals containing PK/PSt interesterified fats on postprandial lipaemia compared to un-interesterified PK/PSt fats.

Method / Design: Changes in plasma triacylglycerol (TAG) concentrations were measured at baseline (fasting) and over 4 h following consumption of a test meal containing 50 g test fat in 12 healthy male volunteers (18-45 y), using a randomized, controlled, crossover (1 week wash-out) double blind design. Test fats were PK/PSt (20:80 blend) un-interesterified (UI; control) versus interesterified (IE, intervention).

Results: Postprandial plasma TAG concentrations were significantly higher following IE versus UI; incremental areas under the curve (iAUC) were (mean with 95% CI) 72 mmol/L.min (52, 92) and 31 mmol/L.min (18, 45) respectively, $P<0.001$. IE displayed a different pattern of response versus UI with IE resulting in a rapid early rise in plasma TAG, reaching peak concentrations at 3 h (1.34 mmol/L) compared with UI which resulted in an attenuated response which continued to increase at 4 h (0.99mmol/L) (ANOVA, diet x time $P=0.002$).

Conclusions: Interesterification of PK/PSt increases early phase postprandial lipaemia (0-4 hours); however, it may elicit a beneficial rapid return to baseline values, which warrants further investigation during the late postprandial phase (4-8 h).

Keywords: (maximum 5): triacylglycerol, interesterification, dietary fat, postprandial lipaemia.

149/870. Safety of fermented foods in Africa: a systematic review

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Introduction: Fermented foods represent a significant part of the diet of Africans, with provision of about 40% of their food supply

Objectives: The objective was to evaluate the safety status of fermented foods produced in the Africa using a systematic approach.

Method / Design: Ten bibliographic databases were searched from their inception to February 28, 2015 and a systematic review of primary, quantitative, observational and published works on African fermented foods was done. Two reviewers appraised the study findings and the quality of the studies was analyzed qualitatively.

Results: Thirty eight studies met the inclusion criteria and the amount of the evidence varied by region with 35% of the studies from Western Africa. There were good evidences that fermentation has provided beneficial foods and played important socioeconomic roles in Africa. However, there were mixed findings on the safety of fermented foods as some studies identified the role of fermentation in decontamination of some toxic components in foods but most recent studies reported the presence of pathogenic microorganisms, their toxins and identified the risk associated with their consumption. Few cases of food borne illnesses were also reported. Also, in these studies, the fermented foods were associated with these because of continuous and unpredictable growth of microorganisms during and after fermentation, pre and post-processing contamination and because they are mostly produced traditionally in homes under spontaneous conditions with little or no consideration of Good Hygienic Practice and Good Manufacturing Practices. Recommendations to carry out more in-depth research on their safety were made in some studies.

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Conclusions: This review provides strong evidences of the presence of pathogenic microorganisms in fermented foods that are traditionally produced in African countries, identified measures that can be adopted to combat them and outlined new areas of research on their safety.

Keywords: (maximum 5): Fermented foods, Africa, Safety, Microorganisms

149/873. Development of Carrageenan based Edible Packaging for Instant Noodle Condiments and Seasonings

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Introduction: Eco-efficient products such as edible films are currently the trend in resolving the rising issues on post-use waste disposal; thus, using these products is encouraged. Carrageenans are family of linear sulfated polysaccharides that are extracted from red edible seaweeds (Phylum Rhodophyta).

Objectives: Hence the objective of this study is to develop an edible packaging from kappa-carrageenan for instant noodle condiments and seasonings.

Method / Design: The film were analyzed for proximate composition, dietary fiber (DF) and mineral content using AOAC standard methods, while the method of Trinidad et al., was used in the in vitro mineral bioavailability assessment. Sensory evaluation was also done using Paired Comparison Test.

Results: Results showed that the films contained 0.10 g/100 g of Fat, 12.6 g/100 g of Ash, 15.1 g/100 g of Moisture, 0.13 g/100 g of Protein and 72.67 g/100 grams of Carbohydrates. The total DF was 59.8g/100g; with 58.1 g/100g of soluble DF and 1.7 g/100g of insoluble DF. The films had a 5.84 ± 0.55 mg/100 g Iron, 416 ± 9 mg/100 g Calcium, and 2.58 ± 0.13 mg/ 100 g of Zinc. Among the three minerals, only calcium was available for absorption. In terms of appearance, there was a significant difference observed between the blank samples and samples with edible film packaging while no significant difference was observed with regards to aroma. In terms of taste, no significant difference was observed for the Chicken Noodle soup while a significant difference was observed for the Original Pancit Canton.

Conclusions: Thus, it can be concluded that carrageenan based edible packaging can be incorporated as a functional ingredient in instant noodle soups, particularly Chicken Noodle soup. It is also recommended that the edible films may be used as a potential functional ingredient in other food products for wider application.

Keywords: (maximum 5): Carrageenan, edible film, packaging, functional food

149/880. Are Foods based on Cereals Safe? Current Risk Assessments of Mycotoxin Contamination

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Introduction: According to a WHO estimation about 25% of agricultural commodities are contaminated with mycotoxins worldwide. In particular cereals are susceptible to fungal infection during growth and storage. The most common fungal genus involved is Fusarium. Major Fusarium toxins such as desoxynivalenol, zearalenone and fumonisins are regulated by EU legislation. However, during the last years so called "emerging" and "modified" mycotoxins [1] have been discovered, which are either plant metabolites of the fungal toxins or produced by other ubiquitous fungi such as Alternaria species.

Objectives: The goal of this ongoing work is to develop approaches to accurately analyze regulated mycotoxins for risk assessents and to identify further toxic metabolites

Method / Design: Targeted and non-targeted approaches have been developed to accurately quantitate „emerging" and „modified" mycotoxins along with multi-analyte approaches based on stable isotope dilution assays (SIDAs) [2] for efficient mycotoxin control.

Results: Multi-SIDAs for foods based on cereals have been developed and validated. In this regard, most Fusarium toxins and major modifications were included and detected in cereal products. Besides, major Alternaria toxins were analyzed and risk assessments along with management actions for infant foods were initiated. Moreover, non-targeted approaches were initiated to screen for other fungal mycotoxins.

Conclusions: Despite the current analytical developments in metabolomics, mycotoxin analysis still is challenging with regard to accurate quantitation and newly identified compounds. However, risk assessment and preventing hazards for the consumers requires data on exposure and toxicological properties, which are still lacking for many substances. Therefore, it can be concluded that in this respect we still see only the tip of the iceberg.

References:

[1] Rychlik M, et al. (2014) Mycotoxin Research, 30: 197-205, open access.

[2] Rychlik M, Asam S (2008) Analytical and Bioanalytical Chemistry, 390: 617-628.

Keywords: (maximum 5): Mycotoxins; Cereals; Targeted and Non-Targeted Metabolomics; Fusarium; Alternaria

149/882. Identification of a para-cresol-specific odorant receptor: The crucial role of SNP

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Introduction: Of ca. 10000 odorants which can be found in foods and beverages, only about 230 occur in concentrations above their odor threshold. These so called key food odorants (KFO) are determinants for the perceivable aroma of the particular food. Until now only few cognate odorant/receptor pairs have been determined. Even fewer of these specific interactions could be verified in individuals carrying a specific OR genotype, e.g. a non-synonymous single nucleotide polymorphisms (SNP), which cause loss-of-function of a particular odorant receptor, thus resulting in a phenotype commonly addressed as specific anosmia for a particular odorant.

Objectives: Bioassay-based testing of receptor libraries with aromas will establish objectified, aroma-specific receptor activity patterns, and thus may become important biotechnological tools for quality control in food production pipelines.

Method / Design: Here we show experiments with the KFO para-cresol (4-methylphenol), which is perceived as horse stable–like and fecal malodor, and related volatile phenolic compounds. By screening a library of 391 OR we identified receptor OR9Q2 as best responder to para-cresol and 4-ethylphenol. Other closely related phenolic compounds were not able to activate the receptor.

Results: Testing the ability to detect the horse stable-like odor quality of para-cresol in a human study, we identified 3 individuals with a specific anosmia phenotype for para-cresol. Those three individuals were homozygous for the SNP C179R within the coding region of OR9Q2, which was the only difference to normosmic individuals carrying the OR9Q2 reference sequence. In our in vitro assay, mutation C179R in OR9Q2 caused a complete loss-of-function for para-cresol. We found for SNP C179R an allele frequency of 17 % in our study, which is similar to what was observed in the 1000 Genomes Project.

Conclusions: In summary, our study shows that single SNP in OR can explain inter-individual differences in aroma perception.

Keywords: (maximum 5): odorant receptor, SNP, key food odorants

149/889. Attitudes and behavior of high school students in relation to food and nutrition - the results of qualitative research from Poland

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Introduction: In Polish schools health and nutrition education does not occupy an important position.

Many nutrition interventions designed to improve the eating behaviours of adolescents were undertakenwithout understanding of the factors that affectadolescents food choice decisions.There is also insufficient awareness of the importance of the role of the family, peer group and media in health promotion.

Objectives: To gain an insight into factors that affect the food choices andeating behavioursof high school studentsin Poland.

Method / Design: Data were collected in three focus group discussions(a qualitative research method) undertaken in one high school in Northern Poland,with approximately 10–12 randomly selected pupils per group.The focus group questions were designed to provide an insight into 15–17-y-old eating behaviour and perception of factors that influenced their food choice.

Results: High school students reported getting information about food from Internet, family and food products labels.It has been found that theyhad a tendency to categorise foods as either 'healthy'or 'unhealthy'. Healthy eating was mainly associated with fruit, vegetables and fish whereas 'unhealthy' with sweets and 'junk food'.This indicate that adolescents were able to identify healthy food, as well as indicate products that consumption should be limited, however they declared difficulties in the introduction of this knowledge in their daily behavior.Eating more healthily was perceived tobe a difficult, unattractive and largely unachievable behaviour. Major barriers were own laziness, appearance of food, taste, time/effort, food price, food availability, eating habits.The majority of children reported that they did have breakfast every morning, however their diets changed at the weekend.

Conclusions: This study has revealed the need for change in high school students eating behaviors.Understanding the perception and relative importance of healthy eating to adolescent can aid in developing interventions that make healthy eating easier, more appealing, and more supported as a peer norm.

Keywords: (maximum 5): healthy eating,food perception, food choice, adolescents

149/891. Determinants of purchasing behaviour for food products with reduced salt content among selected groups of polish consumers

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Introduction: The increased salt intake contributes to cardiovascular diseases. According to WHO, the salt content in a diet should not exceed 5 g per day. In Poland, the excessive intake of salt constitutes an enormous problem (12 g per day). Manufacturers being aware of the problem, modify the composition of their products by lowering

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the salt content and look for simple ways for passing this message to the consumers.

Objectives: To determine the factors of choice and barriers for purchasing products with reduced salt content.

Method / Design: A survey (face to face interview) was conducted among 434 consumers (220 respondents under 25 years and 214 aged 26-55 years) to find out what criteria were taken into account while choosing and purchasing food products with reduced salt content.

Results: The respondents were not able to evaluate their knowledge on the products with reduced salt content. In the group of people under 25, the majority of women chose the answer: "my knowledge is neither broad nor limited". In the group of people aged 26-55 years, women much more frequently declared that an increase of interest in such products is related to the change of diet. In the group of respondents under 25 years, women more often than men declared that a significant decrease in purchasing of products with reduced salt content is due to purchasing habits and high price. In the group aged 26-55 years, women more often than men considered insufficient palatability as an important factor limiting the purchase of such products.

Conclusions: We noticed the lack of sufficient knowledge about the products with reduced salt content. Due to this fact, some actions should be undertaken by the producers and some educational campaigns should be implemented to increase consumer awareness.

Keywords: (maximum 5): salt content, consumer, purchasing behavior

149/904. Factors driving consumers' intention to purchase food products-Konya, Turkey

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Introduction: Consumers' food purchasing behavior is complex phenomena influenced by many factors such as consumer's awareness about food and health, quality, price, brand, package, familiarity and taste.

Objectives: This study aims to determine that factors influencing consumers' intention to purchase food products in Konya, Turkey.

Method / Design: The research was a cross sectional descriptive survey. The study sample consisted of voluntary consumers randomly selected (n=332; 166 female, 166 male) from individuals shopping from markets in Konya, Turkey. The survey was a one-to-one interview using a questionnaire including open-ended and closed-ended questions regarding demographic information, factors that consumers pay attention to for price, brand, production date, expiry date, flavor, packing, color while purchasing food products. The data were statistically analyzed using descriptive method.

Results: Ages of 38.6 % of participants were between 21-29 years. Of the consumers 36.4% were university graduates, 28.3% were self-employed and half of them were unmarried. Consumers paid attention to expiry date while purchasing milk products (77.9%), canned products (68.6%) and frozen foods (67.2%). It was determined that participants gave importance to price during purchase of meat products (46.0%). Package was a feature that consumers did not take into consideration while buying milk products (57.0%) and canned foods (58.8%). For purchasing frozen food, they did not pay attention to price (57.1%), and brands when consumers purchased meat products (87.2%). Gender difference was found to be significantly important among consumers in paying attention to price for purchase of milk and canned products, production date while purchasing frozen foods and taste when they bought meat products ($p<0.05$).

Conclusions: The findings revealed that factors driving consumers' intention to purchase food products were influenced by price, brand, expiry date, package, taste and these factors varied depending on types of food products purchased.

Keywords: (maximum 5): Consumer, food products, purchase

149/910. The impact of a message containing health and ecology aspects related to seafood consumption

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Introduction: Most guidance on seafood consumption does not take into account the ecological and economic impact of seafood consumption choices. Although little attention has been paid to integrate health and ecology in communication activities, this is important because economic viability and nutritional recommendations depend on the maintenance of adequate fish stocks.

Objectives: The determination of a good communication strategy which combines health and sustainability regarding seafood consumption advice.

Method / Design: A web-based survey was performed in two countries, namely Belgium (Flanders, n=474) and Portugal (n=512). The survey consisted of three parts: (1) a baseline questionnaire, (2) presentation of a message and (3) a post-intervention questionnaire. The message contained balanced information about health benefits (nutrients) and health risks (contaminants) of seafood, information about the depletion of fish stocks as well as advice to consume seafood twice per week and to buy seafood in a sustainable way.

Results: Although the message has a negative effect on the attitude towards eating seafood, the Belgian respondents reported an intended higher seafood consumption frequency after reading the message.

Portuguese respondents reported to buy seafood in a sustainable way before reading the message and the intention did not change

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after reading the message. This is in contrast with Flanders where the intention to buy seafood in a sustainable way significantly increased, however this intention remained low. Therefore, attention has to be paid to perceived barriers such as price, satisfaction with conventional seafood and low availability regarding sustainable seafood consumption.

Conclusions: A message including health and ecology aspects related to seafood does not decrease intended consumption frequency and has a positive effect on the intention to buy seafood in a sustainable way. However, barriers and motives are important to consider when aiming a behavioural change.

Keywords: (maximum 5): Seafood, Communication strategy, Health, Ecological sustainability

149/912. Climate change, post harvest food losses and food security trainings for Georgian farmers

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Introduction: By estimating the significant scientific evidence indicating that the climate is changing, largely due to human activities and anthropogenic factors are evident. The goal of this paper is to show our study the complex interaction between agriculture, economic growth and post harvest food looses given future uncertainties. We combine economic concepts to analyze the long-term socio-economic and environmental consequences of different crops. Georgian Agriculture is rapidly transforming into a modernized, productive and competitive force by the State Support in the last three years, a wide ranging, highly effective set of policy reforms focused on enabling private-sector led modernization of the Ag Cooperatives to sustainable agribusiness community.

Objectives: Smallholder farmers in some selected communities of Georgia have been trained by the Experts of the Association for Farmers Rights Defense, AFRD how to reduce Post-Harvest Losses using the small bags and vehicles for collecting post harvest crops for moving to storages.

Method / Design: The benefits to consumers from reducing losses include lower prices and improved food security. In addition, postharvest activities such as processing and marketing can create employment and thus income and better food security in the agricultural sector. Therefore, reducing PHL clearly complements other efforts to enhance food security through improved farm-level productivity and will generate incomes.

Results: During trainings were analyzed the establishment of postharvest weight loss baseline data, as well as a better understanding of the magnitude of the opportunities lost, are both critical to better inform development experts, policy makers, and industry stakeholders of the options offered by the systematic adopting of PHL-reduction strategies.

Conclusions: The exercise presented here on PHL estimations also suggests the need for an approach that balances the costs and benefits of producing more food to cover the losses caused by the lack of appropriate PHL reduction technologies and practices

Keywords: (maximum 5): Climate Change, Food Security, Georgia

149/922. Course for use of tilapia (Oreochromis niloticus) in school meals

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Introduction: The food served in public schools in Brazil is free and constantly seeks to offer good quality, nutritious and healthy. Currently it is necessary to seek more sustainable alternatives that promote greater care for the environment. The Santo Antônio de Jesus city is located in Bahia, Brazil and receives an average of 9,580 students daily. Guide those involved in school feeding on the inclusion of food purchased in the region becomes very important.

Objectives: The study aimed to empower multipliers of school feeding Santo Antônio de Jesus - BA, Brazil on the inclusion of tilapia fish (Oreochromis niloticus) produced in the region replacing the fillet Hake "Merluza" (Merluccius hubbsi) purchased from Argentina.

Method / Design: Agents involved in school feeding management received training with the theme "Inclusion of Tilapia in school meals." The event was addressed the nutritional characteristics of Tilapia, taste, ease of removal of thorns, the low cost and the possibility of acquiring the city itself.

Results: All participants reported at the end of training that will change the fish imported from Argentina by Tilapia acquired locally, they saw that it is possible to make the switch. The impact of this change is too big for only one day in the fish consumption is 700kg.

Conclusions: The training allowed make a major change in the food offered in schools since the fish to be used will be acquired in the town itself and not imported from Argentina. Thanks to the training used positive impacts on the environment and health will be prioritized.

Keywords: (maximum 5): Food. Environment. Health. Fish.

149/933. The impact of packaging type on the antioxidant activity of pickled red cabbage cool stored

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Introduction: Cruciferae family vegetables are characterized by a high content of secondary metabolites, as well as, the presence of other bioactive compounds, which may play an important role in human health.

Objectives: The aim of this study was to investigate the changes of total polyphenols and antioxidant activity in pickled red cabbage, cool stored for 4 months in two types of packaging, namely in zipper seal bags made of polyethylene of low density (PE-LD) and in bags made of metallized polyethylene terephthalate (PET met/PE).

Method / Design: The tests were performed before storage, as well as after 1-, 2-, 3- and 4-month period of cool storage. Analyses were run in the vegetables stored in the above mentioned packaging. Total polyphenols were determined by Folina-Ciocalteau method, while the antioxidant activity by using a method of free ABTS˙+ radicals.

Results: After 3- and 4- month period of cool storage, there were statistical significant ($p<0.05$) losses of the above mentioned components. In the case of vegetables stored in polyethylene zipper seal bags the losses were ~13.3%, respectively, while in the vegetables stored in bags made of PET met/PE, the losses reached 18.3%, compared with not stored vegetable.

In the case of cabbage stored in polyethylene zipper seal bags and in bags made from PET met/PE, after 3- and 4-month period of cool storage, the antioxidant activity decreased by ~16.1% and ~18.2%, respectively compared with not stored vegetable.

Conclusions: This study did not show a statistically significant ($p>0.05$) impact of packaging type on the total polyphenols content and antioxidant activity of pickled red cabbage stored in cooling conditions.

Keywords: (maximum 5): antioxidants, pickled red cabbage, packaging

149/952. Influence of nitrogen, Plant Growth-Promoting Rhizobacteria on growth, nutrient uptake of Cucurbita moschata

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Introduction: Most Africa countries are subject to food insecurity. They have to face the triple burden of malnutrition, especially caused by essentials nutrients deficiency, nutritional transition with the results of high rate of non-transmissible diseases. Nutritional problems are directly related to farming models. Many bacteria are recognized to improve the growth and nutrient quality of plants in an environmentally friendly manner.

Objectives: This study was performed in order to evaluate the effect of nitrogen sources (NO3-, NH4+ and NO3NH4+) and beneficial PGPR (Bionutrients AG-8-1-9) on the yield and nutritional composition of Cucurbita moschata leaves vegetable consumed in Cameroon.

Method / Design: Pots trial was undertaken under controlled conditions on plants supplemented either with nitrogen source, or nitrogen associated with beneficial bacteria. Growth parameters such as number of leaves, shoot length, stem base diameter, shoot and root dry weight as well as nutritional content of leaves (N, P, K, Fe, Ca, Mg, Na, Mn , Zn, fiber) were recorded.

Results: The squash plants supplied with three N sources alone or in combination with PGPR inoculation showed significantly ($p < 0.05$) higher RDW, SDW, shoot length, stem diameter, number of leaves and ramifications than those with N fertilized and uninoculated at the vegetative stages. The highest total plant dry weight harvested (36.99 g plant-1) was found when plants were supplied both with NO3NH4 and PGPR inoculation while the lowest (27.32 g plant-1) was recorded in plants enriched only with NO3-compared to NH4+. N, P and Mn uptake of squash plants were positively influenced by PGPR inoculation and different N sources. However, no significant difference was observed within treatment and fiber content of leaves.

Conclusions: These suggest the use of NO3NH4 and NH4+associated to bacteria to improve the Cucurbita moschata growth as well as its nutrients contents.

Keywords: (maximum 5): Squash, bionutrients, nitrogen, nutrients, growth parameters.

149/963. Risk assessment of the sympathomimetic alkaloid synephrine in athletic and weight-loss dietary supplements

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Introduction: Synephrine is a sympathomimetic alkaloid, naturally found in bitter orange (Citrus aurantium) and other citrus fruits.

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It is added in form of Citrus aurantium-extracts, often in combination with caffeine, to a number of dietary supplements intended for weight loss and sports performance.

Objectives: The health risks of synephrine were evaluated with the purpose to define the safe level for the addition to the food supplements.

Method / Design: The hazard characterization was performed by evaluation of relevant studies and case reports. The derivation of the acceptable intake level of synephrine form the food supplements was conducted in accordance to the EFSA-Guidance on Safety assessment of botanicals and botanical preparations intended for use in food supplements (2009).

Results: In animal studies, orally applied synephrine induced adrenergic effects on the cardiovascular system (increase of heart rate and blood pressure, ventricular arrhythmias), which were en-hanced by the concomitant application of caffeine.

Human intervention studies investigating the acute effects of synephrine on blood pressure and heart rate of healthy, normotensive test persons showed that single doses of synephrine > 27 mg can be expected to induce cardiovascular effects in humans.

A number of published case reports of adverse cardiovascular effects (hypertension, cardiac arrhythmia, myocardial infarction) where associated with consumption of synephrine-containing dietary supplements.

The exposure estimation of average daily synephrine intake via conventional foods (such as oranges and other citrus fruits) resulted in 6,7 mg/day for average consumers.

Conclusions: Consumption of high amounts of synephrine is associated with an increased risk of adverse effects on cardiovascular system. Daily intake of synephrine through dietary supplements should be limited to the intake levels from conventional foods, and thus should not exceed 6,7 mg synephrine per day.

Keywords: (maximum 5): synephrine, caffeine, risk assessment

149/976. Quality of frozen French fries on Slovenian market evaluated with consumers comparative food testing

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Introduction: French fries are appreciated by consumers, especially by youth, since they have a pleasant taste, aroma and crispy crust and are fast and easy to prepare. Frozen prefried french fries are already deep-fried for a short period, but not enough is known about the amount and the quality of fat in which french fries are prefried.

Objectives: The objectives of this consumer's comparative food test were to assess the amount and quality of fat in which french fries has been prefried. Sensory quality of french fries and declaration was also assessed.

Method / Design: Sampling was carried out in several food stores in Ljubljana, comprising classic and budget food store chains that are present in Slovenia. The amount of fat and composition of fatty acids were analysed for 12 samples in an accredited laboratory, sensory quality was evaluated by a panel of 3 skilled assessors in two steps. In the first step the overall appearance of frozen french fries was evaluated. After frying french fries in sunflower oil according to manufacturer´s instructions the main sensory parameters were evaluated: appearance of cross section, odour, taste, texture and aroma.

Results: The results showed different amounts of fat (2.8 to 6.9 g/100 g) in which french fries has been prefried as well as different quality of fat. The quality of fat was evaluated as ratio between polyunsaturated and saturated fat which was 4.90 to 0.18 and with atherogenic index which was 0.06 to 1.02. Prefried french fries differ also in sensory quality, scored with 15.7 to 19.1 points of total 20.

Conclusions: According to declaration 4 samples were prefried in sunflower oil, 3 samples in palm oil and 5 samples in vegetable oil. Fat analysis showed that declared vegetable oil was indeed palm oil which may be misleading to consumers.

Keywords: (maximum 5): french fries, consumers, comparative food testing

149/980. Dietary transgressions in celiac disease can be revealed by detection of gluten peptides in urine

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Introduction: Ingestion of gluten found in wheat, barley, rye and oats, leads to autoimmunity and small intestinal mucosal injury in patients with celiac disease (CD). To date, the mainstay of the management of CD is a strict life-long adherence to gluten-free diet (GFD). However, strict GFD is difficult because it is one of the most frequent ingredients in processed foods.

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Objectives: We have developed a novel method to determine gluten intake and to assess adherence to the GFD in celiac patients by detection of gluten immunogenic peptides (GIP) in urine.

Method / Design: Urine samples of 76 healthy subjects and 58 celiac patients were collected. Urine GIP content was estimated by solid phase extraction and a quantitative lateral flow test with the highly sensitive and specific anti-α-gliadin monoclonal antibody G12.

Results: We detected the presence of GIP in concentrated urine samples from healthy individuals subjected to different dietary conditions as early as 4-6 h after gluten intake. GIP were detectable in healthy individuals' urine for 1-2 days after a GFD followed by a single gluten intake. The sensitivity of the assay was high, with detection of consumption of as little as 50 mg of gluten. The assay also appeared to detect GFD infringement or gluten contamination in CD patients, as over 50% of the patients studied presented detectable GIP in urine. Importantly, there was a correlation between urinary gluten and mucosal atrophy in CD patients. Retrospective analysis of duodenal biopsies, available in 27 CD patients, showed that 90% of CD patients with no villus atrophy had no detectable GIP in urine.

Conclusions: GIP could be sensitively detected in human urine. This sensitive, quantitative, specific and simple technique could be useful to monitor GFD compliance of CD patients as well as for therapeutic research applications.

Keywords: (maximum 5): celiac; gluten-free diet; monoclonal antibody; immunochromatographic strips

149/998. Effectiveness of iCheckTM in Quantification of Carotenoids in Yellow Fleshed Cassava Genotypes

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Introduction: Beta-carotene, the most potent and widespread form of proVitamin A is the predominant carotenoid in cassava (Manihot esculenta Crantz). Breeding for enhanced β carotene levels is important to combat Vitamin A deficiency in Sub Saharan Africa. Biofortification uses conventional breeding method to develop cassava genotypes with increased levels of proVitamin A with a resultant positve impact on human nutrition and health security.

Objectives: To reduce the time and cost to determine concentration of carotenoids present in yellow fleshed cassava roots and to validate the use of iCheck TM device in comparism to other methods to support its use for partners in Africa.

Method / Design: The iCheckTM CAROTENE is a portable digital photometer for determining total carotenoid levels in cassava. A total of 169 yellow fleshed cassava genotypes harvested from the genetic gain experiment maintained at two IITA research sites belonging to different agroecological Zones (AEZ), Ibadan and Ubiaja in Nigeria in 2013/2014 breeding season were used for this analysis. Five selected roots samples per genotype harvested at 12months after planting were processed from which subsamples were used for analysis for iCheck and spectrophotometer.

Results: Results showed a strong correlation (r2) of 0.83 for total carotenoids by iCheckTM and Spectrophotometer. Clone IITA-TMS-IBA070910 with highest iCheck TC of 15.15μg/g gave corresponding highest Spectrophotometer value (13.35μg/g) while IITA-TMS-IBA011368 with medium iCheck TC of 9.95μg/g also gave a corresponding medium Spectrophotometer of 8.01μg/g.

Conclusions: Clones with high and low total carotenoids with iCheckTM device also showed high and low values with Spectrophotometer . Analysis using iCheckTM device is timely and compares favorably with other photometer devices. For effective and quick screening of large populations iCheckTM device is advisable especially when outside of the laboratory environments.

Keywords: (maximum 5): Beta-carotene; genetic gain, iCheckTM; spectrophotometer

149/1028. Building the evidence-base for effective communication strategies to improve child feeding in rural Ethiopia

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Introduction: Introduction: The primary health care provided by the Ethiopian health extension programme, through its health extension workers, has contributed to the reductions of child mortality in Ethiopia. However, building the evidence-base needed to witness faster and more significant stunting reductions is urgent.

Objectives: Objective: To evaluate mothers' knowledge and practices of optimal infant and young child feeding (IYCF) and their association with child stunting in rural Ethiopia.

Method / Design: Method/design: A cross-sectional study was conducted among randomly selected mother-child pairs (n= 122) living in Mecha district, West Gojam, Ethiopia. Mothers' knowledge of optimal IYCF practices was evaluated through interviews. IYCF practices were assessed using two in-home nonconsecutive 24 h recalls. The weight and length of the children (12-23 months) were measured.

Results: Results: About half of the young children were stunted. The mean dietary diversity was low (2.2). Animal source foods, fruits, and vegetables were rarely consumed; hence, the nutrient density of the complementary foods (CFs) was far below the desired density recommended by WHO. The children were mostly self-fed with little attention from their mothers. Mothers had knowledge gaps of recommended IYCF practices like optimal timing for breastfeeding initiation, timing for introduction to CFs, age-appropriate consistency

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of CFs, and minimum dietary diversity, which were associated with child stunting. Mothers trained through the health extension program had better knowledge and practice of optimal IYCF, but this was dependent on the counseling skills of the health extension workers.

Conclusions: Conclusion: The behavioral change communications delivered through the health extension programme could benefit from strategies that enhance the health extension workers' counseling skills on the importance of optimal breast- and complementary feeding for the prevention of stunting.

Keywords: (maximum 5): Keywords: Stunting, complementary feeding, health workers, health system, behavioral change

149/1030. Oxidative stability of pork patties enriched with Omega-3 and natural antioxidants by modifying animal's diet

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Introduction: Omega-3 (ω-3) has low oxidative stability, thus the use of antioxidants is an alternative for increasing the stability of products enriched with this fatty acid

Objectives: To evaluate the effect of the addition of natural antioxidants in the diet of pigs on the oxidative stability of ω-3-enriched patties made with pork loin and pork back fat, over six months of storage

Method / Design: 96 swine were used (48 males and 48 females), aged 127.39±4.29 days, distributed in a randomized block design with 6 treatments for 42 days: (C) control diet without oil addition; (L) diet with 3% linseed oil (OL); (LGP) diet with 3% OL + 10% grape pomace; (LGSE) diet with 3% OL + 0.0022% grape seed extract; (LH) diet with 3% OL + 5% tilapia protein hydrolysate; and (LVitE) diet with 3% OL + 0.04% vitamin E .The patties contained on average 78.37% loin, 19.66% pork back fat, and 1.96% salt. Lipid oxidation was assessed by TBARS (thiobarbituric acid reactive substances) assay at 0, 2, 4, and 6 months of frozen storage

Results: The malonaldehyde levels (mg MDA/kg) were: C=0.21±0.03ab, L=0.27±0.03a, LGP=0.22±0.03ab, LGSE=0.18±0.02b, LH=0.20±0.03b, LVitE=0.15±0.02b($p<0.05$) at time 0; C=0.86±0.08d, L=1.06±0.07bc, LGP=1.22±0.07ab, LGSE=1.26±0.10a, LH=0.97±0.08cd, LVitE=0.65±0.05e ($p<0.001$) after two months of storage; C=1.21±0.10bc, L=1.52±0.12a, LGP=1.35±0.07ab, LGSE=1.38±0.07ab, LH=1.32±0.08ab, LVitE=1.04±0.10c($p<0.05$) after 4 months of storage; and C=1.61±0.16bc, L=1.96±0.17ab, LGP=1.68±0.07abc, LGSE=2.03±0.11a, LH=1.95±0.16ab, LVitE=1.47±0.12c($p<0.05$) at the end of the storage period. Although lower oxidation values were observed in the treatment LVitE when compared to the treatment C after 2 months of storage, no significant differences were observed in the other storage periods.

Conclusions: Vitamin E was the most effective and LH the second most effective in maintaining oxidative stability of ω-3-enriched patties at the concentrations used in this study.

Keywords: (maximum 5): omega-3, vitamin E, natural antioxidants, oxidative stability, pork patties

149/1033. Milk vs soybean polar lipids modulate postprandial lipemia and high-fat diet-induced adiposity in mice

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Introduction: Metabolic diseases are characterized by an altered lipid metabolism including prolonged postprandial hyperlipemia and enhanced adiposity. Numerous food products contain polar lipid emulsifiers which could impact these risk factors. Milk polar lipids (MPL) are emerging ingredients that add value and limit waste of dairy by-products.

Objectives: We investigated the impact of polar lipids from milk vs soybean (SPL) (i) acutely on lipid digestion and postprandial lipemia in mice and (ii) in the long term in addition to a high fat diet.

Method / Design: Swiss mice were gavaged with emulsions stabilized with MPL vs soybean polar lipids (SPL). Both emulsions were also lipolyzed in vitro using a static human digestion model. Moreover, 4 groups of C57BL6 mice received for 8 weeks a normolipidic diet or a high-fat diet based on palm oil (HFP) or a modified isolipidic HFP diet including MPL (HFP-MPL) or SPL (HFP-SPL).

Results: In the digestion study, MPL induced higher plasma concentrations of triglycerides (TG) and nonesterified fatty acids (NEFA) than SPL after 1h, partly explained by the enhanced TG intestinal lipolysis using MPL observed in vitro. Conversely after 4h, MPL group presented lower TG (PtimexPL<0.01). Chylomicrons were larger in MPL group at 2h and 4h ($P<0.01$). The kinetics of synthesis and/or clearance of chylomicrons thus depended on emulsifier type. In the diet study, there was no effect of polar lipids on fasting plasma TAG and cholesterol concentrations. However HFP-MPL diet induced a lower body weight gain ($P<0.05$) and white adipose tissue (WAT) mass ($P<0.05$) than the HFP-SPL diet, despite similar dietary intakes.

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The WAT of HFP-MPL-fed mice presented smaller adipocytes and a lower gene expression of CD11c, marker of inflammatory macrophage infiltration.

Conclusions: MPL used as emulsifier can modulate postprandial lipid metabolism and the mass and structure of white adipose tissue compared to SPL.

Keywords: (maximum 5): lipid; digestion; postprandial lipemia; emulsifier; milk

149/1034. The impact of a fat tax on nutrient demand

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Introduction: A fat tax aims to decrease the consumption of foods that are linked to obesity and can be placed upon fat, sugar, beverages, or junk food. The impact of fat taxes on consumption has frequently been analyzed in many studies. However, a changed consumption structure has implications for the supply with nutrients which until now has been little examined.

Objectives: This study aims to analyze to what extend the consumption of individual nutrients would change if a fat tax were introduced. The analysis refers to a scenario according to the fat tax implemented in Denmark in 2011 which was directed on saturated fatty acids.

Method / Design: Representative German consumption data of about 13.000 households were used. Based on a demand system approach, own- and cross-price-elasticites for different food groups were calculated. Elasticities show the responsiveness of the quantity demanded of a good to a change in its price. These values served as a basis to simulate the effects of a 'Danish' fat tax.

Results: In particular, households reduced their consumption of milk and milk products, sweets, fats, and eggs. On the other hand, they consumed more fruits, vegetables, salad, potatoes, noodles, rice, and beverages. With respect of nutrients, the results showed that households reduced their energy, fat and saturated fat consumption. However, the largest percentage reduction was found for vitamin D which is a vitamin of deficient supply. Furthermore, the consumption of folic acid, iron and calcium was reduced.

Conclusions: A fat tax as in the case of Denmark would induce a change in food structure recommended by nutritionists. In contrast, the demand for important nutrients of deficient intake was also reduced. In view of these results a fat tax could not be considered as a reasonable public health measure.

Keywords: (maximum 5): Fat Tax, simulation, demand system, elasticities, nutrient demand

149/1036. Phenolics composition indicates the prospective health benefits of walnut oil

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Introduction: The health benefits of walnut oil are mainly attributed to polyunsaturated fatty acid content and its high capacity for scavenging free radicals. There are some reports of its beneficial effects on the human body. Walnut oil is not only proven to improve lipid metabolism but is also known for its beneficial action on the skin and widely used in cosmetics manufacturing.

Objectives: The objective of this study was the detailed characterisation and identification of phenolic compounds in cold pressed walnut oil.

Method / Design: Cold-pressed oil was directly obtained from a manufacturer. 30 grams of oil were dissolved in hexane and then extracted with 90% aqueous methanol. LC/MS analysis was carried out using the Waters Acquity UPLC system connected to microQToF-Q.

Results: Based on available standards and, tentatively, on accurate mass determination and relevant bibliographical information, it has been established that walnut oil is characterised by its high content of polyphenols (31 mg/kg). A remarkably substantial amount of pedunculadin, tellimagrandin I and less abundant amounts of hexahydroxydipehenoyl glucose, methyl gallate and ellagic acid were indentified. Among other phenolic compounds isoferulic, p-coumaric and sinapic acids as well as feryloyl-shikimate and ferulic acid glycoside were found.

Conclusions: The obtained data indicates that walnut oil is an abundant source of polar bioactive phytochemicals, especially ellagitannins, and therefore could have potentially anti-atherogenic, antithrombotic, anti-inflammatory and anti-angiogenic effects.

Keywords: (maximum 5): Walnut oil, phenolic compounds

149/1040. Estimation of e220-228 and e249-250 intake by polish population

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Introduction: Preservatives are frequently added to many foodstuffs.

Objectives: Estimation of dietary intake by the Polish population preservatives sulphur dioxide (E220), sulphites (E221-228) and nitrites (E249-250) and health risk assessment based on Acceptable Daily Intake (ADI).

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Method / Design: Data on food consumption (24-hour recalls) was collected in 2000 under the FAO project „Household Food Consumption and Anthropometric Survey". The survey covered 4134 individuals from all over Poland, aged 1-96 years. The conditions of use sulphites and nitrites under EU regulation 1129/2011. Health risk assessment was based on the ADI for E220-228: 0-0.7 mg/kg bw/day and for E249-250: 0-0.2 mg/kg bw/day

Results: The average intake of sulphur dioxide and sulphites by Polish population amounted to 8.3 mg/day (21.2% ADI). The highest exposure was found in children and teenagers diets; mean: 33.2% ADI, P95: 112.1% ADI. Processed vegetables, potato dishes, fruit and soups are the main sources of E220-228.

Intake of nitrites in Polish population is high and amounted 11 mg/person/day (91% ADI). The highest intake (18.9 mg/day; 121.8% ADI) occurred in men diets. Also in children and adolescents diets the contents of E249-250 is high: 9.6 mg/day (94.8% ADI, P95: 333.3% ADI). The main sources of nitrites in Poland are sausages.

Conclusions: Taking into account the food market development with increasing usage of additives, including preservatives, it is necessary to educate population on the selection of foodstuffs in the daily diet. Adherence to the principles of proper nutrition and where possible the use of unprocessed foodstuffs can support lower intake of food additives from diet.

Keywords: (maximum 5): sulphites, nitrites, food additives

149/1057. Contents of some minerals in kombucha based fermented dairy product

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Introduction: Fermented milk products have gained popularity as functional foods and their consumption is on the increase throughout the world. Recent research is dealing with possibilities of kombucha application as non-conventional starter for milk fermentation. Beside nutritive values, kombucha beverage contains components that may have a positive effect on the health, and physical and psychological states of human organisms. Therefore, kombucha based fermented dairy products could been considered as new type of health-promoting dairy products.

Objectives: In this study, the nutritional value in terms of mineral contents of fermented milk product manufactured by application of non-conventional starter cultures – kombucha inoculum in different concentration (1.5 and 3.0%) have been investigated. Samples were produced with or without addition of transglutaminaze.

Method / Design: Flame photometry was applied for determination of potassium, sodium and calcium content in dairy products after simple dilution of samples in water. Quantitative determination was performed using the method of calibration curve. Calibration curves were defined based on seven points for each element. T-test was applied for determining differences among mineral content of analyzed samples.

Results: The most abundant mineral in the kombucha fermented dairy products was potassium with content of 110.97 - 118.36 mg / 100 g. Calcium content were within the range of 99.02 – 109.02 mg / 100 g, while the sodium content was the lowest (42.74 - 45.34 mg / 100 g). The results of statistical analysis (T-test) showed that obtained results were in agreement at 95% confidence level, meaning that at the chosen significance level, the differences between the values obtained for the different sample treatment were within the experimental error.

Conclusions: Results showed that the concentration of kombucha inoculum, as well as the addition of transglutaminase was not significantly affecting the mineral content of the kombucha based fermented dairy product.

Keywords: (maximum 5): Fermented dairy products, kombucha, mineral content

149/1061. Evaluation of biopolymer pouches application for vegetable oil protection

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Introduction: As the standard of living has being increasing constantly, single pack of instant products has gained popularity, due to their responsible price, sensor and nutrition qualities and ease of preparation. Often, vegetable oils are additional part to instant products, as an improvement to the flavour. Such added oils have generally been provided in a separately packaged plastic pouches designed for single usage.

Objectives: Composite pumpkin oil cake (PuOC)/zein films are a promising new biopolymer material obtained from food industry by-products. Since previous works showed that PuOC films present good barrier to gases and have antioxidant activity, and zein films shows good heat sealing properties, in this research we made pouches using PuOC/zein films, and examined their protective effects, determining peroxide value of flaxseed oil.

Method / Design: Casting method was used to produce PuOC films. Zein solution was laminated above PuOC film. Pouches were made using PuOC/Zein duplex. The peroxide value (PV) of flaxseed oil in PuOC/zein and glass bottles (as control) was determined periodically using accelerated PV test.

Results: The high oxygen barrier property of PuOC/zein material and antioxidant activity of the PuOC/zein bilayer films ensure good

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stability of flaxseed oil, resulting in low peroxide value of flaxseed oil, comparing to the traditional glass packaging. The PV of flaxseed oil stored in glass bottle was 0.49 mmol O2/kg oil, as same as at the end of analysis, while PV of flaxseed oil stored in PuOC/zein film pouches was 0.49 mmol O2/kg oil at the beginning, and decrease during the storage time to 0.40 mmol O2/kg oil.

Conclusions: Based on the results, we found that PuOC/MZ films was acting as oxygen barrier and antioxidant agent delaying the development of rancidity in flaxseed oil and showed potential to be used as pouches for food packaging.

Keywords: (maximum 5): Pumpkin oil cake; Zein; Flaxseed oil.

149/1064. Oxidative stability of pork fat enriched with omega3 and natural antioxidants by modifying animal's diet

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Introduction: The omega-3 (ω-3) increment in food products has gained great importance, however, despite the benefits, the incorporation of this fatty acid, increases lipid oxidation susceptibility.

Objectives: To produce pork fat with high oxidative stability, higher ω-3 concentrations and better ω-6/ω-3 ratio compared to conventional pork fat.

Method / Design: 96 pigs (48 males and 48 females) aged 127.39±4.29 days distributed in randomized blocks were used. Six treatments were evaluated for 42 days: (C) control diet without the addition of oil, (L) diet with 3% of linseed oil, (LGP) diet with 3% of linseed oil + 10% grape pomace, (LGSE) diet with 3% linseed oil + 0.0022% grape seed extract, (LH) diet with 3% of linseed oil + 5% tilapia protein hydrolysate and (LVitE) diet with 3% linseed oil + 0.04% vitamin E. The lipid profile of lard was evaluated by gas chromatography and fat oxidative stability by Rancimat.

Results: Considering the ether extract percentage, the C18:3 percentage was C=1.16±0.061, L=5.28±0.338, LGP=5.58±0.227, LGSE=5.37±0.164, LH=5.05±0.206, LVitE=5.07±0.302 ($p<0.001$), the percentage of C20:5 was C=0.0, L=0.052±0.005, LGP=0.045±0.004, LGSE=0.047±0.004, LH=0.038±0.004, LVitE=0.047±0.003 ($p<0.001$). C22:6 was not detected. The ω-6/ω-3 ratio was C=13.49±0.62, L=3.37±0.123, LGP=3.11±0.084, LGSE=3.05±0.069, LH=3.24±0.084, LVitE=3.34±0.139 ($p<0.001$). The oxidative stability analysis demonstrated a retention time of C=7.83±0.07, L=3.15±0.01, LGP=2.98±0.24, LGSE=3.19±0.021, LH=3.53±0.155, LVitE=6.69±0,02 hours. The L, LGP, LGSE, LH and LVitE treatments had significant incorporation of ω-3, but only LVitE presented increase in oxidative stability, with stability similar to group C without ω-3.

Conclusions: The use of 3% of linseed oil in the diet, for 42 days was effective in increasing the ω-3 content and improving ω-6/ω-3 ratio of pork fat. However, from the tested antioxidants, only vitamin E increased the oxidative stability of fat.

Keywords: (maximum 5): omega-3, vitamin E, natural antioxidants, oxidative stability, pork fat

149/1068. OR2M3 – a specialist receptor for a key food odorant of the genus Allium

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Introduction: The recognition of key food odorants (KFO) appears to be the most eminent capability of odorant receptors (ORs). Among KFOs, thiols engage an outstanding position, because of their extremely low odour thresholds. 3-mercapto-2-methylpentan-1-ol is a KFO of the genus Allium with an odour threshold in the pg/L range.

Objectives: Polymorphisms in OR genes, e.g. single nucleotide polymorphisms (SNPs), copy number variations (CNVs), or insertions/deletions (INDELS) lead to individual haplotypes. Such differences could explain an individually altered odour perception, such as specific anosmia or hyperosmia, which may explain different consumer food preferences. However, the molecular mechanisms underlying an extremely specific and sensitive detection of foodborne thiols are unknown, so far.

Method / Design: Therefore, we first screened a library of 391 human ORs against the KFO 3-mercapto-2-methylpentan-1-ol, and subsequently the single 'hit' receptor OR2M3 against a library of KFOs. Moreover, a human study (100 subjects) revealed different phenotypes for the perception of 3-mercapto-2-methylpentan-1-ol, so far.

Results: Here we show that only one single receptor out of 391 ORs responded to µmol/L concentrations of 3 mercapto-2-methylpentan-1-ol in a concentration-dependent manner. Despite the common belief of combi¬na¬to¬rial odorant coding, i.e. one receptor can be activated by several odorants, in contrast, here we found highly specific responses of OR2M3 to more than 100 KFOs and thiols tested, so far. Neither were other receptor homologs activated by the KFO 3-mercapto-2-methylpentan-1-ol, nor was OR2M3 activated by other KFOs. However, different OR2M3 haplotypes, defined by coding SNPs, displayed differences in EC50 values for 3-mercapto-2-methylpentan-1-ol.

Conclusions: So far, our data suggest OR2M3 as a specialist for a single dominant KFO in the overall aroma of onions, which are used all over the world as food, and play a role in complementary medicine since about 5000 years. Recently, two other family-2 OR have been assigned thiols as agonists, suggesting thiols as best agonists for family-2 OR.

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Keywords: (maximum 5): GPCR, chemosensory, odorant receptor, key food odorant, receptor haplotypes

149/1077. Predicting initial lipid release from masticated cashews and walnuts using mathematical modelling

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Introduction: Initial lipid release from masticated nuts is strongly influenced by particle size, due to natural encapsulation of the lipid within intact cells. A mathematical model was developed previously to predict initial lipid release from almond boluses using cell diameter and particle size distribution (PSD) as variables. No studies have been done on other commonly consumed nuts which detail cell size and PSD sufficiently to predict lipid release due to mastication.

Objectives: To use the mathematical model to predict the proportion of lipid released from masticated cashews and walnuts, using measurements of cell size and PSD of masticated cashews and walnuts.

Method / Design: In a randomized, unblinded, cross-over trial, 10 healthy women chewed raw cashews or walnuts at two separate sessions. PSDs of the expectorated boluses were determined using mechanical sieving and laser diffraction. The average diameter of the cells in the nut tissue was measured by automated image analysis of transverse and longitudinal sections. Initial lipid release was then predicted using the mathematical model.

Results: The diameter of cashew cells (34.3 μm) was significantly smaller (one-way ANOVA, $P<0.0001$) than that for walnut cells (49.4 μm) and almond cells (45.1 μm). Laser diffraction showed that masticated cashew and walnut boluses had median particle sizes (178 +/- 12 μm, 179 +/- 8 μm) which were smaller than that for almonds measured previously (550 +/- 18 μm). This results in higher predicted lipid release for cashews (12.3%, 8.7-16.3%) and walnuts (14.5%, 12.0-18.0%) than for almonds (9.5%, 7.4-11.1%).

Conclusions: Almonds have a larger median particle size upon mastication compared to cashews and walnuts, which reduces initial lipid release, and may attenuate postprandial lipaemia. Total nutrient availability may also be reduced. Due to their lipid content and particle size, lipid release from walnuts (after mastication), is likely to be greater than from cashews and almonds.

Keywords: (maximum 5): cashews, walnuts, almonds, bioaccessibility, modelling

149/1089. Product reformulation to lower sodium content via nutrient profiling; a case study on France (2000-2014)

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Introduction: Product reformulation to reduce foods sodium content is a recognized way to reduce the population salt intake in France and globally. The French National Health and Nutrition Programme suggests that reformulation efforts should focus on the biggest dietary sodium contributors. The Nestlé Nutritional Profiling System (NNPS) was developed specifically for product reformulation. In France, the NNPS has been used to reformulate Nestlé-owned soups and hams for the past 14 years (2000-2014).

Objectives: To assess the efficacy of applying the NNPS to reduce sodium content in two high-sodium food categories: soups and hams.

Method / Design: The NNPS sets age-specific targets for sodium content per serving across 32 product categories taking into account international recommendations, intrinsic barriers to reformulation, and the role of sodium in taste preference. Sodium content of all Nestlé-owned soups and hams commercialized in France was compared between 2000 and 2014 for soups and 2002 and 2014 for hams (24 and 39 soups, 3 and 33 hams, respectively). Comparisons were further performed with foods retrieved from the French food composition Ciqual 2013 database (15 soups and 6 hams).

Results: Between 2000 and 2014, there was a 25% reduction in sodium content in soups (mean sodium content: 0.36±0.05 vs. 0.27±0.03 g/100mL, 2000 & 2014 respectively; p-ttest<0.01). A similar 21% reduction was seen in hams (0.90 vs. 0.71±0.06 g/100g, 2002 & 2014 respectively; p-ttest<0.01). Although non-significant, the reformulated soups and hams had a 12 % and 27% lower average sodium content, respectively, compared to the products in the Ciqual database. Consumer preference was maintained along the reformulation process.

Conclusions: Nutrient profiling can be used to drive product reformulation towards lower sodium content while respecting technological barriers. Further research needs quantifying the potential impact on population nutritional intake of a generalized use of nutrient profiling for food reformulation.

Keywords: (maximum 5): Sodium, nutrient profiling, food, reformulation

149/1098. Gastric emptying and satiety is not influenced by interesterification of palm kernel/palm stearin blends.

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Introduction: Interesterification of palmitic acid-rich fats are used commercially to produce fats with desirable functionality. Previous studies have reported differences in postprandial lipaemia and gut hormone response following interesterified palmitic acid-rich fats versus fatty acid matched un-interesterified blends. This may be due to differences in gastric emptying which may subsequently affect satiety. To date, no studies have investigated the effects of commercially-relevant palm kernel/palm stearin (PK/PSt) interesterifed fats on rates of gastric emptying and satiety.

Objectives: To investigate the acute effects of PK/PSt interesterified fats on postprandial feelings of satiety, gastric emptying and glucose concentrations compared to un-interesterified PK/PSt fats.

Method / Design: A double-blind, randomised, controlled trial was carried out in healthy males (n=12, 18-45 y). Plasma glucose and gut hormone concentrations, self-reported ratings of appetite (visual analogue scales) and gastric emptying (determined by rate of appearance of postprandial paracetamol concentrations) were measured at baseline (fasting) and over 4 h following consumption of a test meal containing 50 g test fat. Test fats were PK/PSt (20:80 blend) un-interesterified (UI; control) versus interesterified (IE; intervention).

Results: There were no significant differences in measures of satiety and gastric emptying. Peak glucose (mmol/L) was similar following IE (7.06; 95% CI 6.40, 7.72) and UI (7.26; 95% CI 6.60, 7.92), as were paracetamol concentrations (tmax120 mins for both means; t1⁄2, 164 min for IE (95% CI 157, 175); 167 min for UI (95% CI 159, 178). There were no significant differences in postprandial plasma glucose-dependent insulinotropic polypeptide and peptide YY concentrations between meals.

Conclusions: Commercial interesterified fats do not acutely influence postprandial glucose concentrations, gastric emptying or satiety compared to their un-interesterified equivalents. Observed differences in postprandial lipaemia are unlikely to be related to differential rates of gastric emptying or intestinal absorption rates.

Keywords: (maximum 5): Interesterification, glucose, satiety, palmitic acid, gastric emptying

149/1110. Meat consumption in industrialized countries and hunger in developing countries: two sides of the same coin

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Introduction: Although global food supply has generally improved in recent years, still more than 800 million people suffer from hunger. Against this background, it stands to reason that „food security and sustainable agriculture" is UN's highest ranked Sustainable Development Goal.

Objectives: This paper investigates the sustainability effects of high meat consumption on the global food situation.

Method / Design: To answer this question, we first of all analyze the market size of meat production and draw attention at its considerable economic impact.

Subsequently, global ecological implications of meat production –measured in land use, water consumption and air pollution– are analyzed.

Results: Analyzing underlying data, it becomes apparent that the production of current meat quantities is highly inefficient from a resource-economic perspective. The efficiency of meat production –measured in units of energy usable for humans– is 10% on average and therefore very low.

Based on these results, social implications of the high and constantly rising global meat consumption are examined. We firstly outline the negative (health) effects of mass meat consumption on wealthy nations: In industrialized countries, twice as much meat is consumed as recommended by nutritionists. As a consequence, vegetal food, used to feed animals and to (over)feed wealthy peoples with meat, is no longer available for the basic nutrition of starving humans in developing countries.

In the last part of the paper, interesting changes in consumer behavior in leading industrial nations are identified.

Conclusions: It turns out that meat consumption is declining there since a few years. Analyzing this tendency in more detail, a high level of education is identified as a key driver of this development. All aspects of sustainability as well as global food security might greatly benefit from this trend, if spillover effects on other population strata and emerging countries –associated with public support– are strong enough.

Keywords: (maximum 5): food security; meat consumption; resource efficiency

149/1116. Analysis of the menu in public schools and special needs food

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Introduction: The School Feeding National Program provided by the Ministry of Education serves 43 million Brazilian public school students, the most long-lived program of Nutrition and Food Security in the country. The nutritionist is responsible for the preparation of

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healthy and appropriate menus using foods respecting the nutritional references, habits, culture and tradition of the school. In this context, students who have some Food Special Need (FSN) as diabetes, lactose intolerance or allergy to gluten should be differentiated food treatment because the need for dietary modifications that are currently provided for in national legislation.

Objectives: Analyze the menu provided by schools in a South Metropolitan Region of Brazil, as the presence of food or products with sucrose, lactose or gluten.

Method / Design: Cross-sectional descriptive study with a quantitative approach based on secondary data provided by the State Department of Education of Paraná. The instrument used were the menus offered by schools based on the year 2014 the Metropolitan Region of Curitiba, which is composed of 28 cities, with 162,697 students in 245 schools spread. Were identified by the presence of food or products with sucrose, lactose and gluten present nutritional information through the packaging or the Internet.

Results: Were identified 80 menus with 39 food or processed food products, 30.7% had lactose, 51.7% gluten and 66.6% sucrose in its composition.

Conclusions: Thus, students with diabetes, lactose intolerant to gluten sensitivity or have difficulty in school feeding since at least 1/3 of the food provided to them can cause impairment its pathological condition. As a signatory of the Universal Declaration on Bioethics and Human Rights, it is established that the government should promote health by ensuring adequate food to all its citizens regardless of their life situation and that everyone should be treated fairly and equitably, without decriminalization.

Keywords: (maximum 5): School feeding, gluten, sucrose, lactose, food allergies and intolerances

149/1118. Relationship between abdominal obesity and inflammatory profile in post acute myocardial infarct patients

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Introduction: Different abdominal obesity indexes have been proposed instead to waist circumference to detect a worse inflammatory profile in general population. However, they have been poorly tested in patients with cardiovascular disease.

Objectives: To investigate the relationship between serum concentrations of C-reactive protein (CRP) , fibrinogen, obesity and visceral adiposity in patients with previous heart attack.

Method / Design: This is a baseline crosssectional analysis from a randomized clinical trial conducted in Southern Brazil. Individuals with previous heart attack and ≥40 years of age were enrolled. Demographic, clinical and anthropometric data [weight, height – in order to calculate body mass index (BMI, in Kg/m2) and waist circumference (WC), in cm] were collected and plasma C-reactive protein (CRP) and fibrinogen were assessed by ELISA. Lipid Accumulation Product Index (LAP Index, in cm.mmol.l) and Deep-Abdominal Adiposity Tissue Index (DAAT, in cm2) were calculated according to gender. Nonparametric data were log-transformed and Pearson correlation and multiple linear regression were used for statistical analyses.

Results: In total, 64 patients (73.4% men) were evaluated with a mean age 56.2 ±16.0 years and 39.1% with obesity according to BMI ≥30 kg/m2. In men, CRP was significantly correlated with LAP (r= 0.30, P= 0.04), DAAT (r= 0.39, P= 0.007) and WC (r= 0.44,

P=0.002) and fibrinogen with DAAT (r= 0.34, P= 0.02) and WC (r= 0.35, P=0.02); in women, CRP was significantly correlated with DAAT (r= 0.56, P= 0.02) and WC (r= 0.57, P=0.02) and fibrinogen with LAP (r= 0.49, P=0.04), DAAT (r= 0.63, P= 0.006) and WC (r= 0.59, P=0.01). However, when adjusted for age and BMI, none of these abdominal obesity indexes were associated with the inflammatory profile in both genders.

Conclusions: Overall obesity seems to strongly influence the levels of inflammatory markers in patients with previous heart attack

Keywords: (maximum 5): abdominal obesity, inflammatory profile, myocardial infarct

149/1132. Chemical composition and nutritional quality of wholegrain bread from Belgrade market

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Introduction: There is a growing number of epidemiological evidences that wholegrain products may reduce the risk of cardiovascular diseases, type 2 diabetes, some forms of cancers, as well as obesity. The beneficial health effects are due to the presence of many biologically active compounds, which are located in the outer layer and germ fraction of the grain. Therefore, the higher intake of wholegrain foodstuffs is recommended. Wholegrain bread, locally known as brown bread, is the most common foodstuff of this type in Serbian diet.

Objectives: The objective of this paper was to assess the quality indicators, basic chemical composition, and fiber profile of wholegrain breads sampled from Belgrade supermarkets and bakeries.

Method / Design: In total 8 different samples of wholegrain bread were analyzed. The nutritional quality of samples was evaluated by common physicochemical analyses (contents of protein, ash,

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water, crude fiber, acid degree, sodium chloride, starch). Enzymatic methods were used for determination of fiber profile (resistant starch, beta-glucan, fructans, and arabinoxylan). Also, sensory characteristics were assessed.

Results: During evaluation of the sensory quality all samples fulfilled the regulatory requirements. All analyzed samples received high marks for each individual property of quality. However, the variability of acid degree, as well as some nutrient content (protein, crude fiber, starch) among samples was great. On the other hand, other parameters were similar between different bread samples (content of water, ash, sodium chloride). The fiber fractions that were analyzed in wholegrain bread samples revealed that resistant starch, fructans and arabonoxylan were the major fiber fractions, while cellulose content was unexpectedly low.

Conclusions: Obtained results indicated that wholegrain bread from Belgrade market is of the standard quality and could be an important source of specific fiber fractions in everyday diet.

Keywords: (maximum 5): wholegrain, bread, Serbia, market

149/1134. Optimization of microwave-assisted extraction of natural antioxidants from spent black coffee grounds by response surface methodology

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Introduction: In the Balkan region, including Serbia, traditional black coffee is consumed more frequently than other types of coffee. It is served mainly at homes and pubs, so called "kafana", and is often referred to as Turkish or Greek coffee. Spent coffee grounds (SCG), by product of black coffee consumption abundantly produced in cafeterias and in domestic environment, could be used as a low-cost and rich source of valuable polyphenol compounds with high antioxidative properties.

Objectives: The overall objective of this study was to examine an optimal range of extraction conditions for extraction of natural antioxidants from spent black coffee.

Method / Design: Optimization of the extraction process from SCG was carried out using response surface methodology (RSM). Microwave-assisted extraction (MAE) has been used as a potential alternative to conventional solvent extraction for the isolation of polyphenol compounds from SCG. A complete central composite 23 factorial experimental design has been used to monitor the extraction characteristics, as affected by different variables, extraction time (ET), liquid-to-solid ratio (LSR), and microwave power (MWP). Low concentration ethanol in aqueous solutions was employed as non-toxic extracting media.

Results: With 180s and more ET, 400W MWP and and 12mg/g LSR, the polyphenols extract with high antioxidant activity can be achieved. The obtained experimental values were in solid agreement with predicted values.

Conclusions: The sustainability of the coffee processing system can be substantially improved through the use of by-products, by adoption of new technologies that maximize process profitability. The presented data could be reliable guidelines for development of a full-scale project and good business opportunities for SMEs, producing functional foods or nutraceuticals.

Acknowledgements: This work is funded by the Ministry of Education, Science and Technological Development, Republic of Serbia, Projects TR31035 and III 41030.

Keywords: (maximum 5): Spent coffee grounds, Microwave-assisted extraction, Response surface methodology, Polyphenols, Natural antioxidans

149/1153. Health outcomes and greenhouse gas emissions from varied dietary patterns – is there a relationship?

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Introduction: Greenhouse gas emissions (GHGEs) and health outcomes are both major consequences of dietary choices. Assessments of dietary patterns that vary in their content of plant and animal contents are emerging at the intersection of nutrition, environment and public health.

Objectives: Compare the GHGEs associated with a variety of dietary patterns consumed by a large population across North America and simultaneously assess mortality according to the same dietary patterns in the same population.

Method / Design: SimaPro Life Cycle Assessment software was used to calculate GHGEs for each of the 200+ food items in the food frequency questionnaire of the Adventist Health Study-2 cohort. GHGEs were then calculated for 5 dietary patterns derived from the food intake data of the cohort, which varied in the quantity and type of animal and plant foods: vegan, lacto-ovo vegetarian, pesco vegetarian, semi vegetarian, and non-vegetarian. All-cause mortality rates for the 73,000+ subjects were adjusted for a range of lifestyle and sociodemographic factors and estimated according to dietary pattern.

Results: Using the non-vegetarian diet as a reference, the mean reductions in GHGEs for the semi vegetarian, pesco vegetarian, lacto-ovo vegetarian and vegan diets were 20%, 24%, 28% and 42%

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respectively. The age, gender and race adjusted mortality rates for non-vegetarian, semi vegetarian, pesco vegetarian, lacto-ovo vegetarian and vegan diets were 6.66 (6.26, 7.05), 6.18 (5.00, 7.37), 5.49 (4.80, 6.18), 5.60 (5.20, 5.99) and 5.38 (4.64, 6.12) deaths per 1000 person-years, respectively. The differences were significant.

Conclusions: Moderate differences in the caloric intake of plant and animal products provided nontrivial reductions in GHGEs and health outcomes, as shown through the mortality analysis.

Keywords: (maximum 5): sustainable diets, greenhouse gas emissions, dietary patterns, plant-based, life cycle assessment

149/1156. Mulberry (Morus alba L.) fruit as a functional ingredient in formulated ready-to-drink juice

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Introduction: Mulberry (Morus alba L.) is a tropical and subtropical plant species distributed in Asia, Africa, America and Europe. It is commonly cultivated for sericulture industry. Its fruits contain minerals and phytonutrients that are beneficial to human health. However, studies on its application in food and beverage industry are so far limited.

Objectives: To develop mulberry formulated ready-to-drink juices; to determine the effects of juice processing on the chemical properties of mulberry fruit; and to assess the sensory acceptability of the juices.

Method / Design: Juices were processed by means of pasteurization. The fruit and juice samples were subjected to mineral and phytonutrient analyses using the atomic absorption spectrophotometer and ultraviolet visible spectrophotometer, respectively. The antioxidant activities of the fruit and juice samples were evaluated through DPPH and FRAP assays. The sensory evaluation was conducted using the 9-point hedonic scale.

Results: Findings indicated that mulberry fruit is an excellent of source of Calcium (865.30 ± 21.90 mg/100g) and Iron (28.30 ± 1.40 mg/100g) and it has adequate amount of Zinc (2.30 ± 0.30 mg/100g). It is also rich in phytonutrients such as total anthocyanidins (3637.11 ± 39.33 mg/100g), total flavonoids (6477.31 ± 67.56 mg /100g), and total polyphenols (1720.34 ± 13.76 mg/100g). The antioxidant activity of mulberry fruit is higher in FRAP assay. Moreover, the formulated ready-to-drink juices exhibited poor recovery of minerals (0.5-4%) and phytonutrients (1-4%). In contrast to the fruit material, the juices showed greater antioxidant activity in DPPH assay. Furthermore, the formulated ready-to-drink juices were organoleptically acceptable.

Conclusions: Mulberry fruit is a potential functional ingredient in the development of healthy food products like ready-to-drink juices.

Keywords: (maximum 5): functional food, mineral, mulberry fruit, phytonutrient, pasteurization

149/1160. Nitrite substitution by Lactobacilli plantarum and citrus extracts in cooked poultry products

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Introduction: The excess of nitrite consumption can lead to a multitude of harmful effects for human health such as allergic responses, intoxication, cancer development through nitrosamines accumulation, etc. Therefore, USDA (United States Department of Agriculture) legislation of nitrite use was limited to 156ppm for comminuted meat products such as cooked poultry products using mechanically separated meat as raw meat material. Nitrite concentrations used in the Tunisian poultry industry (500 ppm) widely surpass the legislated concentrations of 156 ppm by USDA.

Objectives: Hence, the aim of this study is to reduce nitrite concentrations in cooked meat products (salami type) from 500 ppm to USDA legislated amounts by using high nutrition value products which benefit of antioxidant and antimicrobial properties. The latter would allow these substitutes to maintain or improve physicochemical, microbiological and sensory properties of the control sample. The substitutes used are Lactobacilli plantarum strain (TN8) and citrus extracts (from by-products).

Method / Design: 70 and 80% substitution of control samples nitrite were performed using Lactobacilli plantarum strain (107 units/ml) reaching legislated levels of 156 ppm and 100 ppm of nitrites. Also 80% substitution by citrus extracts and other 80% nitrite substitution with 2.5% and 5% of mechanically separated meat substitution by also citrus extracts were performed. To the obtained poultry products, proximate, physicochemical, microbiological and sensory parameters were evaluated during a one month period aiming to compare between control and reformulated samples.

Results: Results showed general similarity between products concerning proximate, physicochemical and microbiological parameters, while sensory attributes revealed high punctuation levels in the reformulated products.

Conclusions: These findings are of high importance in order to both diminish nitrite use in the meat industry and highlighting nutritional values of cooked meat products through the incorporation of probiotics and citrus extracts.

Keywords: (maximum 5): Nitrite substitution, cooked poultry products, Lactobacilli plantarum strain, citrus extracts, physicochemical and sensory analysis

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149/1196. The effect of information on consumer's response to white rolls with different dietary fibre content

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Introduction: New products brought into market could be not unacceptable for consumers due to their sensory characteristics. Thus, information about the content of fibre is a way to increase consumers' willingness to buy such foods.

Objectives: The effect of information about dietary fibre was investigated for consumer perceptions of rolls with different level of fibre and willingness to buy them.

Method / Design: Food choice of three test products was measured in various information conditions. White low-fibre, white fibre-enriched and white low-fibre roll sprinkled with grain were presented on the photos as whole roll and cut pieces. 1014 participants took part in a survey carried out in 2013 with the use of self-designed questionnaire. Selection criterion of the sample was representativeness of the population due to province. Appearance and expected taste of products were rated. Before and after the information about fibre was presented participants chose one of the three foods to consume. Two-way analyses of variance were used to assess the effect of information on the product choice.

Results: Test products did not differ significantly in the assessment of appearance and expected taste in the blind part. Choice between products differed significantly between the blind and information conditions. After getting information participants chose white roll with fibre addition most frequently than others. In the blind part they chose white low-fibre roll sprinkled with grain most frequently. Choice in blind assessment correlated only with expected taste, while after getting information with opinions on appearance. Higher ratings of sensory attributes increase the likelihood of being chosen.

Conclusions: Information on fibre content influenced on consumer response to roll enriched in fibre. Thus, such information on the package is needed to persuade consumers to purchase the functional product.

Keywords: (maximum 5): dietary fibre, functional food, acceptance, consumer, food choice

149/1198. Consumers' beliefs as determinants of willingness to eat functional foods

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Introduction: More and more functional food is proposed to consumers each year based on the promise to improve their health and well-being. Knowledge about consumers` behaviors on this market and their determinants is still incomplete.

Objectives: The aim was to identify the consumers' behaviour by exploring the determinants of willingness to eat foods enriched with vitamins and minerals (FEVM).

Method / Design: A group of Polish consumers at age 15+ (n = 1002, age: M = 43.84 years; SD = 18.38) was recruited using a random-selection route. The questionnaire included questions concerning familiarity with these foods, beliefs on their health value, benefits and risks from eating FEVM. The 5-point scales were used ranged from 1 (strongly disagree) to 5 (strongly agree). The willingness to eat enriched foods was measured with a 5-point scale from 1 (not very willing) to 5 (very willing). Descriptive statistics and Pearson's correlation coefficients were computed to investigate the relationships between variables. Linear regression analyses were used to find predictors of willingness to eat FEVM.

Results: The inclusion of age and gender into regression did not alter the final results, so they were excluded from further analysis. First model of the regression, comprising opinions on health value, benefits, and risks from eating these foods was significant, $R2= 0.369$, $F (3, 929) = 518.394$, $p<0.001$. Overall model, including familiarity with foods, predicted significantly willingness to consume FEVM next year, $R2=0.466$, $F (4, 928) = 654.899$, $p<0.001$. The significant predictors of willingness to eat were the opinions on positive benefits from the eating (0.251, $p<0.001$), and familiarity with these foods (0.334, $p<0.001$).

Conclusions: The increase of familiarity of functional foods was shown to be very important. Potential benefits resulting from the consumption of enriched foods, are to be taken into account in nutritional education.

Keywords: (maximum 5): beliefs, functional foods, willingness to eat, consumers

149/1204. Flavonoid glycosides in legumes dependent on the genotyp

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Introduction: Legumes such as peas (Pisum sativum) and fava bean (Vicia faba) are rich in proteins and fiber. Further, value adding components are secondary plant metabolites like flavonoids that are relevant for humans due to their antioxidant activity. These compounds are in high concentrations in leaves of legumes e.g. ready-to-eat pea sprouts.

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Objectives: The aim was to identify the flavonoid glycosides in legumes and to determine their genotypic differences.

Method / Design: Five pea cultivars and four fava bean cultivars were grown in the green house. Flavonoid glycoside profiles were measured in methanolic extracts by HPLC-ESI-MSn.

Results: Pea contains quercetin as main flavonol aglycone followed by kaempferol. In contrast, fava bean has low concentrations of quercetin, but high concentrations of kaempferol. Further differences occur in the flavonoid glycosides. Pea is characterized by quercetin glycosides acylated with hydroxycinnamic acids and their corresponding kaempferol glycosides. The only glycosylated sugar moiety is glucose. In contrast, fava bean has a more complex flavonoid glycoside profile containg kaempferol mono- to tetraglycosides with rhamnose, glucose, galactose and arabinose. Only two flavonoid glycosides were acylated with acetic acid. Furthermore, a low number of quercetin glycosides were detected. Dependent of the cultivar the flavonoid glycoside profiles changed. Exemplarily, the summer cultivars of fava bean are characterized by high concentrations of kaempferol-3-O-rhamnoarabinoside-7-O-rhamnoside.

Conclusions: The pea cultivar Salamanca has the most promising flavonoid glycoside profile for further investigations on the efficency of UV-B including high concentrations of quercetin glycosides and the main quercetin glycosides acylated with p-coumaric acid. The focus of following investigations will be the enhancement of the quercetin to kaempferol ratio by choosing an optimal genotype and optimal agricultural conditions. Correspondingly the antioxidant activity will be increased and leaves of legumes gain interest as functional foods or sources of nutraceuticals.

Keywords: (maximum 5): Pisum sativum, Faba bean, Flavonoid glycosides, genotype

149/1228. The organic food system as a framework for a global, sustainable and healthy diet, taking into account regional and cultural adaptations (Organic Diet Project, ODP)

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Introduction: This poster presents an emerging framework to develop and explore organic as a global, sustainable and healthy diet. The project aims for a diet concept development from a scientific perspective.

Objectives: One of the underlying determinants of organic agriculture and food production is the link between sustainability and health. There are various studies showing a contribution of organic agriculture to global sustainability issues. The organic food market is growing rapidly worldwide. The dietary pattern of organic consumers seems to be close to healthy dietary patterns as well as close to the sustainable diet concept. As global diets link sustainability and health, organic may be defined as a global, healthy and sustainable diet, taking into account regional and cultural adaptations.

Method / Design: The aim of this poster is to continue the scientific discussion about what would be needed to develop such an organic diet. The developmental process of the organic diet will be in a circular manner from concept development to verification and implementation, from scientific construction to practical application. Until now more than 30 research institutions from all over the world joined the development process and participated in the starting workshop in UK in April 2015.

Results: The thus developed and verified organic diet may be taken as a pilot model for assessing sustainable diets within the sustainable food systems programme and to stimulate organic development.

Conclusions: The organic diet project will essentially contribute to the development of sustianble diets on a global and regional scale.

Keywords: (maximum 5): Sustainable diets, organic food, food system approach

149/1240. Food safety: an essential factor to ensure food security

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Introduction: The subsequently appearing food scandals, whether international or national, have got a huge impact on ensuring the food security. The food security remains directly or indirectly related to each four pillars: (1) the availability of food, (2) an access to food, (3) the use of food by individuals, who are influenced by, among others, food safety and nutritional value and diet diversity. The fourth pillar (4) ensures the stability of the first three pillars of food security in time. The effects of food affairs have got not only economic but also social and health dimension. Together with the following processes of globalization require extensive coordination on a global scale.

Objectives: The aim of this study was to analyze the factors affecting the food safety, which is an integral part of food security.

Method / Design: Food safety and epidemiological data were obtained from annual reports of Polish national food control agencies, CSO of Poland, EU annual reports on zoonoses, zoonotic agents and food-borne outbreaks, RASFF Annual Reports.

Results: In Poland, as an example, the implementation of obligatory food safety system in European Union – HACCP, reduced the percentage of establishments (production and trading facilities) from 10,2% in 2003 to 1,7% in 2013 which were incompatible with the sanitary and hygienic requirements. This led to halving the number of foodborne illnesses incidents including an illness caused by the

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bacteria Salmonella. Working EU's RASFF and the circulation of alert notifications, shows the efforts to protect human life and health.

Conclusions: Ensuring the food safety alongside the entire agri-food chain reduces health, social and economic impacts associated with food-borne illnesses and outbreaks. That increases the availability and utilization of food. Education about food safety and food security issues rise the consumer awareness.

Keywords: (maximum 5): food safety, food security, foodborne illness, food-borne outbreaks

149/1265. Antioxidant and antibacterial activities of selected herbal infusion with addition of honey

Author(s): Joanna Newerli-Guz; Aleksandra Wilczyńska; Millena Ruszkowska; Piotr Przybyłowski; Agnieszka Palka.

Affiliation: *Gdynia Maritime University. Gdynia. Poland.*

Introduction: Herbal infusions: mint [Mentha piperita L.], chamomile [Matricaria chamomilla L.] and lime [Tilia europaea L.] are the most often consumed beverages, due to their potent pharmacological properties. Purpose of use (pharmaceutical/ beverages) may affect their quality. In turn honey is known for its antioxidant and antibacterial activities and have nice, sweet taste useful in masking unaccepted taste of herbal infusions.

Objectives: The aim of this study was to investigate the antioxidant and antimicrobial activities of herbal infusions (mint, chamomile and lime, purchased in pharmacies and in supermarkets), with addition of different types (buckwheat and multifloral) honeys in different quantities (5 and 10%).

Method / Design: The spectrophotometric analysis of antiradical activity was performed using DPPH assay, total phenolic content was measured with Folin-Ciocalteau method. Antimicrobial activity against E. Coli, S. aureus was determined by the viable cell count method.

Results: The highest total phenolic content (TP) and antiradical activity was characterized by a lime infusion, purchased at a pharmacy (more than 350 mg/GAE/100ml and more than 85% respectively), whereas infusion of chamomile from the supermarket had the lowest antioxidant activity. The addition of different quantities and type on honeys caused the increasing in total phenolic content, however the addition of buckwheat honey caused the decreasing of antiradical activity. The honey addition had also impact on antimicrobial activity. The highest effect on it had 10% addition of buckwheat honey.

Conclusions: Type and quantity of honey had significant impact on antioxidant activity.

The addition of honey can positively influence the therapeutic effect of herbal teas.

Keywords: (maximum 5): INFUSION, HONEY, ANTIOXIDANT ANTIMICROBIAL ACTIVITY

149/1266. Studies on the hygroscopity of marjoram [Origanum majorana l.] in therms of their geographical origin

Author(s): Joanna Newerli-Guz; Millena Ruszkowska; Aleksandra Wilczyńska; Agnieszka Palka; Piotr Przybyłowski.

Affiliation: *Gdynia Maritime University. Gdynia. Poland.*

Introduction: Characteristics of hygroscopic properties of spices are an important element in the production process to determine the storage stability of these products.

Objectives: The aim of this study was to assess the impact of the geographical origin on the hygroscopic properties of marjoram [Origanum majorana L.] Polish (I) and Egypt (II) origin, purchased in Poland.

Method / Design: The sorption properties of these products were determined with the static method based on the evaluation of water vapor sorption isotherms and with the dynamic method by assaying water vapor sorption kinetics. Sorption isotherms of steam were determined at 25°C by the static desiccator method. The empirical data were subjected with the use of the Brunauer, Emmett and Teller equation in a water activity range of $0.07 \leq aw \leq 0.33$. Based on the equilibrium moisture content of the products designated capacity of adsorption monolayers BET surface area and sorption.The kinetics and rate of water vapor sorption were determined in the environment with relative humidity of - aw=0.44, 0.64, 0.86, within 48 h.

Results: The sorption isotherms of investigated spices belonged to type II, according to the classification of Brunauer et al.. Dynamic sorption measurement showed that the sorption kinetics of water vapor in the tested products were conditioned by humidity difference between the samples and their surroundings. The rate of sorption process in the tested spices I and II decreased with increasing water content.

Conclusions: It was found that the differences in the hygroscopic properties of spices I and II were determined by geographical origin. It also was impacted by the initial water content and its activity.

Keywords: (maximum 5): SPICES, HYGROSCOPICITY, BET MODEL, SORPTION ISOTHERMS, STORAGE LIFE

149/1267. Relationship between Food Security and Soil Quality in Cocoa Production: The Case of South-Western Nigeria

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Introduction: Food-security is becoming a crucial issue in Nigeria as a consequence of unreliable rainfall, marginal soil fertility and a low level of inputs resulting in declining crop yields. Southwestern Nigeria occupies about 30% of Nigeria with an estimated population of 40 million. Over 90% of Nigerian cash crop cocoa is produced in

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the cocoa belt of the Southwestern region, but both cash and food crops have consistently decline in the last few years. This phenomenon constitutes a threat to food security and calls for efforts to explain the downward trend and make recommendations for improvement.

Objectives: The objectives of this study were to evaluate the soils of some areas in Southwestern Nigeria for cocoa on one hand, and identify factors affecting cocoa yields on the other hand. A novel technique that combines soil survey with socioeconomic analyses was adopted in the properties.

Method / Design: A novel technique that combines soil-survey with socioeconomic analyses was adopted in the properties. Socioeconomic surveys covered resource quality and constraints to agricultural food-production, whereas soil sampling and analyses were carried out to assess contribution of soil to yield. 3 locations having similar agro-ecological features were selected, namely Ibadan, Ife and Akure. Cocoa-Farmers were randomly selected and interviewed on their farms using standardized questionnaires to elicit information on factors affecting crop yield.

Results: Relationships between cocoa-yield and variables presumed to influence yield were determined using linear-multiple-regressions. Soil-organic-C, Age of farm-soil, and Effective-Cations-Exchange-Capacity (ECEC) were identified as the major constraints to yield. Other variables are related to biophysical and management-factors.

Conclusions: It is recommended that emphasis should be placed on soil management techniques that conserve organic matter and enhance the nutrient and water holding capacity of the soils. Policies that would enhance sustainability of agricultural land-use and crop marketing are also required.

Keywords: (maximum 5): Cocoa-yield, Food-security, Land-use, Soil-organic-C, Soil-quality

149/1274. Taxonomic structure of the microbiota of Tunisian Organic Prickly Pear (Opuntia ficus indica Mill) cladodes and fruits and their exploitation through lactic acid fermentation

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Introduction: Organic prickly pear production in Tunisia is constantly increasing, due to its high ecological adaptability to extreme cultivation condition and growing demand for its food and non food products, which guarantees high income. Fruits are characterized by pronounced flavor and high nutritional properties, whereas cladodes are less exploited for human consumption. Recently, beside targeted analytical approaches, non-targeted- holistic approach dealing with nutritional and microbiological characterization of organic products become very important.

Objectives: The present study aimed to explore the endophytic and epiphytic cladodes and fruits associated microbiota and to exploit the nutritional and functional properties through lactic acid fermentation.

Method / Design: Fruits and cladodes were collected in September 2014 in Tunisia from three different locations: Jendouba, Kasserine and Le Kef. Cultivars Amles, Chawki and Hbari were investigated. The structure of the microbiota cladodes and fruits associated was explored through culture-dependent and independent (pyrosequencing of the 16S rRNA targeting RNA) methods of identification. Lactic acid bacteria and yeasts were identified by partial 16S rRNA and 26S rDNA gene sequences, respectively. Cladodes and fruits were exploited through lactic acid fermentation by selected autochthonous lactic acid bacteria. Chemical, microbiological and functional properties (e.g., flavonols profiles, phenolic content and antioxidant activity) were evaluated.

Results: Microbial diversity and community structure showed variability on the axis fruits or cladodes, cultivar or location; whereas functional properties were more in relation to the plant part and cultivar and starter used. The setting up of the protocol for processing fruits and cladodes may guaranty improved safety, and nutritional properties.

Conclusions: The exploitation of organic products through new approaches presented in this study may contribute to sustainability of Mediterranean diet. Accordingly, nutritional and biotechnological valorization of cladodes and fruits seems to be promising.

Keywords: (maximum 5): Opuntia ficus indica Mill, plant associated microbiota, nutritional properties, lactic acid fermentation, organic food

149/1286. Sociodemographic characteristics associated with sustainable food choice motives during purchasing in French adults

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Introduction: Sustainability has recently become an important concern in food choice motives during purchasing. The sociodemographic profiles associated with these food choice motives need to be identified.

Objectives: This cross-sectional study aimed to investigate the relationships between sociodemographic characteristics and sustainable food choice motives during purchasing in a large sample of French adults.

Method / Design: Food choice motives were collected in 31,694 participants from the Nutrinet-Santé study, using a validated 63 items questionnaire gathered into 9 dimension scores: ethics and environment, traditional and local production, taste, price, environmental limitations, health, convenience, innovation and absence of contaminants. Multivariable multinomial logistic regression models estimated the relationships between the scores and sociodemographic characteristics.

Results: Individuals with greater concern for all dimensions were more likely to be women and older, except for price. Subjects with greater concern for local and traditional production, health and absence of contaminants were more likely to have higher education level (for no education vs. higher education, respectively, OR=0.73, 95%CI=0.59-0.90 ; OR=0.85, 95% CI=0.79-0.91 ; OR=0.73, 95%CI=0.61-0.88) and higher income (for higher income vs. lower, respectively, OR=1.19, 95%CI=1.04-1.30 ; OR=1.29, 95% CI=1.16-1.45 ; OR=1.17, 95%CI=1.05-1.30). Individuals motivated by health, absence of contaminants were more likely to be managerial staff, those motivated by ethics and environment and local production were more likely to be farmers (respectively, OR=1.86, 95% CI=1.19-2.92 and OR=1.59, 95% CI=1.03-2.28). Individuals motivated by taste were more likely to be highly educated persons and managerial staff. Individuals motivated by price were more likely to have lower income and to be manual workers, intermediate professions or employees or with no occupation.

Conclusions: Individuals with sustainable food choice motives appear to belong to high socioeconomic categories. Further public health policies to promote sustainable food choices may focus on population subgroups that seem less concerned by these dimensions of food choice motives.

Keywords: (maximum 5): Sustainability, food choice, sociodemographic characteristics

149/1288. Association between sustainable food choice motives during purchasing and dietary patterns in French adults

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Introduction: During the last decade, there was an increasing concern about sustainability issues in consumer food choice motives. However, the association between these motives and dietary patterns has not been studied.

Objectives: This cross-sectional study aimed to investigate the relationships between sustainable food choice motives during purchasing and dietary pattern in a large sample of French adults.

Method / Design: Food choice motives were collected in 31,846 adults participating at the Nutrinet-Santé study, using a validated 63 items questionnaire gathered into 9 dimension scores: ethics and environment, traditional and local production, taste, price, environmental limitations, health, convenience, innovation and absence of contaminants. Dietary intakes were assessed using at least three 24-h food records and classified into food groups according to the French dietary guidelines. Three dietary patterns were derived through factor-analysis using principal component analysis. Multiple linear regression models were performed to assess the associations between dietary patterns and dimension scores.

Results: Taste, health, ethics and environment dimensions had the highest mean scores. The three dietary patterns reflected a "healthy diet", "traditional diet" and "western diet". Individuals more concerned by environmental limitations (βwomen=0.18, 95% CI=0.15-0.20, βmen=0.20, 95% CI=0.15-0.25), ethics and environment (women only, β=0.05, 95% CI=0.02-0.08), absence of contaminants (women only, β=0.04, 95% CI=0.01-0.07), local production (women only, β=0.08, 95% CI=0.05-0.11) but also health (women only) and innovation (men only), and those less interested in price, were more likely to have a "healthy diet". The traditional and western diets were less likely to be associated with sustainable food choice motives dimension scores.

Conclusions: This study highlighted that sustainable motives in food purchases were associated with a healthier diet. Thus, promoting sustainable food choices may contribute to enhance diet quality of individuals.

Keywords: (maximum 5): food choice, sustainability, dietary patterns

149/1289. Innovative eco-friendly methods to ensure freshness and safety of organic leafy vegetables.

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Introduction: Growing consumption of organic vegetables is caused by consumer demand for fresh chemical-free products. Microbial growth is main cause of deterioration of vegetables, especially in case of organic products that are more susceptible to microbial attack

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as they are produced without agrochemicals. Strict restriction in organic regulation related to post-harvest treatments can pose question about food safety. Use of natural compounds in active packaging is a smart solution to deliver fresh and safe product to the consumer as it helps to improve food safety, maintain quality and prolong shelf-life.

Objectives: Aim of this study is to evaluate effect of natural antimicrobials on quality and safety of organic spinach packed in biodegradable film.

Method / Design: Antimicrobial activity of eugenol, carvacrol, trans-cinnamaldehyde, trans-anethole was tested in in-vitro study against storage rot (Pectobacterium carotovorum) and human pathogens (Escherichia coli, Salmonella enterica). Sachets with different active compounds were inserted into biodegradable packages of organic spinach and stored in cooling chambers. Chemical and physical analysis were carried to evaluate effectiveness of the treatments on quality of the product after storage. Sensory panel was performed in order to evaluate visual, odor and texture attributes.

Results: Antimicrobial effect on Pectobacterium carotovorum had higher efficacy in comparison to Escherichia coli and Salmonella enterica. However antimicrobial activity of tested natural compounds is comparable to activity of antibiotics commonly used during disease treatments. Addition of antimicrobial sachets had positive effect on many factors related to quality of the product, however off-odor related to plant extract was slightly dominant.

Conclusions: The study showed that natural antimicrobials can maintain quality of packaged organic spinach and providing safety for consumers, however natural antimicrobial compounds are strongly aromatic and method need to be optimized before it can be implemented on the market.

Keywords: (maximum 5): carvacrol, eugenol, anethole, organic leafy greens, antimicrobial sachets, biodegradable packaging

149/1294. Antioxidant capacity of cocoa products from Serbia market

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Introduction: Cocoa is gaining importance as a source of biologically active substances. Cocoa flavonoids have received considerable attention because of their physiological functions including antioxidant, antimicrobial, antimutagenic and anti-inflammatory activities.

Objectives: The aim of this study was to evaluate the correlation of declared cocoa content with the antioxidant activity of analyzed cocoa products.

Objectives: The aim of this study was to evaluate the correlation of declared cocoa content with the antioxidant activity of analyzed cocoa products.

Method / Design: Different kinds of cocoa products from Serbia market were analyzed regarding total polyphenol, flavonoid and proanthocyanidin content using spectrophotometric methods. DPPH, FRAP, ABTS and ORAC assays were applied for measuring antioxidant capacity. The average of all four antioxidant tests for each cocoa product was used for calculating antioxidant potency composite index (ACI).

Results: The total polyphenol and flavonoid content was the highest in cocoa powder samples (35.35 mg GAE/g and 63.3 μmol CE/g, respectively). The content of flavonoids followed the content of total polyphenols in all samples. Total polyphenol content was 3 and 13 times lower in dark and milk chocolates than in cocoa powders and this decrease did not follow declared cocoa content in products. The content of proanthocyanidins in chocolate/cocoa extracts varied between 0.69 mg CyE/g in milk chocolates and 7.07 mg CyE/g in cocoa powders. Cocoa powders had average ACI value of 88.3%, dark chocolates 29.1%, while average ACI value for milk chocolates was only 7.3%.

Conclusions: Obtained results for all four assays have shown that antioxidant capacity of analyzed chocolate/cocoa extracts followed cocoa, polyphenol, flavonoid, and proanthocyanidin contents. In addition, correlation between antioxidant potency composite index and declared percentage of cocoa was high (R 2=0.798, $p<0.05$) and indicated that declared cocoa content was a reliable indication for antioxidant capacity of chocolates produced in Serbia.

Keywords: (maximum 5): chocolate, DPPH, FRAP, ABTS, ORAC

149/1305. Development of functional products with dried micro-algae: consumer acceptance and nutritional benefits

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Introduction: Micro-algae are increasingly recognized in Europe for their high potential as an alternative source of nutrients for humans and animals. In addition to proteins, micro-algae contain a wide variety of micro-nutrients and bioactives of interest in nutrition and health. Research and product development work is needed to bring these nutrients to consumers. This work is a collaboration, within the newly formed interdisciplinary Center at ZHAW - Combining Competencies in Micro-algae (CCMA), which aims to promote micro-algae research in Switzerland,

Objectives: To enrich selected food products using commercial dried micro-algae (Chlorella vulgaris) with focus on consumer acceptability, as well as nutritional benefits.

Method / Design: Small-scale product development was done on cookies, muffins, spaghetti. Based on preliminary trials, acceptable addition levels of dried C. vulgaris were 0.5, 1.4%, and 1.0%,

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respectively. Increases in nutritional content were estimated using Swiss Food Composition data base (products), supplier information (micro-algae) and from literature (micro-algae). A consumer test (9 questions; 9-point hedonic scale, 63 panelists) was done on the algae-enriched muffins.

Results: Chlorella-enriched pasta and muffins were the most acceptable in preliminary trials. Addition levels of micro-algae were limited by strong coloring effects and by off flavors. This prevented significant increases in most nutrients; with exceptions, e.g. ß-carotene was increased by 50 %. The consumer test showed 65% panelists liked the idea of micro-algae enriched food products. Overall liking of Chlorella-enriched muffins was 6/9; odor was scored highest (6.8/9), and appearance was lowest (4.1/9) largely due to the green color (38% panelists).

Conclusions: Consumers showed an openness towards micro-algae enriched products for nutritional reasons. Chlorella-enriched pasta and muffins were the most successful. Further studies should confirm the presence of a selected number of these (e.g. Lutein) in the enriched products.

Keywords: (maximum 5): micro-algae, functional Foods, enrichment

149/1312. Do we need alternative solution for reducing anemia prevalence among adolescents in Indonesia? A literature review

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Introduction: Introduction:Anemia in Indonesia remains public health problem with prevalence among adolescent girls 13 to 18 years is 22.7%. Based on UNICEF classification, anemia prevalence among adolescents in Indonesia categorized mild public health problem. Although iron supplementation and wheat flour fortification has been given since early 2000, no significant decreasing numbers yet. School health program can be one of the most cost effective investments a nation. However, evidences that underlying the policy to conduct school health program for reducing anemia prevalance are not conclusive.

Objectives: Objective: Review from literatures are needed to reveal the pros and cons of school health program implementation.

Method / Design: Method: Literature review from internet search database such as scholar google, cochrane, journal database from sciencedirect and pubmed and university libraried for unpublished studies.

Results: Results: More studies show the benefit of school health program to reduce anemia prevalence among adolescents than giving iron supplementation only. School health program can be sustainable if it is inserted in curriculum. A novel method of education delivery such as android application and computer game may be the choice for future program.

Conclusions: Conclusion: School health program implementation is a challenging pathway to reduce anemia among adolescents. Multisectors (policy makers in education, health and religion affairs as well as the school stakeholders and parents) should be involved in order to have a sustainable program.

Keywords: (maximum 5): Keywords: school health program, adolescent, anemia, nutrition

149/1314. Stone Fruit Wines as a Sources of Antioxidants

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Introduction: The consumption of fruit and their product is very important for balanced nutrition. They are rich source of natural compounds which show beneficial health effects on human organism. Fruit wines are rich sources of phenolic compounds which possess antioxidant properties and play role in health protection from oxidative stress.

Objectives: The aim of this study was to investigate the profile and in vitro antioxidant properties of fruit wines.

Method / Design: Total polyphenol content was conducted by using Folin-Ciocalteu method. Anioxidant capacity of samples was determined by DPPH method, by calculating the percent of inhibition of DPPH radical. Discoloration was measured on spectrofotometer at 518 nm. Also was used modern FRAP procedure for determination of antioxidant properties of wine samples. For identification and quantification of some antioxidant compounds HPLC TQ-MS/MS method was used.

Results: Wines were made from apricot, peach and plum in winery according to the wine making procedure. From each kind of fruit were made four different types of wine. All determinations were conducted in these 12 samples of wine. The total polyphenol content determined by Folin-Ciocalteu method was in range 358-1389 mg/L expressed through concentration of gallic acid. The results of DPPH analyze of samples were in range 35.69-68.50%. The results of antioxidant capacity analyzed by FRAP procedure were in range 21.75-45.15 mmol/Fe2+. Results of HPLC TQ-MS/MS analysis showed that our samples are sources of compounds such as catechin, epicatechin and phenolic acids. All those compounds have antioxidant properties.

Conclusions: The obtained results indicate that fruit wines are sources of antioxidant compounds. Antioxidant properties of fruit wines depend from which kind of fruit they were made. Natural compounds from fruit wines are particularly important in the prevention of non-communicable disease caused by oxidative stress.

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Keywords: (maximum 5): Fruit wines, Antioxidants, Polyphenols

149/1335. Sweet potato Beauregard composition evaluation grown in Fundetec, Paraná in Brazil

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Affiliation: *(1) Nutritionist, Faculdade Assis Gurgacz. Brazil.; (2) Engenheiro Químico. Fundetec. Brazil.*

Introduction: Sweet potatoes are an excellent source of nutrients and energy due to carbohydrates, sugars, minerals, vitamins A, C and B complex. Also contains large amounts of methionine, which is an essential aminoacid for the welfare of human beings. The Beauregard sweet potato is an american cultivar developed by Louisina Agricultural Experiment Station in 1981, in Brazil, was identified by Embrapa in the BioFORT program, it has pulp orange-intense color, which is indicative of high content of beta-carotene (an average of 115mg/kg), which is essential for the development of vision organs, skin formation and body growth. When processed into flour, can replace all or partial or totally in a lot of recipes. Sweet potato have benn grown and analyzed at Fundetec , a foundation of the city of Cascavel, Paraná in Brazil.

Objectives: Develop more nutritious agricultural products; Entering these nutritional products in school meals.

Method / Design: he research was an experimental field in Agrotec- Technological Agricultural School for planting and the production of sweet potato flour, physico-chemical and formulation development were made in the Physical-Chemical Laboratory of Fundetec

Results: The analysis of lipids, carbohydrates and proteins were performed in triplicate according to the methodology proposed by the Adolfo Lutz Institute obtained as results (%), 0.1; 23.36 and 1.77, respectively. These values are very close to those of regular cultivar.

Conclusions: The Beauregard is an effective alternative in the diet of brazilian population, since will result in an increase in the consumption of vitamin A, without losing the original properties.

Keywords: (maximum 5): Enrichment, sweet potato beauregard, vitamin A.

149/1336. Technology quality of wheat flour integral germinated and no germinated

Author(s): Sabrine Zambiazi da Silva.

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Introduction: Wheat is one of the main agricultural products in the world being used in food processing, presenting important economic role and nutrition. With the growth of world population, procedures that increase the nutritional quality of the food has been constantly studied, especially in this segment, the germination of the grain.

Objectives: Compare the nutritional characteristics of wheat germinated and not germinated.

Method / Design: Thus, this work aimed to compare the nutritional quality of wheat Triticum aestivum, BRS Tangará germinated and not germinated observing s levels of iron, fiber and protein. During the experiment has been performed to test for germination vigor in small sample of wheat seeds and then the seeds were conducted the experiments and analyzes of germination, resulting in whole wheat flour and whole wheat germinated, which were analyzed when their nutritional characteristics.

Results: The results demonstrated that the protein content was 10% lower in germinated wheat flour. To the iron content of the flour has not germinated to over 97% of the mineral when compared with the non-germinated wheat flour. The index fibers sprouted wheat was 17% higher than reported for wheat not germinated.

Conclusions: With that, contrary to expectations, it was found that the germinated wheat flour does not have superior nutritional quality compared to whole wheat flour does not germinated.

Keywords: (maximum 5): Triticum aestivum L., nutritional quality, germination of grains

149/1348. Culinary Preparation of Giant Waterbug Lethocerus americanus for Customer Intake

Author(s): (1) Virginia Melo Ruiz; (2) Karina Sanchez-Herrera; (3) Concepcion Calvo-Carrillo; (4) Maritza García-Nuñez; (5) Rafael Díaz-García.

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Introduction: Giant water bug insect adequate preparation is required to satisfy the demand of customers in the market, this related with different factors such as appearance, food health, nutrient components like proteins, carbohydrates, fats, minerals and sensorial aspects, specially taste and flavor. It is difficult to evaluate the importance of these parameters, but from the consumer point of view quality mainly means, food good to eat, therefore sensorial characteristics play an important role in the consumptions of insects, thus one of the most important parameters are flavor and appearance responsible for pleasing factors when intake giant water bug insect. Customers perceive sensorial value, but not identify healthy and diet aspects.

Objectives: The aim of this study is to design different culinary preparations and presentations with giant water bug Lethocerus americanus in relationship to the taste and acceptability available at high class restaurants.

Method / Design: Different culinary presentations in this study were: giant water bug Lethocerus americanus boiled and crush lightly

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sprinkles with garlic, salt, lemon and chili powder; insects crushed mix with tempura batter and deep fry in vegetable oil; croquettes with pulverized dried bugs, with garlic, shallots and salt and serve with chili sauce or briefly sauté in melt butter. Sensory assess performed with 150 inhabitants random selected at Xochimilco delegation of Mexico, conducted one session per day tested during one week. Sensory assess was provide with hedonic scale of five parameters.

Results: Results showed preference for tempura preparation, follow by croquettes and dislike insect as a whole sauté in butter, because of tough chitinous exoskeleton and unpleasant appearance

Conclusions: Giant water bugs culinary design of Lethocerus americanus can be influenced by preparation. Giant water bugs can be trade for protein source

Keywords: (maximum 5): Waterbug, Intake, Culinary Preparation

149/1354. Uses of pesticides by farmers and its impact on consumers in Algeria

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Affiliation: *(1) Food safety agro-environment. ENSA. UR-ADTE. Algiers. Algeria.; (2) Phytopharmacy. ENSA. Algiers. Algeria.; (3) Nutrition. ENSA. Algiers. Algeria.*

Introduction: In Algeria, more than 30,000 tons of pesticides are used annually. Because of their health risks they should be handled with a lot of precautions, but farmers do not take these precautions into consideration

Objectives: We tried to assess compliance with good pesticide practices of some Algerian farmers to estimate the consumers' risks

Method / Design: We conducted a survey with farmers near the capital of Algeria, on compliance with good agricultural practices (GAP) during the manipulations of pesticides, and we tried to reproduce their behavior by the treatment of fruits and vegetables (tomato, strawberry and zucchini) with two pesticides (chlorpyrifos, Methiocarb) to determine their residue and assess their risk to the consumer by calculating the Estimated daily Intakes (EDI) which is compared to the acceptable daily Intakes (ADI)

Results: We found that most farmers do not meet the GAP when handling these toxic products. Pesticide residue levels were between 171 and 1190 µg / kg, most of them exceed the maximum residue limits (MRLs), and the calculated EDI are lower than the fixed ADI.

Conclusions: The results found for two pesticides only in some fruits and vegetables show the risk of misuse of these substances when in fact hundreds of pesticides are used on many fruits and vegetables in Algeria. Cancer kills about 30,000 people each year, 30% of diagnosed cancers are gastrointestinal and occur at a younger age Unlike Western countries. Stunting rates among children has increased in recent years. So we must act quickly, by instilling them a hygiene and security education against these risks to preserve our health

Keywords: (maximum 5): pesticides, farmers, ADI, EDI, Algeria

149/1370. Sustainability: Importance of Smallholders and Women Farmers in Kellogg's Supply Chain

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Introduction: Both smallholder and women farmers play critical roles in the global food supply, fostering food security in their own families and rural communities in which they may live.

Objectives: Kellogg acknowledges the key role smallholder and women farmers play in global food security, which is why two of our new Global 2020 Sustainability Commitments specifically call on us to develop and support programs that assist these types of farmers.

Method / Design: Identify the parts of our supply chain with the highest likely prevalence of smallholders and women, as well as the risks and opportunities they face and use the information to identify and prioritize programs that provide resources and education to improve productivity and livelihoods.

Results: Kellogg Companies recent work supporting smallholder and women growers directly includes:

Conclusions: •In the Andean plains, Bolivia, we partnered with our supplier Andean Naturals to support more than 700 farmer families, and a women-run farm cooperative, who grow quinoa. Our grower cooperatives ensure that the grower communities keep 10 percent of their crop for personal use. Two grower cooperatives have received financing and Andean Naturals and Root Capital will continue to measure the social and environmental outcomes of these engagements into the future.

- In the mountain province of Luzon, Philippines, a community of farmers—more than 90 percent of them women—have been growing heirloom rice varieties for generations. These grains often have high nutrient levels, taste exceptionally good, and may be more resilient to climate changes, bacteria and insects. Through a partnership with the International Rice Research Institute and other organizations, we are funding training sessions and equipment that will improve these farmers' agronomic practices and entrepreneurial skills.

Keywords: (maximum 5): women, smallholders, sustainability

149/1374. Metal contaminants in a canteen meals

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Introduction: Lead and cadmium are metals that exist naturally, they are found at different levels in the environment

They may be present in food as residues because of their presence in the environment caused by human activity (agriculture, industry, exhaust, tobacco ...), or contamination during processing or food storage.

Man can be contaminated by their presence in the environment or by ingestion of food / water contaminated

Objectives: This work consists of producing the inorganic contaminants assay (lead "Pb" and cadmium "Cd") in canteen meals to appreciate the importance of the dietary intake of these contaminants.

Method / Design: A canteen meals were collected over a period of one (01) month, each meal was split into its various constituents (meat, vegetable, fruit and other).

Each part of the meal is weighed and then finely ground ore by oven.

The determination of lead and cadmium was performed on digests by technical validated by electrothermal atomic absorption spectrophotometry (AAS)

The results obtained were compared to standards

The average daily intake (ADI) supplied by the diet were calculated and compared to tolerable daily intakes (TDI)

Results: 27 meals were collected with varying composition

The average daily intake of cadmium in food is about 3.62 µg / day / person representing 6.03% of the tolerable daily intake

The average daily intake of lead in meal is about 23.62 µg / day / person representing 10.69% of the tolerable daily intake

The mean levels of cadmium and lead in food is consistent with the standards, however many foods separately exhibit superior levels to standards

Conclusions: Average daily intakes are low compared to the tolerable daily intakes but remember that it was lunch meal only. Do not neglect the other contributions: breakfast, lunch,water...

The difference between the levels found in the different components requires diversification of meals

Keywords: (maximum 5): Lead, cadmium, meals, AAS

149/1378. The effect of pressurization conditions on selected properties of the Lactobacillus casei 0889 strain

Author(s): Agnieszka Jankowska; Paulina Baranowska; Krystyna Wisniewska; Arnold Reps.

Affiliation: *Food Technologist. Chair of Food Biotechnology. Department of Food Science. University of Warmia and Mazury. Poland.*

Introduction: The application of high pressure is an alternative technique of food preservation (high pressure preservation – HPP) which ensures high product quality with good sensory and nutritional qualities as well as extended durability.

Objectives: The aim of this study was to determine the effect of high pressure on some properties of Lactobacllus casei 0889 strain used in production of fermented milks.

Method / Design: This study was aimed at determining the effects of pressures of 100 - 400 MPa at temperatures of 4oC, 18oC and 37oC on the survival rate, antibacterial activity and antibiotic resistance of the Lactobacillus casei 0889 strain. Two pressurization environments were used in the experiment: MRS growth medium and fat-corrected milk. All analyses were conducted in duplicate. Statistically significant and insignificant changes were determined at $p < 0.05$.

Results: A pressure of 100 MPa caused a relatively small decrease in the survival rate of the tested strain. The highest degree of inactivation was achieved through the means of pressurization using a pressure of 400 MPa regardless of the temperature used. No significant differences were spotted between the survival rates of Lactobacillus casei 0889 in the MRS medium and milk. Lactobacillus casei 0889 demonstrated a varied antibacterial activity against the five test strains. An increase in pressure resulted in a decrease in antibacterial activity in the majority of the examined attempts while, in a number of attempts, a slight increase in the activity was noted after applying a pressure of 100 MPa. Lactobacillus casei 0889 in the MRS medium and in milk was not susceptible to kanamycin when exposed to pressurization at a temperature of 40oC. Larger areas of growth inhibition of the examined strains were observed for erythromycin and ampicillin along with an increase in the applied pressure.

Conclusions: Pressure resulted a significant reduction in the number of Lactobacillus casei 0889 and its antibacterial activity.

Keywords: (maximum 5): HPP, Lactobacillus casei, nonthermal food preservation,

149/1386. Nutritional profile of unripe banana flour as affected by organic acid pretreatment.

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Affiliation: *Department of Food Science and Technology, bDepartment of Horticultural Sciences, School of Agriculture, University of Venda. South Africa.*

Introduction: Unripe banana can be processed into flour for use in various food applications and functionality. Banana high starch content at its unripe stage makes the fruit flour of great use and application in several food processes.

Objectives: Flour obtained from four banana cultivars: Williams, Luvhele (Musa ABB), Mabonde (Musa AAA) and Muomva-red (Musa balbisiana) at unripe green stage 2 of maturity were characterized for nutritional properties.

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Method / Design: Banana cultivars at unripe green stage 2 of maturity were processed into unripe banana flour (UBF) upon pretreatment with 10, 15 and 20 g/L ascorbic, citric and lactic acid. UBF samples were profiled for individual polyphenols, mineral content, total dietary fiber (TDF), browning index (BI) and bulk density. Liquid chromatography mass spectrometry (LC-MS) electrospray ion connected to a Waters Acquity ultra-performance liquid chromatography (UPLC) and Acquity photo diode array (PDA) detector was used to determine the phenolic content of UBF while inductively coupled plasma optical emission spectroscopy (ICP-OES) was used for determination of mineral content.

Results: Analysis of individual polyphenols showed that epicatechin and myricetin-O-rhamnoside were identified in UBF of three cultivars except for Mabonde. UBF from Williams recorded the highest concentration of epicatechin, 3.24 ± 0.58 µg/g at ascorbic acid pretreatment of 20 g/L while Luvhele UBF recorded the highest concentration of myricetin-O-rhamnoside, 17.33 ± 2.31 µg/g at ascorbic acid pretreatment of 10 g/L. The ICP-OES mineral profiling of flour showed the presence of calcium, iron, magnesium, phosphorus, potassium, sulphur and zinc in varying amounts while sodium was not detected. Bulk density and BI varied significantly ($p < 0.05$) in flour of all cultivars due to pre-treatment while TDF was not detected in UBF of all cultivars.

Conclusions: Polyphenols and minerals identified in flour of all four banana fruits make them useful for application as nutrient enhancing food products.

Keywords: (maximum 5): banana flour, organic acid, polyphenols, minerals.

149/1388. Taste Evaluation of Fruits and Vegetables in Commercial Baby Foods: Garcia A.L, Cole E, Wright C: Key Words: weaning, non-trained consumer evaluation, early years, complementary foods

Author(s): (1) Ada Garcia; (2) Elise Cole; (3) Charlotte Wright.

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Introduction: In the UK commercial baby foods (CBF) are widely used during the transition from a milk-based diet to solid feeding. Food taste and texture can influence the development of preferences for fruit and vegetables (F&V). Vegetables are common ingredients in CBF but mostly used are sweet-types (i.e. carrots) while bitter vegetables (i.e. brassicas) are less frequent. Combining F&V in the same food is common, thus it is not clear whether these foods actually taste of the named F&V.

Aims

The aim was to determine if non-trained participants could detect F&V tastes in CBF.

Objectives: Method / Design Glasgow University medical students (n=21) were recruited to taste 13 different spoonable CBF, each student tasted 6 foods and each food was tasted at least 3 times (Mean 7±3SD). Fruits in CBF as part of a sweet food matrix were banana, mango and apple combined with either rice or yogurt (n=6). Vegetables in savoury food matrix were tomatoes combined with meat, chicken or cheese (n=3), carrots combined with red meat or chicken (n=2) and brassicas (cauliflower/broccoli or spinach) combined with cheese (n=2). Participants were asked to identify if foods were sweet or savoury and individual key F&V ingredients using taste and smell, while blinded to name and food packaging.

Results: Sweet taste was recognised universally (37/37 tastes) while savoury taste was only recognised in 71% (44/59) tastes. Tomato was the most easily identified (40, 60, 100%), followed by carrot (44, 100%). In the sweet matrix, banana was easily recognised (89, 100%) followed by apple (67, 88%). There was poor recognition of brassicas (6, 40%) and mango (12, 3%) but these constituted only ~23 and 54% of the food.

Conclusions: Paradoxically, the most strongly flavoured F&V ingredients were poorly recognised, probably reflecting the small amount included. This might have implications for development of taste preferences in infancy, particularly for bitter tastes.

Keywords: (maximum 5): 149/1390. Effects of Microbial Reduction by HClO Washing Method on Ginger

Author(s): Su Ji Kim; Ji-Hyun Lee; Won-Bo Shim; Hae-Won Lee; In-Min Hwang; Ye-Seul Hwang; Ji-Su Yang; Su-Yeon You; Sung Hyun Kim.

Affiliation: *Food Science&Technology. World Institute of Kimchi. Gwangju. Republic of Korea.*

Introduction: This study examined on the Kimchi and its ingredients and optimized the washing method to reduce microbial hazards.

Objectives: This study suggest that the washing method with HClO was confirmed to be an effective washing method to reduce microbial contamination on Ginger.

Method / Design: The Kimchi and ingredient samples were subjected for total aerobic bacteria, coliforms, E. coli, and food pathogens (Bacillus cereus, Enterohemorrhagic E. coli, Clostridium perfringens, Campylobacter jejuni/coli, Staphylococcus aureus, Salmonella spp., Vibrio parahaemolyticus, Listeria monocytogenes, and Yersinia enterocolitica).

Results: Coliforms were detected up to 8.0 log CFU/g at Gingers so it was regarded as a major contaminant among the ingredients of Kimchi. In our preliminary study, HClO solution at 100 ppm was selected as an optimal concentration for the reduction of microbial hazards. In this study, washing solutions (water and 100 ppm HClO), types (rinse, immersion, sonication), and period (3 and 5 min) was investigated. Ginger samples before and after washing were subjected for the microbiological analysis. E. coli and most food pathogens except B. cereus were not detected from all Ginger samples tested. The levels of total aerobic bacteria, coliforms, B. cereus on Ginger non-washed were 7.0, 6.4, and 3.9 log CFU/g, respectively. Among the washing types, the largest microbial reduction effect was obtained by the sonication method with 100 ppm HCIO for 5 min. After the optimization of washing step, the levels of total aerobic bacteria, coliforms, B. ce-

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reus contaminated at Ginger samples significantly decreased (0.41 log CFU/g, 0.82 log CFU/g, and 1.19 log CFU/g).

Conclusions: The results suggest that the washing method with HClO at 100 ppm for 5 min was confirmed to be an effective washing method to reduce microbial contamination on Ginger which is generally used as a minor ingredient in Kimchi.

Keywords: (maximum 5): Kimchi, Ginger, washing method, HCIO

149/1393. Higher antioxidant and lower cadmium concentrations and lower incidence of pesticide residues in organically grown crops: a systematic literature review and meta-analyses

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Introduction: Demand for organic foods is partially driven by consumers' perceptions that they are more nutritious. However, scientific opinion is divided

on whether there are significant nutritional differences between organic and non-organic foods, and two recent reviews have

concluded that there are no differences.

Objectives: In the present study, we carried out meta-analyes based on 343 peer-reviewed publications that indicate statistically significant and meaningful differences in composition between organic and non-organic crops/crop-based foods.

Method / Design: The literature search strategy and meta-analysis protocols used

were based on those previously published by Brandt et al. (2013)

Results: Most importantly, the concentrations of a range of antioxidants such as polyphenolics were found to be substantially higher in organic crops/crop-based foods, with those of phenolic acids, flavanones, stilbenes, flavones, flavonols and anthocyanins being an estimated 19 (95% CI 5, 33) %, 69 (95% CI 13, 125) %, 28 (95% CI 12, 44) %, 26 (95% CI 3, 48) %, 50 (95% CI 28, 72)% and 51 (95% CI 17, 86)% higher, respectively.Many of these compounds have previously been linked to a reduced risk of chronic diseases, including CVD and neurodegenerative diseases and certain cancers, in dietary intervention and epidemiological studies. Additionally, the frequency of occurrence of pesticide residues was found to be four times higher in conventional crops, which also contained significantly higher concentrations of Cd. Differences were also detected for some other (e.g. minerals and vitamins) compounds. There is evidence that higher antioxidant concentrations and lower Cd concentrations are linked to specific agronomic practices (e.g. non-use of mineral N and P fertilisers, respectively) prescribed in organic farming systems.

Conclusions: In conclusion, organic crops, on average, have higher concentrations of antioxidants, lower concentrations of Cd and a lower incidence of pesticide residues than the non-organic comparators across regions and production seasons.

Keywords: (maximum 5): Organic foods, Conventional foods, Composition differences, Antioxidants, (poly)phenolics

149/1399. Benefits and opportunities of small-scale sustainable egg production system due to emerging new consumers in Mexico.

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Introduction: Small-scale poultry production system is present in more than 85% of family production units in rural communities of Mexico. This livestock system contributes to household food security, allows the generation of high quality animal products for family consumption and improves family income by the sales of animal products that respond to the expectations of new consumer, looking for products associated with animal welfare, environmental protection, freshness and quality practices.

Objectives: The aim of the study was to describe and analyze the benefits that appropriate practices/technologies provide to peasants (higher income, food security, family welfare) and consumers (freshness, safety and quality eggs). The development and establishment of appropriate technologies that better suit with the particular characteristics, resources, needs and logic of small-scale sustainable egg production systems and peasant families is essential to include the internal and external egg characteristics preferred for the new consumers.

Method / Design: Household and production system data illustrate the actual situation and the potential improvement small peasants can achieve in the production of quality and safe animal products. An analysis of the growing consumer interest on these animal products as a result of the design and implementation of a sustainable poultry system for small-scale peasant of poor rural communities in Mexico is also presented.

Results: Conclusions We conclude that there is a great potential for small-scale egg producers due to the generation of eggs with intangible attributes (safety, health, animal welfare, environmental protection) and tangible attributes (freshness and quality).

Keywords: (maximum 5): small-scale, food safety, peasant, consumer.

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149/1403. Quality control of refined oils mixed with palm oil during repeated deep-frying using FT-NIRS, GC, HPLC and multivariate analysis

Author(s): (1) Mohamed Bouaziz; (2) Akram Zribi; (2) Hazem Jabeur; (3) Bertrand Matthäus.

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Introduction: Frying performance of blends of a monounsaturated oil like refined olive oil (ROO) or a polyunsaturated oil such as refined soybean oil (RSO) with a refined oil rich in saturated and monounsaturated fatty acids like refined palm oil (RPO) was investigated by assessing their chemical changes during 50 successive deep-frying sessions of potato fries at 180°C. The blends were prepared in the volume ratio of 80:20 (ROO:RPO and RSO:RPO). Indeed, the chemical properties of the frying oil blends were significantly ($p<0.05$) influenced by type and concentration of oil compounds. The ROO/RPO blend exhibited the highest chemical stability during the frying process and the RSO/RPO blend showed the lowest stability. In fact, 25% of total polar compounds were exceeded after 40 fryings for the ROO/RPO blend, whereas, after 30 fryings for the RSO/RPO blend. Finally, ROO/RPO blend revealed better frying performance than that of RSO/RPO, as confirmed by both statistical analyses such as principal component analysis (PCA) and repeated measures analysis of variance.

Objectives: Method / Design Results Conclusions **Keywords: (maximum 5):** 149/1427. Effects of drying and extraction techniques on the profile of volatile compounds in banana pseudostem

Author(s): Pantea Salehizadeh; Robert Driscoll; Jayashree Arcot; George Srzednicki.

Affiliation: *Food Science and Technology Group. School of Chemical Engineering. UNSW. Sydney 2025. Australia.*

Introduction: Banana is one of the most important crops produced in large quantities in tropical and sub-tropical countries. However; 40% of this production is considered as waste, which allows fungal diseases such as Sigatoka Leaf Spot disease to develop in the field, reduce the plant growth and by spreading spores in the air and can cause lung problems in the surrounding population. The pseudostem (PS) is considered a residue of production (60 to 80 tonnes/ha/year). It is a good source of dietary fiber (DF) and volatile compounds (VC). Identification and extraction VC from dried and fresh PS with different desirable smells could improve the smell, nutritional value and reduce the price of products for confectionary and bakery industries.

Objectives: The aim of this study is to determine the effects of two banana species and optimization two drying methods and two fibres on the profile of volatile aroma compounds in dried product.

Method / Design: The banana species were (Musa acuminata and Musa balbisiana). Drying involved freeze-drying (FD) and heat pump drying (HPD). The extraction of volatile compounds was performed at ambient temperature using vacuum distillation in conjunction with headspace solid-phase micro-extraction (HS-SPME). Two fibre coatings (DBV/CAR/PDMS1; Stable Flex, 50/30 lm) and (PDMS /DBV2; 65 lm) at 50 0C and 60 min were investigated.

Results: The results show that there is a significant difference between the compositions of volatile compounds in the two species. Applying SPME with (PDMS /DBV; 65 lm) has two fold higher efficiency than triple fibre Stable Flex. It was discovered that FD kept more volatile compounds than HPD.

Conclusions: This study is still in progress and should lead to the optimization of the processing techniques that would promote the utilization of banana pseudostem in the food industry.

Keywords: (maximum 5): Heat pump drying, Freeze-drying, HS-SPME, Ambient temperature vacuum distillation, VC.

149/1429. Fate of Mannan Oligosaccharide in the Gastrointestinal Tract

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Introduction: Mannan oligosaccharide (MOS) is a complex that is derived from the cell wall of the yeast Saccharomyces cerevisiae. This complex carbohydrate product has been utilized around the world to improve the productivity and wellbeing of poultry, fish and livestock. Questions related to the specific interaction between MOS and the immune cells still remain unclear.

Objectives: The objectives of this study was to determine if MOS crosses through the intestinal epithelium and if it is translocated to the lamina propria of the small intestine. In order to understand the fate of MOS in the gastrointestinal tract and its interaction with the immune related cells.

Method / Design: This study compares the translocation of Albumin, the negative control which is known not to be quickly digested and not translocated; that of Dextran, the positive control which is known to be phagocytosed by dendritic cells and that MOS, the experimental group. Pure mannan was obtained from a mannan rich fraction by reacting with 7-methoxycoumarin-3-isocyanate in dimethylsulphoxide. The labeled product was isolated by ethanol precipitation. The MOS was labeled with a flourescent tag. In this study sixteen one-day old broiler chicks (Cobb x Cobb) were used. They were kept in brooder batteries with four chicks per pen. Each group (n=4) was assigned to a different fluorescent-labeled diet. The control group got the basal diet without fluorescent-tagged molecules in order to determine background levels of fluorescence. The ratio of fluorescent labeled MOS, albumin and dextran to the basic diet was 20 mg/kg. The experiment lasted three weeks. At the end of the study chickens were terminated with carbon dioxide. The removed intestinal segments were preserved in 10% formalin and fixed on the slides using the paraffin method. From each segment, 72 glass slides were

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prepared. Images captured by fluorescent microscopy were used to determine the extent of translocation of MOS into the lamina propria.

Results: The data was analyzed by ANOVA. P value <0.05 was considered to be significant. Foci of fluorescence from albumin were not detectable. The albumin was degraded prior to entrance into the lamina propria as expected in the negative control group. Thus it was not included in the statistical analysis. Comparatively, dextran, the positive control group was transported into the lamina propria, most significantly in the ileum. MOS, the experimental group was transported into the lamina propria. In the duodenum and jejunum, our results indicated that larger amounts of MOS were as transported into lamina propria as compared to dextran.

Conclusions: In conclusion MOS does not interact specifically with the epithelial cells but it makes its way to the gut associated lymphoid tissue (GALT) of the lamina propria via an independent method, which appears to be mediated by dendritic cells as an immune surveillance mechanism that is vital in the mucosal immunity. MOS has likely a general adjuvant effect on immune system without causing "danger signals" that are inherent in pathogen. Further studies are needed to identify the mechanism of this interaction especially with M-Cells, which are specialized epithelial cells and play a key role in stimulating the immune system.

Keywords: (maximum 5): Immune system, Lamina propria, Mannanoligosaccharide

149/1434. Effectiveness of G.C.E. drink with diet and activity modification on anthropometrics and metabolics of Asians

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Introduction: As reported by the World Health Organization there is an increasing prevalence of obesity on most countries around the world. The cause of obesity is multi-factorial and the most widely known cause is energy imbalance. In the Philippines, as reported in the 7th National Nutrition Survey (2008) by FNRI-DOST, an increasing prevalence of obesity particularly the android type was seen and has been associated and known to be an important marker of degenerative diseases such as atherosclerosis, diabetes and some forms of cancer. In Vietnam, the 2009 General Nutrition Survey indicates that prevalence of overweight and obesity was at 4.9% for males and 6.3% for females.

Objectives: This study was done to see the efficacy of green coffee extract supplemented juice drink with diet and activity modification on body fat loss among Filipino and Vietnamese adults for twelve (12) weeks.

Method / Design: Sixty (60) participants from the Philippines and Vietnam were divided into Placebo, GCE only (GCEMNOT) and GCE with Diet and Physical Activity Modification (GCEMPAD). GCE supplementation is at 450mg per day. Analysis of Co-variances (ANCOVA) with Duncan Multiple Range Test (DMRT) was used to analyze data.

Results: After intervention, GCEMPAD can conceivably decrease body weight by 4.59%, body fat by 25.53%, fat mass by 11.81%, visceral fat by 17.98%, body mass index by 5.28%, waist and hip circumferences by 7.09% and 3.31% respectively. While GCEMNOT can possibly reduce body fat by 2.37%, fat mass by 0.67%, body mass index by 1.02%, and waist circumference by 2.98%

Conclusions: Intake of juice drink supplemented with green coffee extract can further enhance weight and body fat loss while modification of diet and physical activity generally help improve morphometrics of study participants.

Keywords: (maximum 5): Body Fat Loss, Filipino, Vietnamese, Green Coffee Extract (GCE)

149/1436. Formation of oxysterols in the thermally processed meat

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Introduction: Sterol oxidation products, known as oxysterols, are very important compounds from hygienic and toxicological point of view. It is well known that oxysterols have harmful health effect (cytotoxicity, mutagenicity, carcinogenicity, inflammation and the promotion of atherosclerosis). Some oxysterols are synthesized in vivo from cholesterol. But, they can also be formed in food during industrial technological procedures and storage. Inadequate cooking (culinary processing of food) can also lead to significant increase the degree of sterol oxidation. Temperature, time, free access of oxygen, potential antioxidant protection are the most important factors influencing the oxysterol formation. Oxysterols can be formed in various processed food. But baked meat and minced meat products contain sufficient amount of precursors and favourable condition for sterols oxidation.

Objectives: It is necessary to identify and quantify oxysterol formation in food, mainly in thermally processed food. The aim of this work was the evaluation of sterol oxidation in baked minced meat products (meatloaf) prepared under different conditions.

Method / Design: SPE method was used for oxysterol separation from lipid fraction of processed material. Identification and quantification of oxysterols was provided by GC/MS.

Results: The content of oxysterols rose as the temperature of baking increased and was different in various parts of thermally processed meat.

Conclusions: Cooking conditions should be carefully controlled because influenced the formation of oxysterols in meat. Under uncontrolled conditions, thermally processed meat is the important source of oxysterols in our diet.

Keywords: (maximum 5): oxysterol, baking, meat

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