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## Blood expression patterns of retinoic and fatty acids receptors are associated with cognition in elderly

C. Féart, B. Buaud, L. Letenneur, Paul Higuieret, C. Vaysse, P. Barberger-Gateau, Véronique Pallet

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# **11th European Nutrition Conference (FENS)**

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## **Abstracts**

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## ORAL COMMUNICATIONS

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27/3. Gut: An open door to Nutrition

**Divalent minerals negatively impact micellarisation and uptake of carotenoids into Caco-2 intestinal cells**

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**Introduction:** Carotenoid intake has been associated with decreased incidence of several chronic diseases. However, prior to their availability for various physiological functions, carotenoids have to be absorbed by the human body, following micellarisation and cellular uptake. While some dietary factors impacting carotenoid bioavailability have been elucidated, the influence of minerals/trace elements has never been thoroughly studied.

**Objectives:** To study the effect of minerals and trace elements, and their effect on carotenoid solubilisation/cellular uptake. Furthermore, the uptake of epoxy-carotenoids and their degradation products was evaluated.

**Method/Design:** Employing an in vitro model coupling simulated digestion to Caco-2 cells, we assessed the effect of several divalent minerals (range 2.8-30 mM), including calcium (Ca), magnesium (Mg), and the trace elements zinc (Zn) and iron (Fe), on spinach-derived carotenoid micellarisation and cellular uptake.

**Results:** Minerals and trace elements significantly inhibited both micellarization and cellular uptake, with strongest effects for Fe>Zn>Ca>Mg, and stronger effects for higher concentrations. Most pronounced reduction of micellarisation and uptake was found for iron (12.5mM), 87.5% and 95%, respectively, lowest reduction was observed for Mg (25 mM), 3.2% (non-significant) and 30.8%. In general, total carotenoid cellular uptake was in proportion to reduced micellar carotenoid concentrations; however, decreased beta-carotene and lutein micellarisation was counterbalanced by increased fractional cellular uptake. Thus, compared to the control, fractional beta-carotene uptake from micelles was increased by samples digested in the presence of Fe, Ca and Zn at highest ion concentrations, up to 5-10 times ( $p<0.001$ , Bonferroni), while fractional lutein uptake slightly increased (1.4 – 1.6 times,  $p<0.001$ , Bonferroni). We further observed a significant negative effect of Fe, Ca, and Zn on the micellarization and uptake of the epoxy-carotenoid conversion products neochrome (from neoxanthin) and luteoxanthin/auroxanthin (from violaxanthin).

**Conclusions:** It is demonstrated for the first time that divalent ions could negatively interact with carotenoids during micellarisation and cellular uptake.

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27/43. Gut: An open door to Nutrition

**Perinatal antibiotic treatment and long-term influence on gut TLR stimulants in offspring**

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**Introduction:** Gut bacterial colonisation may influence gut susceptibility to insults later in life. Dietary and bacterial pathogen-associated molecular patterns (PAMPs) may contribute to chronic inflammation via TLR stimulation.

**Objectives:** We hypothesized that peripartum antibiotic treatment of mothers affects offspring gut content PAMP profiles in adulthood.

**Method/Design:** The hypothesis was tested in sows (11 antibiotic-ATBQ, 12 controls-C) treated with amoxicillin (40 mg/kgBW/d) orally around parturition (day -10 to +21) in order to disturb sows' microbiota and offspring gut colonisation. At the age of 5 months, pairs of offspring of similar BW within litters from each sows' group (10 pairs/treatment) were randomly offered a low (LF) or high (HF) fat diet (2 and 11% fat) for 4 weeks. Afterwards, ileal and rectal contents were collected. PAMPs in foodstuffs and digesta were quantified using TLR-transfectant-based bioassays. Data were analysed by SAS using a MIXED model.

**Results:** TLR-2 and TLR-4 stimulants amounted to 1771 and 923 ng/g in LF diet and 1321 and 1275 µg/kg in HF diet. TLR-2 and TLR-4 stimulant concentrations in ileal contents were low ( $4.8\pm(\text{SEM})2.7$  and  $0.14\pm0.10$  µg/g content DM) and not influenced by the factors tested. In contrast, TLR-2 and TLR-4 stimulant concentrations in rectal contents were high ( $120\pm19$  and  $8.7\pm1.5$  µg/g content DM). Both were higher in ATBQ offspring than in controls ( $P<0.05$ ). TLR-4-stimulants were also higher ( $P<0.05$ ) in ATBQ offspring fed the HF diet than in the other groups (interaction,  $P=0.08$ ). Rectal concentrations of TLR-2 and TLR-4 stimulants were positively and linearly correlated ( $R^2=0.37$ ,  $P<0001$ ).

**Conclusions:** Present data suggest gastrointestinal detoxification of dietary TLR stimulants and that the large intestine is a site of TLR-stimulant production. Both TLR stimulants were influenced by peripartum antibiotic treatment of mothers, suggesting a long-lasting effect on the gut microbiota. Finally, gut TLR stimulants may be modulated by the diet.

**Key Words:** TLR stimulants, diet, ileal contents, rectal contents, pig model

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**27/61. Gut: An open door to Nutrition**

**Altered fecal bile acids and increased intestinal permeability in diet-induced obese mice**

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**Introduction:** Systemic low-grade inflammation is a typical disorder in obesity and an independent risk factor for type 2 diabetes. This inflammation has been proposed to be caused by increased intestinal permeability to highly inflammatory bacterial lipopolysaccharides, since some studies have reported a loss of intestinal barrier function in obesity. Bile acids have not yet been studied as a mechanism for obesity-induced permeability dysfunction, although they are known to be cytotoxic in high concentrations.

**Objectives:** We aimed to see if a high-fat diet deteriorates gut barrier function and modifies fecal bile acid profile in genetically wild type mice.

**Method/Design:** Male C57Bl/6J mice were fed on a high-fat or low-fat diet for 15 weeks. Diets were similar in fiber content. Fecal samples were collected at week 13 in metabolic cages. Bile acids were analyzed with gas chromatography. Intestinal permeability was measured at the end of the feeding period from duodenum, jejunum, ileum and proximal colon in an Ussing chamber system using 4 kDa FITC-labeled dextrans. Dextrans were added to the luminal side and fluorescence was detected from the serosal side of the intestine.

**Results:** High-fat-fed mice became significantly heavier compared to low-fat-fed mice (49.5±0.59 g vs. 28.6±0.36 g,  $p<0.001$ ). High-fat feeding increased permeability in jejunum ( $p=0.031$ ) and proximal colon ( $p=0.014$ ), and slightly but not significantly in duodenum ( $p=0.325$ ) or ileum ( $p=0.692$ ) (N=10-14 per group). The concentration of nearly all measured bile acids was increased in the feces of high-fat-fed mice. Relative concentrations of isolithocholate, chenodeoxycholate and ursodeoxycholate were decreased by high-fat feeding ( $p<0.01$ ).

**Conclusions:** Diet-induced obesity significantly increased intestinal permeability in jejunum and colon. Diet-induced obesity also increased fecal bile acid concentration and altered fecal bile acid profile, which may have an impact on gut barrier function.

**Key Words:** intestinal permeability, barrier function, bile acids, obesity, Ussing chamber.

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**27/73. Gut: An open door to Nutrition**

**Nutritional status and determining factors in adult-onset celiac disease**

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**Introduction:** Celiac disease (CD) determines small bowel lesions leading to various deficiencies of nutrients, vitamins, and dietary minerals, which also appears in absence of duodenal villous atrophy. However, the prevalence of nutritional deficiencies widely varies between studies and mostly refers to children presenting digestive symptoms. The relationship between the baseline degree of duodenal lesion and nutrition status is unknown

**Objectives:** To analyze nutritional status of adult-onset CD before ongoing to gluten free diet (GFD) and determining factors

**Method/Design:** Observational study of adult-onset CD patients. Analytical and anthropometric data were collected. Kruskal-Wallis test provided by the SPSS statistical package was used

**Results:** Thirty five patients (33 women), average age 42, were studied. Body mass index (BMI mean±SD): 25,6±6kg/m<sup>2</sup> (49% >25). 24% of patients presented anemia and 30% iron deficiency. 60% of patients presented low serum pre-albumin levels, but only 3% had low albumin levels. Vitamin A levels were under normal in 12%, and 91% exhibited suboptimal vitamin D levels. The remaining nutritional parameters did not presented significant alterations, including vitamin B12, folic acid, calcium, phosphor, copper and magnesium serum levels. After classifying according to the Marsh stage classification for the presence (Marsh III) or absence (Marsh I and II) of duodenal villous atrophy, those patients with atrophy showed significantly lower levels ( $p<0.05$ ) in BMI, serum cholesterol, pre-albumin, iron, folic acid, but not for the remaining parameters

**Conclusions:** Adult CD patients in our series exhibited a high frequency (47%) of overweight or obesity at the moment of diagnosis. A high proportion of patients also showed important nutritional deficiencies, highlighting anemia (24%), iron deficiency (30%), and vitamin A (12%) and D (91%) reduced serum levels. Duodenal villous atrophy (Marsh III) associated with lower iron, folic acid, cholesterol and pre-albumin serum levels, together with a reduced BMI, compared with non atrophic Marsh stages

**Key Words:** Celiac disease, nutritional status, duodenal villous atrophy, Marsh stages

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27/146. Gut: An open door to Nutrition

**Dietary fibre from cereals and fruits & vegetables in the stability of human colonic microbiota**

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**Introduction:** Microbiota composition and metabolic activity actively affects host health. Alterations in microbiota composition, known as dysbiosis, are related to many diseases and pathological status

**Objectives:** Evaluate the effect of natural occurring dietary fibre in the whole bacteria biomass and stability of microbiota composition

**Method/Design:** In vitro colonic fermentation was performed in the TIM-2 in vitro model for the human large intestine. As substrate for fermentation, dietary fibre from two European diets (Copenhagen, Denmark and Murcia, Spain) was used. Moreover, dietary fibre from the cereal foodstuffs and fruit and vegetables of those diets was fermented independently. During 72h, luminal samples were collected each 24h. Total bacterial biomass modification was determined by RT-PCR and microbiota composition was analysed by DGGE. Stability was calculated comparing the rate of change from the initial inocula. The composition of *Lactobacillus* and *Bifidobacterium* genera was independently analysed.

**Results:** It was observed that dietary fibre, as well as some of its constituents, had a strong effect increasing bacterial biomass and modulating the microbiota stability. Dietary fibre from whole diets increased bacterial biomass more than isolated dietary fibre sources, and cereal fibres more than fruit and vegetable dietary fibres. Dietary fibre composition was related to microbiota stability: a direct positive correlation was observed between the ratio carbohydrate:protein and the microbiota stability during the fermentation. Moreover, a relationship between the dietary fibre content of resistant starch, soluble polyphenols and hydrolysable phenols and the stability of *Lactobacillus* was observed. However, the growth and stability of *Bifidobacterium* was independent of the amount and composition of the dietary fibre added as substrate for colonic fermentation.

**Conclusions:** Natural occurring dietary fibre provided by different food sources is a good substrate for colonic fermentation, increasing bacterial biomass and modulating the microbiota composition.

**Key Words:** Dietary fibre, Colonic fermentation, Microbiota, *Lactobacillus*, *Bifidobacterium*

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27/335. Gut: An open door to Nutrition

**Does dietary Inulin affect the biological properties of grapefruit flavonoids in rats?**

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**Introduction:** Inulin and flavonoids are dietary phytochemicals with many health-promoting properties, such as lipidaemia-lowering activity. In the native form, most flavonoids are bound to sugars and, like inulin, they reach the large intestine in high quantities, affecting the activity of microflora.

**Objectives:** Verification of the hypothesis that the concomitant presence of dietary prebiotic with flavonoid glycosides in a Western-type diet may provide an additional effect to the hindgut metabolism and blood lipid profile.

**Method/Design:** Forty male Wistar rats were distributed into 4 groups and fed for 28 days with model Western-type diets. Each diet had a high and equal content of saturated fats, cholesterol and protein (23%, 14% and 1% of the diet, respectively). Two-way repeated measures ANOVA was applied to assess effects of the type of dietary carbohydrate (sucrose vs. inulin, 5% of the diet), the addition of dietary flavonoids (diets without or with 0.3% of extract from hard parts of grapefruit – 53% flavonoid content in the glycosidic form) and the interaction between these aforementioned factors.

**Results:** Single inulin addition to a diet decreased pH value, supported bifidobacteria growth and increased propionate production in the caecum, the main part of the hindgut in rats, when compared with the control sucrose-containing diet. The dietary grapefruit extract without inulin considerably increased bulk and pH value of caecal digesta, as well as the content of main SCFA, whereas the bifidobacteria population was lowered. Simultaneous dietary addition of both tested components favourably decreased the pH value as well as increased the number of bifidobacteria and butyrate production when compared to the group fed diet with sucrose and flavonoid addition. As for blood lipids, the dietary flavonoids decreased triacylglycerolaemia regardless the type of carbohydrate.

**Conclusions:** Dietary inulin has positive and partly synergistic effects with grapefruit flavonoids in the hindgut.

**Key Words:** inulin, grapefruit flavonoids, bifidobacteria, SCFA, blood lipid profile.

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27/406. Gut: An open door to Nutrition

**Energy content of almonds measured in healthy humans**

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**Introduction:** Results from epidemiological studies suggest that there is an inverse association between individuals who frequently

consume nuts and body mass index. despite the relatively high energy density of nuts. Clinical studies have shown that fat from almonds and other nuts is not well absorbed; therefore. using Atwater factors for determining the energy value of almonds could result in an over-estimation of the energy content.

**Objectives:** To empirically determine the metabolizable energy (ME) content of almonds.

**Method/Design:** We conducted a randomized. crossover. controlled-feeding study with healthy adults (n = 9 males and n=9 females) and fed almonds in 3 doses as part of a controlled diet: 0 g.day (control). 42 g.day. and 84 g.day. Following a 2-week acclimation to the controlled diet. urine and fecal samples were collected for 7 to 10 days. Diet and feces were analyzed for nitrogen. fat. total dietary fiber. ash. and combustible energy. and urine was analyzed for nitrogen and combustible energy. The energy value of almonds was calculated from differences in energy excretion during the dietary treatments.

**Results:** The measured ME density of almonds was found to be 19.1 kJ.g. which is less than the ME value of 23.9 kJ.g calculated using the Atwater general factors (and currently used for food labeling).

**Conclusions:** The measured ME value of a 28 g serving of almonds is 530 kJ which is 20% lower than the calculated value using Atwater factors. Accurate information about ME content of foods is important for reliable food labeling so consumers can make informed dietary choices.

**Key Words:** Almonds, energy, digestibility, absorption

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#### 27/415. Gut: An open door to Nutrition

### Lactose malabsorption in rats: role of the short chain fatty acids?

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**Introduction:** Diagnostic tests of Lactose Malabsorption may be impaired by metabolic adaptation of the intestinal microbiota through Short Chain Fatty Acids (SCFAs) production. However no relationship between their production. absorption and the host metabolism has been established.

**Objectives:** This study aimed to determine the impact of lactose ingestion on the Glucid Oxidation (Gox). Lipid Oxidation (Lox) and possibly the relationship with SCFAs production and absorption.

**Method/Design:** Adult Wistar rats. naturally lactase-deficient. were randomly assigned to L25 groups or S25 groups (n=6). They received a 5g single dose of a diet containing respectively either 25 % of lactose or 25 % of sucrose. One L25 and one S25 group were immediately housed in a calorimetric chamber for Respiratory Exchanges recordings. The other S25 groups were sacrificed respectively at 0. 120. 240. 360. 480. 780 min after the diet. Hepatic portal blood and intestinal contents were sampled for SCFAs measurements. Similar

protocol was applied to the L25 groups.

**Results:** The calorimetric records revealed significant Gox decrease and Lox increase in the L25 group over 300min after the diets. underlying the low absorption and subsequent metabolic lactose utilization in rats. However. this trend reversed after 300 min and the Gox of L25-group became greater than the Gox of S25-group. Concomitantly the SCFAs quantification exhibited a 140 % higher caecal concentration and a 100 % higher portal blood concentration of the total SCFAs in L25 groups compared to S25 groups. The higher differences were observed 480 min after the diets.

**Conclusions:** Lactose ingestion leads to increased production and intestinal absorption of microbial SCFAs. assessed with calorimetric parameters of the lactase-deficient host.

Calorimetric studies could be considered as a useful tool for the detection of lactose malabsorption and the monitoring of the subsequent metabolic adaptation of the Intestinal Microbiota.

**Key Words:** Lactose Malabsorption. Short Chain Fatty Acids. Respiratory Exchanges. Intestinal Microbiota

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#### 27/700. Gut: An open door to Nutrition

### High protein diet is not associated to increased fecal water genotoxicity

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**Introduction:** Colonic fermentation of proteins leads to the production of short chain fatty acids. branched chain fatty acids. phenols. sulphides and amines. Some of these metabolites are potentially toxic.

**Objectives:** We modified the degree of protein fermentation by changing protein intake and investigated the impact on fecal water genotoxicity.

**Method/Design:** After a 1-week run-in period with normal protein (NP) intake. 20 healthy volunteers followed an isocaloric high protein (HP) and low protein (LP) diet for 2 weeks in a randomized cross-over study. Fibre and fat intake were kept constant. During the run-in period and the second week of each intervention period the volunteers completed a dietary journal and collected urine for 48h and feces for 72h. Colonic protein fermentation was estimated from the urinary concentration of p-cresol. Profiles of volatile organic compounds (VOC) were analysed in fecal samples using GC-MS. Metabolite profiles were compared using cluster analysis. Fecal water genotoxicity was determined using the Comet assay and expressed as tail length (TL). Genotoxicity was related to the metabolite profiles.

**Results:** Protein intake accounted for 26.6 ± 4.2% of energy intake during the HP diet. 15.2 ± 2.2% during the NP and 12.0 ± 1.8% during the LP diet. Urinary p-cresol excretion was significantly correlated with protein intake (r=0.314; p=0.015). Fecal water genotoxicity was not different after the NP. HP or LP diet (p>0.05). Cluster



analysis of metabolite patterns according to genotoxicity revealed a separation between the high toxicity (TL > 150) samples and the low toxicity (TL < 100) samples. This separation was mainly due to the presence of sulfides in the high toxicity samples.

**Conclusions:** Higher protein intake is associated with a higher degree of protein fermentation but not with a higher fecal water genotoxicity. Increased genotoxicity was due to the presence of sulphides.

**Key Words:** protein, fermentation, genotoxicity, sulfides

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27/706. Gut: An open door to Nutrition

### **Impact of feeding brassicaceae on bioactivation of glucosinolates via bacterial myrosinase in the murine gut**

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**Introduction:** Isothiocyanates are effective chemopreventive compounds derived from glucosinolates, which are mainly contained in brassicaceous vegetables. They are formed by myrosinase that is released from myrosin cells upon plant tissue damage or by intestinal bacteria, which possess myrosinase activity.

**Objectives:** Microbial myrosinase is induced by incubation with glucosinolates. Therefore we hypothesized, that feeding a diet rich in glucosinolates may result in an improved bioactivation of glucosinolates by bacterial myrosinase.

**Method/Design:** Mice were fed a diet containing either broccoli sprouts (1.2% of dry mass) or in addition an extract from broccoli seeds high in glucoraphanin (4-Methylsulfinylbutyl glucosinolate) for 4 weeks. Further feeding groups received a diet containing either pak choi sprouts (1.2% of dry mass) or in addition an extract from pak choi sprouts high in neoglucobrassicin (1-Methoxy-3-Indolylmethyl glucosinolate) for 1 week. Mice that received no additives served as controls. After killing of the animals, either glucoraphanin or neoglucobrassicin was incubated with cecum contents anaerobically at 37°C. Degradation of glucosinolates and formation of metabolites were quantified using HPLC.DAD.

**Results:** Glucosinolate concentrations remained stable during incubation without bacteria. Almost complete degradation of glucoraphanin was observed within 24 hours of incubation with cecum contents of all feeding groups. The corresponding isothiocyanate sulforaphane was not detected in any of the incubations. Average

degradation of neoglucobrassicin within 24 hours of incubation was higher by cecal bacteria of mice fed a broccoli diet low or high in glucoraphanin (76.7 and 89.8%, respectively) compared with cecal bacteria of mice fed a pak choi diet low or high in neoglucobrassicin (46.3 and 48.0%, respectively) and of control mice (35.8%). Neoglucobrassicin, which was degraded, was detected in equimolar amounts as 1-Methoxyindol-3-carbinol, which is formed from 1-Methoxyindol-3-isothiocyanate.

**Conclusions:** Myrosinase of intestinal bacteria was constitutive, since a diet high in glucoraphanin or neoglucobrassicin did not result in an increase of bacterial activation of these glucosinolates.

**Key Words:** Glucosinolates, Myrosinase, Broccoli, Pak Choi, Intestinal microbiota

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27/725. Gut: An open door to Nutrition

### **Traditional foods of plant origin maintain the mucosal immune response via its prebiotic effect on gut microbes**

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**Introduction:** At the front line of host defense are the mucosal surfaces, which are in direct contact with varieties of members of microbiota formed under influence of regular food intake.

**Objectives:** The aim of proposed research is to test whether prioritised within BaSeFood project traditional foods and drinks as whole meal or their major plant components can provide stimulation (prebiotic) effect on gut microbial species which are beneficial to human health.

**Method/Design:** The complex of in vitro, and/or ex vivo and/or in vivo studies is undertaking to assess the micro-organism-mediated gut function regulation.

**Results:** Lactobacillus salivarius was stimulated by the extracts of fresh white cabbage, pumpkin, melon and cumin tea. The traditional Georgian dressings (red and green sauces from plum) similarly affected only two of Bacillus strains (B. subtilis and B. licheniformis) at the same time acting inhibitory for the L. salivarius. Enterococcus faecalis and Morganella morganii or demonstrating no effect on murine strain Schaedler's Escherichia coli and E. coli 058 of human origin. The lactobacilli were mainly inhibited by sauerkraut; whereas bacilli were sensitive to influence of fresh cucumber extract. Nettle was able to limit selectively the growth of Schaedler's E. coli compare to fresh juices of carrot, onion and grape affecting only on E. coli 058. Strains of E. faecalis and M. morganii were susceptible to the garlic. The beet extract did not influence on any of the tested strains of commensal gut flora representatives.

**Conclusions:** Ability of selected bioactive-rich plant extracts from traditional foods of Black Sea region countries to modulate and regulate host mucosal immune defense correlates with their promoting and antibacterial properties.

The research leading to these results has received funding from the European Community's Seventh Framework Programme (FP7.2007-2013) under grant agreement No 227118.

**Key Words:** traditional foods of plant origin, prebiotic properties, gut microbes, mucosal immune response

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**27/815.** Gut: An open door to Nutrition

**Relative validity of a short qualitative food frequency questionnaire for national food consumption surveys**

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**Introduction:** Food frequency questionnaires (FFQ) are often used as dietary assessment instrument in the context of epidemiological studies because of their inexpensiveness and low burden for participants. Moreover, in the context of nutritional surveillance they have potential to serve as a quick measure for long term usual food intake and identification of non-consumers.

**Objectives:** The aim of the present study was to assess the relative validity of a short self-administered qualitative food frequency questionnaire applied in the Belgian food consumption survey.

**Method/Design:** Comparison of food consumption data from an FFQ with 7-day estimated diet records (EDR) was performed in a sample of 100 participants (aged 15-90 years). The qualitative FFQ included 9 frequency categories and comprised a total of 50 foods. Both FFQ and 7-day EDR food intake was categorized into 15 food groups.

**Results:** De-attenuated Spearman rank correlation coefficients between the FFQ and the 7-day EDR ranged from -0.16 for potatoes and grains to 0.83 for alcoholic beverages (consumers only). The proportion of participants classified in the same tertile of intake by the FFQ and 7-day EDR ranged from 32% for potatoes and grains to 76% for alcoholic beverages. Extreme misclassification into opposite tertiles was <10% for milk and soy products, alcoholic beverages, fried foods and fats.

**Conclusions:** Notwithstanding the short nature and the absence of portion size questions, the FFQ appears to be valid in both genders and across different age categories for most food groups. However, for the food groups bread and cereals, potatoes and grains, and sauces, estimates should be interpreted with caution because of poor ranking

agreement with 7-day EDR.

**Key Words:** food frequency questionnaire, 7 day dietary record, validation, food group, nutritional surveillance

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**27/827.** Gut: An open door to Nutrition

**Impact of daily consumption of Vitamin A fortified oil on human milk Vitamin A concentration in lactating Moroccan women**

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**Introduction:**

**Objectives:** To evaluate the efficacy of daily consumption of fortified oil in vitamin A on human milk (HM) vitamin A concentrations from low-income Moroccan women.

**Method/Design:** At 2 week post-partum, healthy lactating women (n=98) aged between 19 and 40 years from a local health centre from Rabat, Morocco, were randomly assigned to receive weekly a quantity of 2 litres of vitamin A-fortified Soya oil (HSF) (33 UI/g of oil) or non-fortified Soya oil (HS) during 6 months post-partum. HM samples were collected at baseline and monthly (until 6 month post-partum before they receive their weekly ration of Soya oil). All women received a supplement of vitamin A (200 000 UI) after HM baseline collect (15 days post-partum). HM retinol (HMR) was determined by HPLC-DA.

**Results:** 1-At baseline there is no significant difference between the HSF (1.9 µmol.l) and HS (1.8µmol.l) groups in HMR concentration. 2-The mean of HMR concentrations were adequate at 3 months post-partum in both treatment groups (>1.05 µmol.l). 3-Between 4 and 6 month, there was a decline of lower vitamin A milk concentrations under 1.05µmol.l for HS group (1.0±0.3µmol.l, 0.8±0.2µmol.l and 0.6±0.1 µmol.l respectively for 4, 5 and 6 month). 4-For the HSF group the level of HMR was higher than HS group as from the 1st month. The difference was strongly significant (p<0.0001)

**Conclusions:** 1-Supplementation with a high dose of vitamin A has a positive impact on milk vitamin A concentration but was not sufficient to maintain adequate milk vitamin A levels throughout lactation, it has limited to the first 3 months of lactation. 2- Fortification is considered a long-term strategy for sustaining and improving adequate human milk vitamin A concentration during the 1st 6 month of lactation.

**Key Words:** oil fortified, vitamin A, supplementation, human milk retinol concentration, lactating women,

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27/870. Gut: An open door to Nutrition

**Incidence of hip fracture and diet in a cohort of elderly Greeks. The chances project\***

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**Introduction:** In the context of the "Consortium on Health and Ageing: Network of Cohorts in Europe and the United States (CHANCES)". an EU-funded project under the FP7 framework. 13 ongoing cohorts have been integrated in order to produce evidence on ageing-related health characteristics and determinants in Europe and the United States. Information on fractures and osteoporosis, one of the four major groups of chronic conditions and disabilities to be studied, is available in a number of cohorts and especially, incidence of hip fractures, a valuable index for the assessment and comparison of osteoporosis within and between populations, will be studied in relation to socio-economic, environmental and lifestyle factors.

**Objectives:** To investigate the association of diet with hip fracture incidence in a population of elderly Greeks, participants in the European Prospective Investigation into Cancer and nutrition (EPIC) study, one of the cohorts of the CHANCES project.

**Method/Design:** A total of 8,863 volunteers (3,491 men, 5,372 women) aged 60 years and above (mean age: 67 years) were actively followed-up for a median of 8 years. An incident hip fracture was recorded in 171 participants (142 women, 29 men). Dietary intakes were ascertained at enrolment through validated interviewed-administered food frequency questionnaires. Data were analysed through Cox proportional-hazards regression, controlling for potential confounders.

**Results:** Increased vegetable [hazard ratio (HR) per SD increment: 0.74, 95% confidence interval (95% CI): 0.60-0.91] and fish consumption (HR per SD increment: 0.76, 95% CI: 0.63-0.93) was found to decrease hip fracture risk.

**Conclusions:** In a prospective study of elderly Greeks evidence was found that increased consumption of vegetables and fish is associated with decreased hip fracture incidence. This finding will be further tested in the context of the CHANCES project and analyses will be repeated after combining relevant data from all cohorts with available information.

**Key Words:** Chances Project, Hip Fractures, Osteoporosis, Diet and Ageing

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27/876. Gut: An open door to Nutrition

**What is so special about the Mediterranean diet in the Maghreb? The role of economics in eating choices and chronic diseases outcomes**

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**Introduction:** The Maghreb diet could be characterized as being a diet particularly high in cereals since they provide more than 50% of the dietary energy and protein intake. Cereals are also a very rich fiber source. The Maghreb diet is also rich in fruits and vegetables and thus rich in vitamins, antioxidants and fiber, all of which are health protective. In addition, the diet of the Maghreb is low in total fats, low in saturated fats with low amounts of added fats, predominantly vegetable oils. However, olive oil consumption is particularly low since sunflower oil and soybean oil are the main vegetable oils consumed. It is thus relatively low in saturated and monounsaturated fats and high in polyunsaturated fatty acids and in particular omega-6. Animal product (meat, egg, and fish) consumption is also very low. High levels of proteins from animal products may not only injure the walls of the coronary arteries; which can start the buildup of cholesterol; they can also promote blood clots; which can be the ultimate cause of a heart attack.

In all countries examined, per capita dietary energy supply increased considerably, during the 33-year period between 1968-1970 and 2000-2009. The relative contribution of vegetable oils to total energy supply has also increased remarkably throughout these periods. In contrast animal fat contribution has either remained stable or slightly decreased during the same period. Beneficial health changes include the rise in the consumption of vegetable products and fish. However, during the same period, meat, milk and egg consumption have also increased although their per capita consumption is still low in comparison with other Mediterranean countries and USA.

Despite the overall changes regarding dietary patterns, the Maghreb diet could be protective against obesity, cancer and other chronic diseases.

**Key Words:** Mediterranean diet, Maghreb, Non-Communicable Diseases, food intakes, food and nutrition policy,

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27/877. Gut: An open door to Nutrition

**Intestinal absorption of nano iron: Cellular uptake mechanism(s) in Caco-2 cells**

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**Introduction:** The standard treatment for iron deficiency anaemia is based on ferrous iron salts, which are cheap and reasonably well absorbed but cause significant gastrointestinal side-effects. We have developed a nanoparticulate ferric iron oxide that is doped with dietary ligands and aims to mimic natural food iron. This compound shows favourable gastrointestinal disaggregation and dissolution profile, indicative of potential good cellular uptake and could therefore be a valuable supplemental iron source.

**Objectives:** We are investigating the intestinal uptake route of nanoparticulate iron.

**Method/Design:** Using the Caco-2 cell model we are investigating differences in the uptake kinetics and possible pathways of nanoparticulate iron versus soluble forms of iron. Cellular outcomes were substantiated by animal studies using the DMT-1 (soluble ferrous iron transporter) knockout mouse model.

**Results:** We found that nanoparticulate iron is efficiently taken up by Caco-2 cells. The kinetics of cellular ferritin formation over time, which was used as a marker of cellular iron utilisation, suggested two different uptake mechanisms for nanoparticulate and soluble iron.

Following the hypothesis that nanoparticulate iron uptake was through endocytosis followed by lysosomal dissolution, we studied the effect of specific inhibitors connected with endocytic uptake. Here, chlorpromazine, an inhibitor of clathrin mediated endocytosis, showed ~60% inhibition of uptake for nanoparticulate iron whereas soluble iron uptake remained unaffected. Similarly, monensin, a compound known to alter the acidification of lysosomes, significantly lowered ferritin formation for nanoparticulate but not soluble iron, presumably because the monensin-affected lysosome was less able to dissolve iron for subsequent cellular utilisation.

**Conclusions:** Results so far suggest a different route for uptake of nanoparticulate iron which may at least partly be endocytic and, furthermore, a desirable slow iron release when given in the nanoparticulate form as opposed to the soluble iron.

**Key Words:** Iron, Nanoparticulate, Cellular Uptake, Ferritin

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27/927. Gut: An open door to Nutrition

**Dietary supplementation with eicosapentaenoic acid decreases natural killer cell activity in broiler chickens**

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**Introduction:** There has been interest in the enrichment of poultry meat with long chain n-3 polyunsaturated fatty acids (PUFA) as to increase their consumption by humans. There is concern that high levels of n-3 PUFA may have detrimental effects on immune function in chickens.

**Objectives:** To determine the effects of various dietary sources of n-3 PUFA on the natural killer (NK) cell activity of splenocytes and peripheral blood leukocytes (PBMCs) in chickens.

**Method/Design:** One-day-old male Ross 308 broiler chicks (n=20) were fed a common starter diet for 21 d. Then, birds were randomly allocated to 4 pens. The broilers were fed for 33 d on one of four sources of n-3 PUFA: echium-, algae-, fish oil (FO)- and linseed-enriched diets. Chickens were sacrificed between 41 and 43 d of age. NK cell activity assay was conducted against LSCC-RP9 cell line on splenocytes and PBMCs.

**Results:** splenocytes and PBMCs from FO-fed chicks exhibited the lowest NK cell activity while those from linseed oil-fed chicks exhibited the highest NK cell activity.

**Conclusions:** Eicosapentaenoic acid (EPA), but not docosahexaenoic acid (DHA) or  $\alpha$ -linoleic acid, maybe responsible for the suppressive effect of NK cell activity. These studies highlight the need for the poultry industry to consider the health status of poultry when poultry meat is being enriched with n-3 PUFA.

**Key Words:** polyunsaturated fatty acids (PUFA), natural killer (NK) cell activity, eicosapentaenoic acid (EPA), docosahexaenoic acid (DHA)

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27/934. Gut: An open door to Nutrition

**Diet and oral pathologies of high level Moroccan athletes**

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**Objectives:** The aim of this study was to establish a precise description to the state of oral health and specific diseases among high-level Moroccan athletes while identifying factors that influences it especially food factors and comparing with non-sporting population.

**Method/Design:** A transversal epidemiological descriptive, analytical and comparative survey among 344 subjects including 172 high-level Moroccan athletes and 172 control cases (non sports) was realised between October 2009 and March 2010. 94.8% men and 5.2% women were examined using a questionnaire and an oral examination.

**Results:** Prevalence of the bad hygiene is 46.5% in athletes and 34.9% in control cases ( $p < 0.05$ ). Risk factors for this bad hygiene included: Eroding: 70.9% in athletes and 81.4% in control cases ( $p = 0.023$ ) especially sugars (81.1%) in athletes; the consumption of drinks between meals is (54.2% vs 57%) in athletes and non sports population; the consummate drinks are diverse: 19.8% coffee, 14% tea, abrasive and sweet drinks, 56.4% of athletes consume vitamins against only 4.7% of control cases ( $p < 0.01$ ). Only 8.7% of athletes consume energy bars during the collations. CAO index of athletes is 5.93, whereas that of non athletes is 3.23.

**Conclusions:** After comparison and because of the specific diet and the fatal habits of oral hygiene of high-level Moroccan athletes, we notice that we must make them sensitive for the oral and food hygiene to perfect it and limit against sports performances.

**Key Words:**

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**27/942.** Gut: An open door to Nutrition

### **Biochemical parameters of lipid metabolism in rats after the intake of tomato juice**

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**Introduction:** The consumption of tomato products have been correlated with a beneficial effect for the prevention of cardiovascular diseases (CVD), since several micronutrients from tomatoes, like lycopene, vitamin C, phenolic compounds and potassium, could reduce the risk of pathogenesis of CVD.

**Objectives:** The objective of the present study was to ascertain the effect of consumption of tomato juice in the biochemical parameters related with lipid metabolism in rats.

**Method/Design:** 24 male rats Sprague-Dawley were used in the intervention for 5 weeks. Animal were feeding with two types of diets: normal diet (ND) and atherogenic diet (AD). Rats were classified in four groups: group 1 without tomato juice and ND, group 2 with tomato juice and ND, group 3 without tomato juice and AD and group 4 with tomato juice and AD. At the end of the study, the rats were deprived of food overnight and sacrificed under anaesthesia. Plasmatic biochemical parameters were measured in the beginning and the end of the intervention period. The analysed parameters were: total cholesterol (CI), HDL-CI, LDL-CI, triglycerides (TAG), aspartate aminotransferase (AST), alanine transaminase (ALT), paraoxonase (PON). In addition the 24 h urine was collected and the isoprotanes were measured at time 0 and in last 24 hours.

**Results:** The intake of tomato juice led to a reduction of CI in rats feeding with NC. In addition an increase in HDL-CI was observed

in rats feeding with HC and tomato juice. The activity of PON was not affected by the diet and the intake of tomato juice, but ALT and AST increased significantly in both group feeding with HC. Only a reduction in the urine isoprostanes was observed in both groups with tomato juice (group 2 and 4).

**Conclusions:** Further studies and analysis must to be carried out to investigate the effect of lycopene in the cholesterol metabolism and the relationship with the biomarkers of CVD risk.

**Key Words:** lipid, biochemical parameters, cholesterol, isoprostanes,

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**27/963.** Gut: An open door to Nutrition

### **A review of human studies investigating the relationship between polyphenol consumption and cognitive health**

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**Introduction:** Polyphenols are the most abundant antioxidants in the diet and are present in fruits, vegetables, and beverages (e.g. juices and tea). Numerous epidemiological studies show associations between consumption of polyphenol-rich foods or beverages and reduced risk of chronic diseases such as cancer and cardiovascular disease. It has been speculated that the antioxidant properties of polyphenols can also reduce the risk of neurodegenerative disease (e.g. Parkinson's and Alzheimer's) via increased cerebrovascular blood flow and increased synaptic plasticity, however, to date, a review of polyphenol consumption for cognitive function has not been conducted.

**Objectives:** To review human intervention studies investigating the relationship between polyphenol consumption and cognition.

**Method/Design:** All studies included healthy or mildly cognitively impaired adults, a control condition, and an objective measure of cognition. Studies were excluded if clinical assessment or diagnosis of Alzheimer's disease, dementia, or cognitive impairment was the sole measure of cognitive function, or if the polyphenol was present with potentially confounding compounds such as caffeine (e.g. tea and Ginkgo Biloba).

**Results:** In summary, 13 of 24 studies showed improvements in cognitive function following polyphenol consumption. There was no evidence that cognitive outcomes were associated with the duration of intervention or magnitude of polyphenol dosage. However, effects varied with the source of polyphenol; fruit juice consumption was most likely to confer benefits for immediate verbal memory, whereas soy Isoflavone studies showed benefits primarily for delayed spatial memory and executive function.

**Conclusions:** Consuming additional polyphenols can lead to cognitive health benefits, especially improvements in memory. These findings support previous literature showing polyphenols are beneficial for cardiovascular health and imply that habitual consumption of dietary polyphenols has potential to reduce the onset of neurodegeneration and cognitive decline associated with ageing.

**Key Words:** Polyphenols, Cognition, Cardiovascular, Health, Memory

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**27/981.** Gut: An open door to Nutrition

**Viable and non-viable form of identical probiotics strains induced differential response in human dendritic cells**

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**Introduction:** Probiotics are currently defined as micro organisms which have to be viable at time of ingestion to confer health benefits. However, increasing evidence are demonstrating that cell wall components and DNA of these important functional foods can be also sufficient for stimulating measurable effects including immunomodulatory responses. One of the putative mechanisms of action of probiotics in provoking immune responses is inducing maturation of dendritic cells (DCs) as key elements of immunologic synapses which their maturation state can delicately orchestrate the fate of further immune cell responses.

**Objectives:** We aimed to investigate if both viable and heat inactivated form of two well described and extensively used Lactobacilli. *Lactobacillus rhamnosus GG (LGG)* & *Lactobacillus delbrueckii (L.del)* are able to induce comparable immune response via studying maturation pattern of DCs.

**Method/Design:** Human monocyte-derived DCs were cultured in vitro with *L.del* and *LGG* in viable and heat-inactivated forms, for 24 hours. The expressions of co-stimulatory molecules involved in DCs maturation as well as extracellular cytokine production were measured by flow cytometry.

**Results:** Similar ratio of viable and inactivated form of *LGG* caused higher up-regulation in expression of CD80, CD86 and CD54 than *L. del.* where as *L.del* down regulated DC adhesion receptor CD209 more than *LGG*. In viable state, only *LGG* induced CD83 expression but in heat inactivated condition both strains showed enhanced up-regulation of CD83. DCs exposed to viable and non-viable strains secreted significantly higher level of IL-1 $\beta$ , TNF- $\alpha$ , IL-12 and IL10. Of course, inactivated lactobacilli were considerably less potent in cytokine production even though increasing the ratio enhanced their cytokine production.

**Conclusions:** Viable and heat killed lactobacilli are both able to influence immune modulation via inducing quite similar phenotypic changes in DCs, although inactivated strains were less potent in elevating cytokine production than their viable form.

**Key Words:** Probiotics, Dendritic Cell, Cytokines and Co-Stimulatory Molecules

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**27/983.** Gut: An open door to Nutrition

**Fatty acid composition in the meat of lambs supplemented with Se, Zn and vitamin E.**

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**Introduction:** Selenium is essential in the active centre of Selenoenzymes that carry out redox reactions. glutathione peroxidase (GPx). Zinc is effective as an antioxidant (i.e., SOD). Vitamin E is primarily active as an antioxidant protecting PUFA in vivo and post-mortem from free-radical attack.

**Objectives:** The aim of the experiment was to test the hypothesis that the diet enriched with Se, Zn, and vit. E will increase the levels of fatty acid in the meat of lambs, particular importance for human nutrition.

**Method/Design:** The experiment was carried out on 24 Polish Merino ram-lambs divided into two groups: control (C) and experimental (E). During 8 weeks of fattening 14 lambs from E group was administered per os Se - 0.42 mg, Zn - 68 mg and 60 mg  $\alpha$ -tocopherol, each lamb daily. The underivatized CLA isomers and other fatty acids containing conjugated double bonds were determined using silver-ion liquid chromatography and AGILENT 6890N gas-chromatograph.

**Results:** The concentration of cis-9 MUFAs, vaccenic acid (TVA, t11C18:1), linoleic (LA, C18:2 c9.12), the sum of CLA isomers,  $\gamma$ -linolenic acid ( $\gamma$ -LNA, C18:3 c.9.12.15), eicosapentaenoic acid (EPA, C20:5 c5.8.11.14.17) and docosahexaenoic acid (DHA, C22:6 (c4.7.10.13.16.19) were higher in the meat of E group. The concentration of TVA, CLA isomers,  $\gamma$ -LNA, EPA and DHA in the meat from E group vs. C group were: 0.697, 0.425; 0.305, 0.272; 0.192, 0.168; 0.131, 0.102; 0.067, 0.051 mg/g respectively.

**Conclusions:** Feeding the diet supplemented with Se,  $\alpha$ -tocopherol and Zn to lambs is an effective way to enrich the meat in CLA isomers and fatty acids important for human nutrition.

**Key Words:** Fatty Acids, CLA, Lamb's Meat, Selenium and Zinc

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**27/985.** Gut: An open door to Nutrition

**A myristic acid enriched cream improves the metabolic syndrome and increases membrane fluidity: The Semyramis Study**

*H. Dabadie; E. Peuchant; C. Motta; D. Ribaud; C. Lopez; F. Mendy.*

**Objectives:** To evaluate a myristic acid (MA) enriched cream in obese patients without or with the metabolic syndrome (MS).

**Method/Design:** One hundred and twenty obese subjects (mean BMI: 37.2) were enrolled in a 3-month double blind trial. Half of them had a MS. They were randomized to consume each day a MA enriched cream in an hypocaloric diet with MA intake of 3.0, 3.5 or 4.0 g.d. MA:stearic ratios were around 1.5. Intakes of other fatty acids were at recommended levels, mainly for alpha-linolenic acid (2 g.d) with a linoleic:alpha-linolenic ratio at 3.1

**Results:** In comparison with baseline, 3-month interventional diet was associated with an increase of MA and pentadecanoic acid (C15) in cholesteryl esters in all groups suggesting a good compliance for cream consumption. Reduction of Weight (-7.0 kg) and waist (-8.0 cm) reductions were more important in the MS group. Glycemia, insulinemia, HOMA ratio and triglycerides were decreased in the MS and HDL-C was only increased with MA intake of 4.0 g.d. Leptin was decreased in all subjects mainly in the MS and adiponectin was increased mainly with MA intake of 3.0 g.d in the MS. Oxidized LDL were decreased with 3.0 g.d MA intake and increased with 4.0 g.d. Membrane fluidity was dramatically increased only with MA intake of 3.0 g.d.

**Conclusions:** Influence of MA on parameters of the MS appears as a U-shaped curve with the most favourable effects for 3.0 g/d. A MA enriched cream with a total daily MA intake of 3.0 g significantly improves the MS, reduces leptin, and increases adiponectin and membrane fluidity.

**Key Words:** myristic acid, enriched cream, obesity, metabolic syndrome

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#### 27/1017. Gut: An open door to Nutrition

### **Are there any differences for FBS, TC, LDL-C and LDL/HDL-C Ratio in diabetic and non-diabetic overweight and obese Iranian women?**

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**Objectives:** To determine FBS, TG, LDL-C and LDL:HDL-C ratio in diabetic & non-diabetic overweight and obese Iranian women.

**Method/Design:** This clinical cross-sectional study took place on 811 overweight and obese Iranian women between 20 till 60 years old in Sistan and Baluchestan province. For determining serum blood parameters, a blood sample was drawn after a 12 hour overnight fast. Fasting blood sugar (FBS) and triglyceride (TG) were measured by usual laboratory methods. LDL-C was calculated according to the Friedewald equation. In this study, 126mg/dl was used as cut off (threshold) for diabetics. On the basis of this criteria the subjects

were categorized to two groups: non-diabetics ( $\leq 126$ mg/dl) and diabetics ( $> 126$ mg/dl).

**Results:** The Mean  $\pm$  SD of FBS was  $91 \pm 12.3$  and  $201 \pm 134.3$  in non-diabetic and diabetic subjects respectively. The Mean  $\pm$  SD of TG was  $144.5 \pm 75.9$  and  $205.9 \pm 103.4$  in non-diabetic and diabetic subjects respectively. Diabetic individual had significant higher of FBS and TG than the non-diabetics ones ( $P=0.000$ ). There were not seen significant differences for LDL-C and LDL. HDL-C ratio between two groups.

**Conclusions:** The result of current study shows that overweight & obese diabetic women in Sistan and Baluchestan suffer of high FBS & TG than non-diabetic ones. Getting weight loss and activity must be suggested to this group of people in this area of Iran.

**Key Words:** Blood Parameters, Diabetic, Obesity and Iran.

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#### 27/147. Innovation in Food for Optimal Nutrition

### **Some functional properties of traditional Turkish wet tarhana during fermentation and storage**

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**Introduction:** Wet Tarhana, a fermented dairy and cereal based product with a high nutritional value, is produced and consumed widely by people as soup in Western Turkey. It has highly solid content and is stored as a wet form in refrigerator. The wet Tarhana consists of wheat flour, traditional regional cheeses (Mihalic cheese and Lor Cheese), butter, thick yoghurt, milk, salt, varied spices (ginger, mint, black pepper, thyme, allspice, cumin, carnation etc.), paprika paste, chickpea and some vegetables (green pepper, paprika, chili pepper, onion, parsley, and tomato). These ingredients are mixed together and Tarhana dough is kneaded up to seven days as daily. The Tarhana dough is kept in room temperature for lactic and alcoholic fermentation and then the wet Tarhana is stored in refrigerator up to three months.

**Objectives:** To determine some functional properties of traditional Turkish wet Tarhana during fermentation and storage.

**Method/Design:** In this study, some functional properties [foaming capacity (FC), foam stability (FS), oil absorption capacity (OAC), water absorption capacity (WAC), viscosity, emulsifying stability] properties of Turkish wet Tarhana were investigated in fermentation and three month storage.

**Results:** The viscosity of wet Tarhana was determined in wet Tarhana soups. Viscosity values of Tarhana soups had a significant effect ( $p \leq 0.05$ ) statistically and the other values of wet Tarhana except OAC had statistically significant effects ( $p \leq 0.01$ ).

**Conclusions:** Wet Tarhana is offered as a functional source for possible food applications.

**Key Words:** Wet Tarhana, Functional properties, Nutrition

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**27/80.** Innovation in Food for Optimal Nutrition

**Corn tortilla fortified with aminoacids for undernourished children in two communities of Yucatán state, México**

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**Introduction:** Malnutrition among rural children in México is a major problem. Corn tortilla is by far the most important food of the Mexican diet. Corn is deficient in lysine and tryptophan and the amino acid imbalance could contribute to the malnutrition problem.

**Objectives:** This experiment was carried out to assess the effect of the consumption of corn tortilla fortified with lysine and tryptophan on growth of pre-school age children undernourished in two rural areas of the State of Yucatán.

**Method/Design:** Forty two undernourished children were selected and measurements of weight and height were carried out. Children's parents were submitted to a social-economic survey. Children were divided at random into two groups of 21 each and consumed tortillas during 12 months: an Experimental group was offered fortified tortillas with lysine and tryptophan; a Control group was given tortillas without fortification. Acceptability of tortillas was estimated using a sensory panel. Correlation between social-economic variables with macronutrient consumption was estimated; data from both groups of children were analyzed using ANOVA method.

**Results:** Correlation analysis showed a significant association ( $p < 0.05$ ) between consumption of macronutrients, with the educational level of the mother and family income; the higher the educational level of the mother, or income, the higher consumption of macronutrients by the children was observed. No difference ( $p > 0.05$ ) was observed concerning the sensory characteristics between Experimental and Control tortilla. Consumption of fortified tortilla did not improve the growth of children in any of the following indexes: weight/age, size/age, weight/height compared with the Control group ( $p > 0.05$ ).

**Conclusions:** Fortified tortilla with amino acids, did not improve the nutritional status of children, since malnutrition is influence by factors such as energy restriction or imbalance, among others. Nevertheless children receiving fortified tortillas improved slightly their growth indexes.

**Key Words:** Lysine, tryptophan, rural children.

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**27/84.** Innovation in Food for Optimal Nutrition

**Nuts assist with weight maintenance while improving diet quality**

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**Introduction:** Regular nut consumption has been associated with reductions in blood cholesterol concentrations and the risk of cardiovascular disease (CVD). Previous studies indicate that the daily inclusion of nuts into the diet results in either no weight gain or less weight gain than is predicted from the additional energy intake, despite the fact that nuts are energy-dense. However, no studies have investigated the body composition of those regularly consuming nuts compared to similar intakes of other snacks of equal energy density.

**Objectives:** The purpose of this study was to assess the effects of providing daily portions (~1100 kJ/d) of either hazelnuts, chocolate or potato crisps for twelve weeks on body weight and composition, blood lipids and lipoproteins, resting metabolic rate (RMR), appetite indices, and diet quality, compared to a control group receiving no snacks.

**Method/Design:** One hundred and eighteen participants took part in this randomised, controlled, parallel study with four arms: control group or ~1100 kJ of each snack.

**Results:** At week-12, there was no significant difference in body weight and composition, blood lipids and lipoproteins, RMR or appetite indices between the groups but there were differences in diet quality. Compared to all other groups, the percentage of total energy derived from saturated fat (all  $P \leq 0.045$ ) and carbohydrate (all  $P \leq 0.006$ ) was significantly lower whereas vitamin E intake (all  $P \leq 0.007$ ), the percentage of energy derived from total fat (all  $P \leq 0.011$ ), monounsaturated fat (all  $P \leq 0.001$ ) and polyunsaturated fat (all  $P \leq 0.011$ ) were significantly higher in the hazelnut group at week-12. The actual weight gain was only 0.64 kg, which equated to 23% of that predicted (2.8 kg) and did not differ between the snack groups and the control group.

**Conclusions:** Nuts can be incorporated into the diet as a means of reducing CVD risk, without adversely affecting body weight.

**Key Words:** Nuts, snacks, body weight, diet quality, cardiovascular disease

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**27/152.** Innovation in Food for Optimal Nutrition

**New food styles analyse: a tool to build relevant nutrition strategy - the experimental case of Algeria**

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**Introduction:** Beyond epidemiological data, analyses of food styles (eating behaviour and practices, representations associated with food) are essential to identify nutritional stakes and to propose concrete



to local public health and food products strategies. Such analyses are lacking in many countries.

**Objectives:** To analyse food styles.

**Method/Design:** A qualitative method was developed by the International Centre in Agricultural Research for Development and Danone Research to characterize food styles. It relies on individual interviews and focus groups led by trained sociologists. The first application was done in Algeria in 2010: interviews were carried out in 60 families from 3 regions (Algiers, Oran and Constantine), both in urban and rural areas. Moreover, 6 focus groups including 56 women were performed and key actors (nutritionist, teacher, cook...) were contacted to have local food actor's points of view.

**Results:** The food styles analysis demonstrates that in Algeria, a new dietary model is emerging, which is a unique combination of tradition and modernity: Algerian people eat more and more western dishes (pizzas, ready-to-eat meals...), still keeping a strong connection to their traditional meals (chorba, couscous...). The role of men and women regarding food purchasing is evolving, especially in urban areas: women are more often in charge of food purchasing, except for desserts and sweetened products which are still bought mainly by men. A new retailing system appears in cities: some women prepare food at home and sell it to grocery shops or directly to active women.

**Conclusions:** Completing epidemiological approach of nutrition & health with qualitative data on food style makes it possible to account for the high complexity of dietary habits, especially in countries facing nutritional transition. These results in Algeria confirm that food style analyses are useful to build relevant nutrition strategies (product development, new logistical approach, public health programmes...).

**Key Words:** food styles, epidemiology, nutrition strategy

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27/222. Innovation in Food for Optimal Nutrition

### **Preclinical analysis of the physiological effects of a functional cheese with improved fatty acid profile**

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**Introduction:** Dietary lipids impact in health, not only due its total intake, but also because its fatty acid composition. Reducing total fat content and improving fatty acid profile is targeted during functional foods development.

**Objectives:** Preclinical evaluation of physiological effects of functional cheese with low fat content and improved fatty acid profile (low saturated fatty acids, high omega3 and CLA content).

**Method/Design:** Development of functional cheese was done with milk obtained from animals that were specifically feed for this study. Healthy Wistar male rats were divided in 3 experimental groups (n=8) and fed with diets composed by standard rodent chow plus experimental or control cheese (50% w.w): Standard Cheese (SC), Light Cheese (LC) or Light Functional Cheese (LFC). During 8 weeks animals were monitored and at the end of the study blood samples were collected. Plasma metabolism biomarkers were analysed. Results were compared using non parametric statistics. All the experimental process was evaluated and approved by the Institutional Animal Ethics Committee of La Paz University Hospital and followed the experimental animal protection legislation (RD 1201.2005).

**Results:** Anthropometrical measurements during the intervention showed a weight gain management effect in both low fat content cheeses (LC and LFC) compared with SC. This effect was significantly higher in the first 2 weeks of study. No significant differences between experimental groups were shown in plasma levels of triglycerides, total cholesterol, LDL, HDL or glucose at the end of study. However, significant lower plasma free fatty acid content was measured in LFC group compared with LC and SC groups, which that may be related with an energetic balance effect at adipose tissue level.

**Conclusions:** Functional cheese developed by reducing whole fatty content and improving fatty acid lipid profile may have in weigh management and energy balance control.

**Key Words:** Functional foods, Conjugated Linoleic Acid, Omega 3, Cheese, Lipid Metabolism

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27/224. Innovation in Food for Optimal Nutrition

### **Dietary plasma protein supplementation ameliorates lung inflammation induced by LPS administration in mice**

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**Introduction:** Spray-dried animal plasma (SDP) and immunoglobulin concentrate (IC, containing approximately 50% IgG) are ingredients given to farm animals, used as an alternative to antibiotics. Both supplements have been shown to attenuate the intestinal inflammation induced by the enterotoxin B of *S. aureus*.

**Objectives:** Since the common mucosal immune system connects different mucosal tissues, we tested whether dietary plasma proteins can modulate the immune responses of the pulmonary tract in a model of lung inflammation.

**Method/Design:** : Mice were fed diets supplemented with 8% SDP (SDP group), 2% IC (IC group) or milk proteins (Control group) from day 19 (weaning) until day 33. On days 32 or 33, mice were given an intranasal dose of lipopolysaccharide from *E. coli* (LPS);

500 µg.kg BW; groups LPS, LPS-SDP and LPS-IC), or PBS (groups Control, SDP and IC). Cytokine concentrations were analyzed in lung tissue 6h after the LPS challenge. The percentage of T helper (Th), activated Th and regulatory T lymphocytes were measured in lung tissue 24h after LPS administration.

**Results:** Intranasal LPS reduced the percentage Th lymphocytes and increased activated Th lymphocytes, while increase the release of pro-inflammatory cytokines IFN $\gamma$  and interleukin (IL)-4. Both SDP and IC reduced the activation of Th ( $P<0.05$ ) as well as the expression of IFN $\gamma$  and IL-4. Treg cells were increased by both supplemented diets in lung in challenged and non-challenged mice ( $P<0.05$ ). Moreover, the ratio between Th and Treg cells revealed a marked effect of the supplemented diets in challenged mice. Both plasma protein supplements increased the concentration of IL-10 in animals challenged with LPS ( $P<0.05$ ).

**Conclusions:** The increased production of anti-inflammatory cytokines and Treg cells together with the lower expression of pro-inflammatory cytokines, suggests that the preventive effects of plasma supplements in lung inflammation are mediated by modulating anti-inflammatory mediators.

**Key Words:** Plasma Proteins

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#### 27/278. Innovation in Food for Optimal Nutrition

##### **Effect of different alpha-linolenic acid in maternal diet on fatty acid composition of newborn tissue.**

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**Introduction:** The polyunsaturated fatty acid (PUFA) composition of the maternal diet during gestation and lactation can affect the composition of the milk, the composition of the newborn and consequently the development of physiological functions. Long chain n-3 polyunsaturated fatty acids (n-3PUFA) are required for normal growth and maturation of numerous organs.

**Objectives:** In order to diversify n-3PUFA dietary sources for pregnant and lactating women, we investigated the impact of extruded linseed in the maternal diet on fatty acid composition of newborn tissue in a porcine model.

**Method/Design:** Sows received a diet containing either sunflower oil (ALA3 with 18:3n-3 representing 3% of total fatty acids) or a mixture of extruded linseed and sunflower oil (ALA9 with 9% of 18:3n-3) or extruded linseed (ALA27 with 27% of 18:3n-3) during gestation and lactation. Fatty acid composition was evaluated on sow milk and on different piglet tissues at days 0, 7, 14, 21 and 28. The post-natal evolution of delta 5 and delta6 desaturases mRNA expression was also measured in the liver of ALA3 and ALA27 piglets.

**Results:** The milk of ALA27 sows had higher proportions of n-3PUFA than that of ALA3 and ALA9 sows. Piglets suckling the ALA27 sows had greater proportions of 18:3n-3, 20:5n-3, 22:5n-3 and 22:6n-3 in the liver and of 22:5n-3 and 22:6n-3 in the brain than ALA3

and ALA9 piglets. Delta 5 and delta 6 desaturases mRNA expression in piglet liver was not affected by the maternal diet at any age.

**Conclusions:** In conclusion, extruded linseed in the maternal diet during gestation and lactation represents a great n-3PUFA dietary source alternative to increase n-3PUFA content in newborn tissues.

**Key Words:** linseed, maternal diet, neonate, fatty acid composition.

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#### 27/280. Innovation in Food for Optimal Nutrition

##### **Carotenoids in Spanish wild edible young shoots (*Humulus lupulus* L., *Bryonia dioica* Jacq., *Tamus communis* L., *Asparagus acutifolius* L.)**

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**Introduction:** Wild vegetables have been traditionally consumed as part of the Mediterranean diet. In the last decades, their consumption have decreased, being replaced by agricultural products. However, a renewed attention toward wild edible plants has grown significantly, especially in relation to their content in potentially bioactive compounds.

**Objectives:** Evaluation of carotenoid composition in four species of edible young shoots (*Humulus lupulus*,L., *Bryonia dioica*, Jacq., *Tamus communis*,L., *Asparagus acutifolius*,L) traditionally consumed in Spain.

**Method/Design:** Samples were collected in two locations of central Spain (spring), and stored after being freeze-dried (average moisture:85.8 $\pm$ 2.5%). Samples were analyzed in cuadruplicate (two sample weights) and extracted (0.25-0.5g) with tetrahydrofurane:methanol (1:1). Saponification process was checked but it did not improve the chromatographic profile. A validated HPLC method was used(1), with a photodiode-array-detector. Lutein, beta-carotene, neoxanthin and violaxanthin were identified by means of retention times, absorption spectra and Q-TOF system compared with standards and quantified using standard curve.

**Results:** Species analyzed presented a similar carotenoid profile, being lutein and beta-carotene those at highest concentrations; neoxanthin and violaxanthin in lower concentrations. No zeaxanthin was found (absorption spectra). Average concentrations of lutein and beta-carotene ( $\mu$ g.100g edible wet weight) were respectively: 316 $\pm$ 123 and 227 $\pm$ 74 for *Humulus lupulus*; 1133 $\pm$ 456 and 315 $\pm$ 129 for *Bryonia dioica*; 1334 $\pm$ 359 and 425 $\pm$ 108 for *Tamus communis*; and 630 $\pm$ 145 and 328 $\pm$ 72for *Asparagus acutifolius*. Neoxanthin and violaxanthin concentrations ranged between 100-1370 and 202-722 $\mu$ g.100g respectively (more details will be given). There is a great variability in concentrations among locations.

**Conclusions:** The edible young shoots showed a high concentration of lutein and beta-carotene (compared with similar, not wild, vegetables), both with nutritional importance. Neoxanthin and vio-

laxanthin data are relevant for inclusion in food composition tables.

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**Key Words:** Young-Shoots, Lutein, B-Carotene, Violaxanthin, Neoxanthin.

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#### 27/442. Innovation in Food for Optimal Nutrition

### **Cardioprotective effect of antioxidant wine based beverages in a hypercholesterolemic animal model**

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**Introduction:** The cardiovascular protection associated with moderate consumption of wine has been widely described. Evidence based on human and animal studies has demonstrated cardiovascular protective effects of tyrosol and hydroxytyrosol present in white wine. Therefore, white wine polyphenols are promising bioactive compounds for the food and beverage industry in functional food formulations. The challenge is to obtain a higher polyphenol concentration comparable to red wines.

**Objectives:** The goal of this research was to evaluate the cardiovascular protective effect of de-alcoholized white wines with various antioxidant capacities.

**Method/Design:** Mid-hypercholesterolemic animal model was used for long-term antioxidant beverage supplementation. Animals were distributed in one control and two groups of animals (n=8), supplemented during 12 weeks with de-alcoholized white wine with 7 or 14 mmol Trolox equivalents respectively. Cardiovascular risk biomarkers were analyzed based on lipid profiles, antioxidant protective effects and endothelial function. All the experimental process was evaluated and approved by the Institutional Animal Ethics Committee of La Paz University Hospital and followed the experimental animal protection legislation (RD 1201.2005).

**Results:** The beverage with the highest antioxidant capacity was more efficient in reducing LDL and the LDL:HDL ratio (p<0.05) in plasma samples and lipid peroxidation in renal tissue (p<0.05) than the medium antioxidant beverage. There was an inverse linear relationship between beverages' antioxidant capacity and plasma

LDL-cholesterol concentrations. LDL:HDL ratios, triglycerides, hepatic lipid peroxidation and a direct linear relationship with NO concentration at the aortic level.

**Conclusions:** We conclude that the prototype with the highest antioxidant capacity has promising beneficial cardiovascular properties, and that this result should be confirmed in a human intervention trial

**Key Words:** De-alcoholized white wines, Antioxidants, Lipid profile, Lipid peroxidation, endothelial function

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#### 27/520. Innovation in Food for Optimal Nutrition

### **Sensory analysis of preparations with lowering the energy density and improves the nutritional value**

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**Introduction:** : In the last 20 years the sweeteners raided the shelves of supermarkets and homes of Brazilians, being natural or artificial substitutes of the sugars that are highly effective due to the high ability to sweeten a lot in small concentrations. Sucrose has a feature that sweetener surpasses his power, it is important for color, texture, ability to retain water, viscosity, firmness of gels, food conservation, forces of the meshes of gluten, leavening agents. Goal: Analyze much sensory preparations undertaken with sweeteners and some with added integral flours.

**Objectives:** Analyze much sensory preparations undertaken with sweeteners and some with added integral flours.

**Method/Design:** Those preparations that successful individuals were not trained appreciated, affective test being used.

**Results:** All preparations have been accepted by assessors, demonstrating that sucrose may be replaced by sweeteners without degrading the characteristics of the products.

**Conclusions:** Replacing sucrose by sweeteners assists in the prevention of diseases, but it is important to note the role of sucrose in each type of preparation, in order to ensure its success.

**Key Words:** Sensory Analysis, Preparations, Energy Density.

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#### 27/641. Innovation in Food for Optimal Nutrition

### **Comparison of nutrition and health status among elderly people in Spain, France and Germany**

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**Introduction:** The population is ageing fast, especially in Western countries (30% of EU population will be over 65 in 2050). Se-

niors have specific and diverse nutrition and health stakes which need to be understood when developing health and nutrition strategies.

**Objectives:** To compare senior's dietary habits (younger: from 50 to 65 and elderly: over 65), nutritional status, lifestyle and nutrition-related health issues in Spain, France and Germany. To identify key facts, trends and knowledge gaps to propose relevant nutritional solutions and research programs for this population.

**Method/Design:** An exhaustive and critical analysis of the available literature, along with expert interviews was carried out in 2010. We identified and analysed 457 scientific articles (260 for France, 88 for Germany, 109 for Spain), mainly from PubMed but also from governmental and non governmental organizations. Thirteen experts in the field of nutrition and ageing were met to challenge the results (4 for France, 6 for Germany, 3 for Spain).

**Results:** Each country analysis enabled a description of current trends in dietary habits, nutritional status, and prevalence of nutrition-related diseases in the senior population. For instance, regarding the milk and dairy products, Spanish seniors consume on average 422 g.d, German seniors 220 g.d and French seniors 189 g.d. Regarding calcium intakes, there is a high prevalence of insufficient intakes in the 3 countries; for example between 10% and 25% of German elderly have deficient intakes. Regarding disease prevalence, there were discrepancies between countries: for instance, the prevalence of hypertension in the elderly was found to be 80% in Germany, 51% in France and 52% in Spain.

**Conclusions:** This comparative analysis, with methodological limits due to data heterogeneity, illustrates differences in senior nutrition and health status between European countries. Understanding those differences helps to define optimal nutrition strategies to meet population needs and expectations.

**Key Words:** Nutrition, Public Health, Food Patterns, Elderly

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#### 27/732. Innovation in Food for Optimal Nutrition

### Content of Lutein and Lutein ester in Tagetes and improvement of their stability

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**Introduction:** Lutein and its isomer zeaxanthin are natural colourants belonging to xanthophylls of the carotenoids. They can be found in the human retina in higher amounts, where they play an important role in the human vision perception. Lutein is associated with lower risk of many diseases, including age-related macular degeneration.

**Objectives:** This study was conducted to evaluate content of lutein and lutein ester in tagetes whole flower, and to enhance the stability of free lutein (FL - a commercial suspension of microcrystalline

nature) or lutein ester (LE - food grade marigold Oleoresin) under food processing conditions with different antioxidants against ultraviolet (UV) light, temperature and pH for different time periods.

**Method/Design:** Four species of *Tagetes* (*tenuifolia*, *erecta*, *patula*, and *lucida*) flower were used to extract lutein and lutein ester with three different methods. Milk whey protein ( $\beta$ -lactoglobulin) was used as emulsifier to produce emulsions which work as carrier for lutein. The produced emulsions were exposed to UV-A light (365 nm) and different pH values for 3 days.

**Results:** The results showed that species *Tagetes erecta*, type "orangeprinz", is the richest source of lutein ester  $14.401 \pm 0.234$  mg.g followed by *Tagetes patula*, type "Orangeflamme"  $11.581 \pm 1.338$  mg.g, and "Carmen"  $11.327 \pm 0.650$  mg.g. On other hand, all types of *Tagetes* have a very low amount of lutein. No significant differences between extraction with oils (MCT and orange) and solvents (hexan, isopropanol) for lutein ester could be observed. Under food processing conditions, the emulsion with lutein ester at pH 7 is stable, confirmed by particle analysis (particles size  $\leq 1.4 \mu\text{m}$  compared to  $1.2 \mu\text{m}$  in case of control). Moreover, more than 60 % lutein ester remains stable for 3 days against UV light, and 75 % against 100 °C for 40 min.

**Conclusions:** *Tagetes erecta* could be a good source of lutein ester that, extracted with MCT oil, to produce stable emulsified lutein ester 100 °C under food condition.

**Key Words:** lutein ester, Emulsion, MCT oil, Stability, UV light

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#### 27/748. Innovation in Food for Optimal Nutrition

### Effect of a casein hydrolysate containing novel peptides in hypertensive subjects

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**Introduction:** Enzymatic hydrolysis of food proteins is an efficient strategy to produce biological active peptides. Our group identified two  $\alpha$ 1-casein fragments with potent angiotensin-converting enzyme-inhibitory activity in vitro and antihypertensive effect and additional cardiovascular benefits in spontaneously hypertensive rats (SHR). Therefore, these results might be translated to humans to consider these peptides as a functional food ingredient to prevent hypertension with additional cardiovascular benefits.

**Objectives:** To evaluate the antihypertensive activity of a food-grade ingredient containing novel peptide sequences in humans.

**Method/Design:** • Stability of the ingredient to atomisation, pasteurisation, incorporation to fermented products and dose in the different batches prepared for the human trial was evaluated by mass spectrometry.

• The human trial was developed using a yoghurt drink enriched

with the hydrolysate. A total of 71 hypertensive subjects (placebo and active substance groups) and 50 normotensive volunteers (only active substance) were enrolled. All subjects consumed one liquid yogurt (150 ml) per day during 6 weeks.

**Results:** The active peptides were stable during the processes of atomization, homogenization and pasteurization. When the hydrolysate was incorporated into liquid yoghurt, no significant reduction of peptides was detected during the shelf-life of the product. The amount of the active peptides in the ingredient was between 2.5-3.1 mg.g hydrolysate, and the dose of active peptides administered during the trial ranged between 5.8 to 7.3 mg. After 6 weeks of consuming the yogurt containing the active ingredient, the hypertensive patients showed a change in their systolic blood pressure of -12.5 mmHg with a confidence interval between 4.7 and 20.2 mmHg ( $p \leq 0.05$ ). It has to be highlighted that no significant changes in blood pressure were detected in both the placebo and the normotensive groups.

**Conclusions:** The beneficial effect of an active casein hydrolysate on hypertensive subjects has been demonstrated.

**Key Words:** Milk Peptides, Hypertension, Clinical Trial

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**27/790.** Innovation in Food for Optimal Nutrition

### **New food with natural content of Vitamin D**

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**Introduction:** Vitamin D status is too low in many parts of the population. A larger diversity of food products with high vitamin D content may increase the vitamin D intake. Mushrooms and yeast have a high content of ergosterol which is known to be converted to vitamin D<sub>2</sub> by UV-exposure.

**Objectives:** We investigated the effect of UV-exposure from lamps on vitamin D<sub>2</sub> formation and growth of white button mushrooms (*Agaricus bisporus*) during the growth phase, and post harvest exposure by natural sunlight at different latitudes.

**Method/Design:** The UV-exposure of the mushrooms was performed just prior to harvest by UV-B lamps in the range of 0-2500 mJ.cm. Post-harvest by 200 mJ.cm and by sun-exposure at different latitudes and duration.

**Results:** The results show that the content of vitamin D<sub>2</sub> was 0.7-164 µg.100g fresh weight, and there was a linear relationship between UV-dose up to 250 mJ.cm and vitamin D<sub>2</sub> content. There was no effect of UV-exposure on mushroom growth. The preliminary results of sunlight exposure of mushrooms to sunlight show a content of 3 µg.100g after 90 min in Madrid (latitude 40 N) at noon and 7 µg.100g after exposure for 12 hours between 11 am and 3 pm for three consecutive days in Copenhagen (latitude 55 N). All results will be ready at the end of June, and will be presented at the conference.

**Conclusions:** The preliminary results demonstrate that mushrooms may be produced with a high and natural content of vitamin D either pre-harvest by UV-lamps or post-harvest by sunlight. The potential of these results is that mushrooms may become a significant

vitamin D source. In Denmark, for example, with the current average intake of mushrooms, bio-fortified mushrooms would contribute to a 26% of the recommended dietary intake of vitamin D.

**Key Words:** ergosterol, Vitamin D, biofortification, mushrooms

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**27/829.** Innovation in Food for Optimal Nutrition

### **Association of weight status with quality of life, physical fitness and symptomatology in female fibromyalgia patients**

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**Introduction:** Fibromyalgia (FM) is a relatively new and unknown disease compared to other established diseases. Factors related to this pathology and its symptomatology are not fully understood.

**Objectives:** We aimed to analyze the relationship of weight status with quality of life, physical fitness and symptomatology in Spanish female FM patients.

**Method/Design:** The sample comprised 177 Spanish women with FM (51.3±7.3 years). We assessed the following variables: tenderness (pressure algometry), quality of life (the Short-Form-36 Survey, SF36), and symptomatology (the Fibromyalgia Impact Questionnaire, FIQ). Physical fitness was measured by means of the 30-s chair stand, handgrip strength, chair sit&reach, back scratch, 30s blind flamingo, 8-feet up&go and 6-min walking tests. The international criteria for body mass index was used to classify the patients as normal weight (NW), overweight (OW) and obese (OB).

**Results:** Thirty-two percent were NW, 35% OW and 32% OB. We have observed worse quality of life across weight status categories in the following SF36 subscales: physical functioning, bodily pain, general health ( $P < 0.01$ ) and mental health ( $P < 0.05$ ). Both OW and OB patients had higher levels of pain than NW, as assessed by FIQ and SF36 questionnaires and tender point count ( $P < 0.01$ ). Both OW and OB patients had higher levels of fatigue, work difficulty, morning tiredness and stiffness ( $P < 0.05$ ) than NW patients. Cardiorespiratory fitness, dynamic balance, motor agility (both  $P < 0.05$ ) and upper flexibility ( $P < 0.001$ ) were worse across higher weight status categories, whereas pairwise comparisons showed significant differences mainly between NW and OB group.

**Conclusions:** OB female FM patients displayed worse quality of life, cardiorespiratory fitness, dynamic balance, motor agility and upper flexibility than their NW peers. The FM symptomatology in OB patients did not differ from OW patients, whereas NW patients significantly differ from either OW and OB patients.

**Key Words:** Fibromyalgia, Women, Weight Status, Physical Fitness, Quality Of Life and Fibromyalgia Symptoms

### Spanish and Moroccan women do not differ on body composition.

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**Introduction:** Fibromyalgia (FM) is a relatively new and unknown disease compared to other established diseases. Factors related to this pathology and its symptomatology are not fully understood.

**Objectives:** We aimed to study the differences on anthropometry and body composition between Spanish and Moroccan women.

**Method/Design:** The present pilot study comprised 90 women from the South of Spain and 58 from the North of Morocco aged 40-65 years. We assessed body composition with anthropometry, bioelectric impedanciometry (InBody R20. Biospace) and ultrasound densitometry (CUBA Clinical™. Sunlight Omnisense™). The international criteria for body mass index (BMI) was used to classify the women as normal weight, overweight and obese. Comparisons between Spanish and Moroccan women were performed through the analysis of covariance (ANCOVA), adjusted by age.

**Results:** Excepting a lower height and waist circumference in the Spanish when compared to the Moroccan group (155.8±5.7 vs. 160.0±4.8 cm, P=0.001, and 89.5±10.4 vs. 92.0±11.3cm, P=0.036, respectively) no differences between groups were observed on weight status, fat mass, muscle mass or bone mass. The descriptive results for the rest of variables were the following (showed for Spanish vs. Moroccan women, respectively): weight: 70.8±11.7 vs. 74.4±13.7 kg, (P=0.087); BMI: 30.0±5.4 vs. 30.4±10.2 kg.m<sup>2</sup>, (P=0.380); fat percentage: 39.4±6.6 vs. 40.1±6.4 %, (P=0.145); muscle mass: 22.7±3.1 vs. 24.0±3.1 kg, (P=0.135) and bone mineral density, as measured by broadband ultrasound attenuation: 68.0±16.2 vs. 70.2±18.1 g.cm<sup>2</sup>, (P=0.904). Weight status for Spanish vs. Moroccan, respectively, was: 17% vs. 26% normal-weight, 44% vs. 38% overweight and 38 vs. 36% obese

**Conclusions:** Despite the cultural, nutritional and social differences between both countries, we have not found any differences related to the body composition between the studied groups. This study should stimulate further research, involving larger sample sizes, on other health indicators in understudied populations.

**Key Words:** Body Composition, Muscle Mass, Fat Mass, Bone Mineral Density, Moroccan, Spanish and Women.

### Chrononutrition applied with tryptophan-enriched cereals: Reconsolidation of the sleep, wake cycle increasing melatonin and serotonin levels in the elderly.

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**Introduction:** Melatonin rhythm, which exhibits a close association with the endogenous circadian component of sleep, is attenuated with increasing age. Melatonin decrease seems to be linked to sleep alterations in the elderly. Chrononutrition is a field of Chronobiology that establishes the principle of consuming foodstuffs at times of the day when they are more useful for health. It can, therefore, improve biorhythms and physical performance.

**Objectives:** To analyze if the consumption of cereals enriched with tryptophan, the precursor both serotonin and melatonin, could help in the reconsolidation of the sleep.wake cycle.

**Method/Design:** Participants were 40 mature.elderly volunteers (aged 55-75 yr). Data were collected for 3 weeks according to the following schedule: The control week participants consumed tryptophan-enriched cereals (22.5 mg tryptophan.30 g cereals) at breakfast and dinner; the treatment week, cereals enriched with a higher dose of tryptophan (60 mg tryptophan.30 g cereals) were eaten at both breakfast and dinner; the post-treatment week volunteers consumed their usual diet. Each participant wore a wrist actimeter that logged activity during the whole experiment and urines at 07:00 am and 21:00 pm were collected. Actimetry data were analyzed with Sleep Analysis© (Cambridge Neurotechnology Ltd., UK). 6-Sulfatoxymelatonin (urinary metabolite of melatonin) and 5-Hydroxy-3-Indole Acetic Acid (urinary metabolite of serotonin) levels were measured using commercial DRG© ELISA kits.

**Results:** The consumption of cereals containing the higher dose in tryptophan increased sleep efficiency (5.7±SEM:3.81 %; p<0.001), actual sleep time (3.5±SEM:1.86 %; p<0.01), immobile time (2.2±SEM:1.67 %; p<0.01), and decreased total nocturnal activity (16.18±SEM:5.32 %; p<0.01), sleep fragmentation index (7.73±SEM:3.69 %; p<0.001), and sleep latency (31.54±SEM:8.51 %; p<0.01). Urinary 6-sulfatoxymelatonin and 5-hydroxy-3-indole acetic acid levels also increased 22.5±SEM:5.86 % (p<0.05) and 90.6±SEM:31.75 % (p<0.05) respectively after the ingestion of these cereals.

**Conclusions:** Cereals enriched with 60 mg tryptophan.30 g cereals may be useful as a Chrononutrition tool for alterations in the sleep.wake cycle due to age. Supported by Laboratorios Ordesa S.L. SD Paredes was the beneficiary of a grant from Junta de Extremadura-Fondo Social Europeo (REI09009).

**Key Words:** Chrononutrition, Tryptophan, Melatonin, Elderly, Sleep, Wake Cycle

**27/860.** Innovation in Food for Optimal Nutrition

**Texture design in ready-to-eat foods to improve well-being in the elderly.**

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**Introduction:** A daily personalized nutrition plays an important role in disease prevention and promotion of well-being in the elderly. Health conditions associated to ageing affect food swallowing, perception of sensory properties (taste and flavor) and make food cooking at home difficult.

The design of texture modified ready-to-eat products is a promising business opportunity for the Food Industry and one of the challenges of EKITEX project.

**Objectives:** The aim of this preliminary study is to analyze the feasibility of designing modified texture food prototypes based in traditional recipes and adapted to senior population mastication and swallowing requirements. Palatability and preparation method are also considered.

**Method/Design:** Review of formulation techniques to modify and control food texture based in viscoelasticity modulating properties of hydrocolloids and their application in commercial references. The review also covers the instrumental methods and scales currently employed to classify texture modified food products.

Implementation of hydrocolloids as texture ingredients in the formulation of different seafood products (from soup to pudding) and beverages targeted to elderly consumers. Characterization through instrumental techniques (texturometer) and sensory analysis is also analyzed

**Results:** Different hydrocolloids as modified starches or gums have been identified and selected for the trials due to two criteria; their properties to manipulate food texture in processed food products and their suitability to develop food that can be masticated and swallowed easily.

According to the existing International texture scales four different seafood taste prototypes have been designed and characterized by means of textural and sensory analysis. The feasibility of the industrialization of the process has also been considered.

**Conclusions:** There is a lack of commercial ready-to-eat texture modified products to be included in the daily menu of older people or those consumers affected by chronic diseases and the ageing process. Improved sensory (flavor, texture and taste) characteristics and self-cooking might have a positive effect in psychological satisfaction and enhanced quality of life.

**Key Words,** Texture Design, Ready-To-Eat Foods, Elderly, Nutrition, Well-Being

**27/873.** Innovation in Food for Optimal Nutrition

**The effects of dietary polyunsaturated fatty acids in the prevention of coronary heart disease**

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**Introduction:** Dietary n-3 polyunsaturated fatty acids (PUFA) reduce coronary heart disease (CHD) complications, such as chronic arrhythmia and sudden cardiac death. Improved myocardial resistance to ischemia-reperfusion injury results in smaller myocardial infarction, which is a major factor in the occurrence of CHD complications.

**Objectives:** We hypothesized that a specific dietary fatty acid profile (low in saturated and n-6 PUFA but high in plant and marine n-3 PUFA) may improve myocardial resistance to ischemia-reperfusion injury and reduce infarct size. To test this assumption, we used a well-defined rat model of myocardial infarction.

**Method/Design:** Based on our results, in comparison to a diet that is high in either saturated or n-6 PUFA but poor in plant and marine n-3 PUFA, a diet that is low in saturated fats and n-6 PUFA but rich in plant and marine n-3 PUFA results in smaller myocardial infarct size ( $P < .01$ ). The effects of the 3 diets were also examined by analyzing the fatty acid composition of plasma, erythrocyte cell membranes, and the phospholipids of myocardial mitochondria.

**Results:** The results show a great accumulation of n-3 PUFA and a parallel decrease in arachidonic acid, the main n-6 PUFA, in plasma, cell membranes, and cardiac mitochondria ( $P < .0001$ ).

**Conclusions:** We conclude that improved myocardial resistance to ischemia-reperfusion may be one of the critical factors explaining the protective effects of dietary n-3 PUFA against CHD complications in humans. In addition to increasing n-3 PUFA intake, an optimal dietary pattern aimed at reducing cardiovascular mortality should include a reduction of the intake of both saturated and n-6 PUFA.

**Key Words:** Mediterranean Diet, Ischemia-Reperfusion Injury, Infarct Size and Omega-3 Fatty Acids.

**27/915.** Innovation in Food for Optimal Nutrition

**Impact of the 2008 food price crisis on household's food insecurity in urban Burkina Faso**

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**Introduction:** The 2008 food price crisis has plunged millions of households into poverty and food insecurity, in particular those living in cities in developing countries. However, few studies have demonstrated the actual impact of this crisis on food insecurity.

**Objectives:** To assess the impact of the 2008 food price crisis on dietary diversity and household food insecurity in Ouagadougou, Burkina Faso.

**Method/Design:** Two cross-sectional surveys were conducted among randomly selected households living in Ouagadougou in July 2007 (n=3017) and in July 2008 (n=3002). At each round, food insecurity was assessed using the Household Food Insecurity Access Scale (HFIAS) and dietary diversity was assessed using the Individual Dietary Diversity Score (IDDS = number of food groups consumed over 24h) of a household's adult member. Socioeconomic characteristics of households, and coping strategies adopted by them were also collected. In parallel, food prices of the 17 most frequently consumed food items were recorded throughout the study areas.

**Results:** Food prices considerably increased between 2007 and 2008, especially those of fish (+113%), cereals (+56%) and oil (+44%). Individuals consumed less fruits, vegetables, dairy products and meat/poultry in 2008 than in 2007 (mean IDDS=5.2 ±1.5 versus 5.7 ±1.7 food groups; p<0.0001), but this decrease was less marked for the richest. In 2008, 75% of households were food insecure, versus 65% in 2007; all the households were affected, whatever their socioeconomic level. Strategies adopted by households to face the situation included changing their food habits, reducing motorized transportation, getting a loan and/or food aid from relatives.

**Conclusions:** Food security and dietary diversity, which were already low in Ouagadougou, alarmingly decreased due to the soaring food prices in 2008. Both the HFIAS and IDDS were sensitive to the socio-economic climate and allowed to identify the most vulnerable households in this context.

**Key Words:** food security, dietary diversity, food prices, urban West Africa.

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#### 27/916. Innovation in Food for Optimal Nutrition

### **A propensity score to match exposed and unexposed groups when evaluating a food voucher programme**

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**Introduction:** Recent food price and economic crises have popularized food/cash transfer programmes aiming at alleviating food insecurity of poor households. Rigorous evaluation of such programmes is urgently needed. Because these programmes usually target the

most vulnerable households, defining a comparable unexposed group is a challenge for any evaluation design.

**Objectives:** To assess the usefulness of a Propensity Score (PS) to match unexposed and exposed groups at baseline in the evaluation of a food voucher programme in urban West Africa.

**Method/Design:** In Pikine (Dakar, Senegal) a participatory process was used to identify the most vulnerable districts in the area, followed by the most vulnerable households in each district, to receive food vouchers. A two-stage cluster sampling was used to select 417 beneficiaries. A similar process was used to identify 915 vulnerable households in the non-targeted districts. This unexposed group was reduced to 417 households using a PS calculated with a logistic model predicting the probability of being a beneficiary, using a large set of variables characterizing the household's social, economic, demographic status. Food security indicators assessed comparability between groups.

**Results:** Before matching, beneficiaries tended to have lower food security status than non-beneficiaries according to the Household Food Insecurity Access Scale (HFIAS: 17.15 vs. 15.73; p=0.06), the Coping Strategies Index (CSI: 31.2 vs. 29.2; p=0.08); the Food Consumption Score (FCS: 55.2 vs. 61.4; p=0.0028) and the mean Household Food Expenditure (HFE: 6.715 vs. 8.051 CFA Francs per adult-equivalent and per day; p=0.0025). Selecting the 417 non-beneficiaries with the greatest PS significantly reduced these differences for HFIAS (17.15 vs. 16.45; p=0.35) and CSI (31.2 vs. 29.9; p=0.32), and for FCS (55.2 vs. 59.9; p=0.029) and HFE (6.715 vs. 7.742 CFA Francs; p=0.024) to a lesser extent.

**Conclusions:** Using a PS matching procedure increased the comparability of unexposed and exposed households while halving the sample size at the final survey.

**Key Words:** Propensity score, matching, cash transfers, food insecurity, programme evaluation.

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#### 27/993. Innovation in Food for Optimal Nutrition

### **Effects of natural inhibitors of pancreatic lipase in the treatment of obesity**

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**Introduction:** In the continued search of effective antiobesity treatments and since dietary lipids represent the major source of unwanted calories, there are many efforts in the development of natural products that inhibit the fat digestion to prevent obesity. In this sense, presence of inhibitors of pancreatic lipase (PL), the most important enzyme in the digestion of dietary fat, has been identified in different plant species.

**Objectives:** Analyze the effects and mechanisms of six natural compounds in the treatment of obesity in a rat model of obesity indu-



ced by a high fat sucrose diet (HFS).

**Method/Design:** 96 male Wistar rats were divided into 8 groups (n = 12 rats per group). One group was fed a standard chow diet; a second group. HFS diet and the other six groups were fed HFS diet with supplementation of six different natural compounds (orange. hamamelis. lime. grape vine. birch and cinnamon) during 67 days. The amount of each compound depends on IC50 in vitro studies.

**Results:** Body weight gain of the HFS groups supplemented with six natural compounds was slightly lower than the HFS group. A daily intake of orange. hamamelis. birch and cinnamon inhibited intestinal fat absorption as measured by fat in feces. probably related with the decrease in body weight.

Hamamelis prevented the HFS-induced hyperleptinemia and hamamelis. birch and cinnamon were able to reduce hyperinsulinemia and HOMA index.

**Conclusions:** Hamamelis. birch and cinnamon seem to exert beneficial effects on obesity. Hamamelis and birch improve glucose metabolism by diminishing circulating insulin levels and HOMA index. and cinnamon has been beneficial on body composition. and prevented postprandial elevation of the plasma glucose level.

**Key Words:** Obesity, High Fat Diet, Fat Digestion, Pancreatic Lipase and Natural Compounds

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#### 27/1054. Innovation in Food for Optimal Nutrition

### **HMTOOL: Aligning objectives from researchers, health professionals, food chain companies and target consumers**

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**Introduction:** The World Health Organization warns that of the 10 most harmful risks to health. 6 are directly related to food and diet. Managing food and diet processes has become a EU public health priority and a competitive market strategy.

**Objectives:** To create a menu and recipe reformulation Web2.0 tool as a research project to empower businesses through the food chain to transfer scientific knowledge to distribution and consumers.

**Method/Design:** First. a food management software using LanguaL and full ingredient indexing was created in order to characterise foods according to nutritional quality and technology. A second module was then developed to target specific consumer needs. Finally. a third module was developed to assess menus based on recipe ingredient availability and conditions (frequency. minimum or maximum requirements and incompatibilities). as requested by users.

**Results:** After publication of the first software release (HANCPTool). based on the control of three nutrients (saturated fats. free sugars and salt). the website received 4.223 visitors from 252 companies in 48 countries and 5 continents. producing 2.997 reformulated recipes.

Results from the current release (HMtool) for healthy menus. based on self-management of healthy persons and patient target-groups. are preliminary and not discussed in this presentation.

**Conclusions:** The web-based recipe reformulation system proved that a food product or recipe could be improved while preserving its essential characteristics and without converting it into a different product. The greatest amount of nutrients can be preserved and the product made healthier. This know-how opens the way for a future Web2.0 computer application to self-manage disease-related nutritional hazards.

**Key Words:** Food & Menus reformulation in Web2.0 and e-Healthy Nutrients

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#### 27/130. Nutrition and Healthy Lifestyle

### **A prospective cohort study of dietary patterns of non-western migrants in the Netherlands in relation to risk factors for cardiovascular diseases: HELIUS-Dietary Patterns**

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**Introduction:** The prevalence of cardiovascular disease (CVD) is often higher in non-western migrants compared to the host population. Diet is an important modifiable determinant of CVD. Differences in diet may partly underlie the observed higher risk for CVD. Increasingly, dietary patterns rather than single nutrients are the focus of research in an attempt to account for the complexity of nutrient interactions in foods. No comprehensive picture of the dietary patterns of non-western migrants in the Netherlands exists.

**Objectives:** The aims of this study are to (1) develop ethnic-specific Food Frequency Questionnaires (FFQs); (2) to understand whether differences in dietary patterns explain differences in CVD risk; (3) investigate the determinants of these dietary patterns. This paper outlines a systematic approach to overcome the difficulties in the assessment and analysis of dietary intake data in ethnically diverse populations.

**Method/Design:** This study is embedded in the HELIUS study, a multi-ethnic cohort in Amsterdam. Using newly developed ethnic-specific FFQs, we will gather data on the habitual intake of 5000 participants (18-70 years old) of ethnic Dutch, Surinamese of African and of South Asian origin, Turkish or Moroccan origin. We will apply factor analysis based on correlation of food groups to derive dietary patterns. Concentration biomarkers will be used as reference instruments to validate the ethnic-specific FFQs. The derived patterns will be related to CVD risk factors, collected in the baseline examination of HELIUS. Important explanatory variables are migration history, acculturation, socio-economic factors and lifestyle.

**Conclusions:** This study will allow research into determinants and health consequences of dietary patterns of non-western migrants. The inclusion of 5 ethnic groups in one setting is highly innovative as we can limit confounding by local environment characteristics. The heterogeneity of the study population will provide variance in food intakes, which has advantages for studying the link between diet and disease.

**Key Words:** Dietary patterns, ethnicity, cardiovascular diseases

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## 27/170. Nutrition and Healthy Lifestyle

### Effect of incorporating avocado in meals on satiety in healthy overweight adults

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**Introduction:** Although it is generally assumed by the public and professionals alike that high fat meals fuel weight gain, there is no evidence that high-fat, natural whole foods such as avocados are associated with the global obesity epidemic. Further, avocados are a rich source of fat and fiber, which are nutritional factors linked to enhanced satiety.

**Objectives:** This study investigated the effect of incorporating avocados in meals on subjective feelings related to satiety.

**Method/Design:** We performed a randomized 3 x 3 single blind cross-over postprandial study (three 1-day study periods scheduled 1 week apart) in 26 healthy overweight adults (16 women, 10 men; mean±SD age 40.8±11.0 years; BMI 28.1±2.4 kg.m<sup>2</sup>). Subjects were given a standard breakfast on each of the 3 days, followed by 1 of 3 lunch meals: Control, avocado-free (35% of daily energy needs); isocaloric Avocado, isocaloric replacement (35% of daily energy needs); and, Avocado Added (41% of daily energy needs). The avocado portion size contributed 125 kcal (6% of daily energy) to the lunch meal for the reference 2000 calorie menu. Visual analog scales (were administered 5 hours after the lunch meal to assess subjective feelings of hunger, fullness, satiety and desire to eat before dinner.

**Results:** Both avocado-containing meals significantly reduced self-reported hunger and desire to eat, and, increased satiety as compared to the Control meal (p<0.002, for all).

**Conclusions:** The inclusion or addition of avocado to a lunch meal is an effective approach to reduce hunger and the desire to eat in

overweight adults. The increase in self-reported satiety may yield a reduction of energy at the subsequent meal and reduce overall 24-hour energy intake, which may favorably influence weight management.

**Key Words:** avocado, satiety, overweight adults

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## 27/200. Nutrition and Healthy Lifestyle

### Oxidizability of core and surface of lipoproteins as early marker of metabolic syndrome

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**Introduction:** Central obesity is a principal causative factor in the development of metabolic syndrome (MS), a common and complex disorder combining hypertension, insulin resistance and alterations in the composition and function of lipoproteins. Oxidative stress is an important pathogenic mechanism of obesity-associated MS. Peroxidation of lipoproteins not only makes LDLs atherogenic, but can also reduce the anti-atherogenic properties of HDL.

**Objectives:** The aim of this study was to investigate the oxidizability of the hydrophobic core and the surrounding envelope of LDL and HDL in obese males.

**Method/Design:** Fifty normal-weight (CT) and 60 obese (25< BMI<35 Kg.m<sup>2</sup> OB; 40 without MS, wMS; 20 with MS according to ATP III criteria, MS) adult males were studied. Core and surface of LDL and HDL were labeled by incubating plasma with selective pyrenic probes before isolation of lipoproteins by ultracentrifugation. Susceptibility to 2,2'-azobis-2-methyl-propanimidamide-dihydrochloride-induced peroxidation was measured following kinetically the decrease of fluorescence of the probes. The length of the lag phase and maximum velocity of the reaction were used as indices of lipoprotein oxidizability. Lipoprotein contents of proteins, cholesterol, phospholipids and triglycerides were determined by colorimetric assays.

**Results:** The oxidizability of both core and surface were higher in both LDL and HDL of OB than in CT. The oxidizability of the two lipoprotein regions was higher in MS than in wMS, especially that of HDL core. This last parameter was inversely correlated with visceral adiposity (measured as waist to hip ratio). Moreover, triglycerides levels of LDL and HDL were higher in MS than in wMS.

**Conclusions:** The elevated oxidizability of lipoproteins found in MS could be due to increased oxidative stress and alterations of the composition. These preliminary results could be the rationale of future clinical trials addressed to investigate the effects of lifestyle and/or different hypocaloric diets and/or nutritional supplementations on these parameters.

**Key Words:** metabolic syndrome, oxidative stress, lipoproteins, HDL, LDL

### **A novel approach for increasing fruit consumption among children**

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**Introduction:** Increasing fruit consumption is an important health behavior for both children and adults. However, children do not follow current recommendation regarding fruit intake, and several interventions have been implemented so far under this perspective; however their effects have not been very exciting.

**Objectives:** Aim of the present study was to evaluate a school-based novel approach for increasing children's fruit consumption.

**Method/Design:** In this study, 218 pupils (54% girls, 9-year old) were randomly assigned (randomization at a class level) into three intervention groups for one year: Knowledge Group (N=62; a weekly educational programme for increasing nutrition awareness and improving skills regarding fruit preparation and consumption); Exposure Group (N=66; a behavioral programme including only children's exposure to the consumption of a fruit on a daily by their teacher); Control Group (N=57; no specific intervention). Children's dietary intake was assessed by two 24h recalls before and at the end of the intervention. Family sociodemographic and lifestyle characteristics were also recorded.

**Results:** No significant difference was found in children's fruit consumption at baseline between Exposure Group and both Control and Knowledge Groups (1.2±1.3 vs. 1.3±1.1 vs. 0.9±1 serving.day, respectively), The Knowledge Group consumed significantly less fruits compared to the Control Group (P=0.05). At the end of the intervention, children in the Exposure and Knowledge Groups significantly increased fruit consumption (2.8±1.6 and 2.4±1.7 serving.day, respectively) compared to the Control Group (1.1±1.0, P<0.001 for both comparisons). No significant difference was observed between the Intervention Groups concerning fruit consumption. Adjustment for potential confounding factors, such as parental educational level, did not change the results.

**Conclusions:** The findings of this study indicate that children's exposure to the habit of consuming one fruit every day by a significant other (e.g. teacher), is a new, convenient, economical approach for increasing fruit intake among them and probably as effective as "traditional" educational approaches.

**Key Words:** fruit, children, exposure, school

### **Influence of a 24h fluid restriction on mood and physiological markers of dehydration in women**

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**Introduction:** Only few clinical studies have been conducted to evaluate the impairments induced by an acute fluid restriction (FR) on mood and physiological markers of dehydration. Moreover those studies led to contradictory results partly explained by the lack of homogeneity between study designs (e.g.: duration of FR, inter-subject variability, circadian rhythms, timing of mood assessment).

**Objectives:** The aim of this study was to evaluate the effect of an acute FR on mood and physiological parameters by using a well-controlled dehydration protocol.

**Method/Design:** Twenty healthy women (age: 25 ± 3.5 years) with a daily water consumption between 2L and 2.84L participated in a randomised two-period (dehydrated versus control) cross-over study. Caloric intake was strictly controlled in both conditions. In the FR period, the last water intake was between 18:00-19:00 and no fluid intake was allowed up to 18:00 on the next day. Water intake was only allowed at fixed hours during the control condition. Physiological parameters in urine (volume, gravity, color), blood and saliva (osmolality) as well as subjective mood and sensations (headache and thirst) were compared between experimental conditions.

**Results:** The FR protocol was well conducted as indicated by a significant reduction of urinary volume. No clinical abnormalities of biological parameters or vital signs were observed although heart rate was increased by FR. Plasma osmolality did not differ between experimental conditions. Increased urinary gravity, darker urine color and increased thirst were early markers of dehydration. Interestingly, dehydration also induced a significant increase in saliva osmolality at the end FR period. Sleepiness, fatigue, decreased alertness and increased confusion were also early parameters altered by FR.

**Conclusions:** Using a rigorously-controlled FR protocol, urine volume, color and gravity as well as saliva osmolality appear as early, reliable and non invasive methods for assessing hydration status. The most consistent mood effects concerned sleep/wake parameters.

**Key Words:** dehydration, mood, osmolality, urine, saliva

### **β-glucan beverage in individuals at high risk for diabetes mellitus**

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**Introduction:** The risk of developing type 2 diabetes mellitus (T2DM) is increasing worldwide. Some studies suggest whole grain consumption and cereal fiber intake may reduce the risk of developing T2DM and recent studies show high risk T2DM individuals may respond to nutritional/lifestyle changes which may decrease the potential for developing T2DM. A few studies suggest viscous soluble fibers like β-glucan may improve plasma glucose and insulin concentrations in individuals at risk for T2DM.

**Objectives:** To examine the effects of barley β-glucan (BBG) among individuals at high risk for T2DM

**Method/Design:** This randomized, double-blind, placebo controlled, parallel group study included fifty generally healthy subjects at high risk for T2DM. Subjects had a mean age of 56 years, BMI 32 kg.m<sup>2</sup> and fasting plasma glucose of 102 mg.dl without a prior diagnosis of diabetes mellitus. Subjects were randomized into three groups to receive placebo (control), or low dose (3 g.day) or high dose (6 g.day) BBG in a flavored water beverage to be consumed every day for 12 weeks. All subjects followed a weight maintaining Therapeutic Lifestyle Changes Diet. Fasting and post-oral glucose tolerance testing (OGTT) plasma glucose and insulin were measured and Dual Energy X-Ray Absorptiometry (DEXA) scans were analyzed at baseline and after 12 weeks of treatment.

**Results:** Fasting serum insulin levels decreased 7.3% in the 6g.d BBG group (-1.5uU.ml) compared to the placebo group (+2.1 uU.ml, p=0.006) and glucose OGTT values decreased 9.6% in the 3g.d BBG group (-1775 mg.dl\*min) compared to placebo which increased 7.5% (+1234 mg.dl\*min; p=0.012). In addition, gynoid fat was reduced 3.9% for the 6 g.day BBG group (-0.24 kg) compared to placebo group (+0.10 kg, p =0.021).

**Conclusions:** The findings suggest 6g.day BBG consumed over 12 weeks may have favorable effects on glucose and insulin levels among individuals at high risk for T2DM

**Key Words:** Soluble Fiber, Barley β-Glucan, Pre-Diabetes Mellitus

### **Relationship between sleep duration, diet and BMI in 4- to 14-year-old Danish children**

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**Introduction:** A negative association between sleep duration and BMI has been observed in children. However, knowledge about the association between sleep duration and diet is limited.

**Objectives:** The objective of this cross-sectional study was to examine the association between sleep duration and intake of foods and nutrients in a representative sample of 802 children, aged 4-14 years, from the Danish National Survey of Dietary Habits and Physical Activity.

**Method/Design:** Dietary intake and sleep duration were recorded for seven consecutive days in a pre-coded food and sleep record. Height and weight were reported by one of the parents.

**Results:** No gender differences were found regarding age, sleep duration and parental education. Sleep duration was negatively correlated to age (rho=-0.68, P<0.001) and to BMI (rho=-0.41, P<0.001). Short and long sleep duration were defined within three age groups: 4-6 years, 7-10 years, and 11-14 years using median sleep duration as cut-off values. Sleeping less than the median duration was associated with less healthy food consumption patterns in terms of higher intake of certain energy-dense foods (snacks, sweets & chocolates and fast food) and lower intake of certain nutrient-rich foods (vegetables and rye bread).

**Conclusions:** Our results support the view that children with short sleep duration have less healthy eating habits and higher BMI than children with longer sleep duration, highlighting the importance of having a good night's sleep. The study is part of the OPUS project 'Optimal well-being, development and health for Danish children through a healthy New Nordic Diet' supported by a grant from the Nordea Foundation.

**Key Words:** Sleep, BMI, obesity, dietary intake, children

### **Avoidance of reward deficiency**

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**Introduction:** predisposition to obesity may be due to inadequate activity of the brain's reward circuitry, leading to reward deficiency.

**Objectives:** outline strategies to avoid reward deficiency.

**Method/Design:** different studies using fMRI, a computer-test to measure reward (i.e. liking-wanting) and visual analogue scales for appetite were used to rate solid and liquefied food forms.

**Results:** In the fasted state, wanting is signaled in the hypothalamus and striatum and liking is signaled in the nucleus accumbens (NAc). In the absence of hunger, wanting-signaling in the right pallidum and liking-signaling in the striatum, anterior-insula, cingulate cortex, predict food intake. Food choice and food intake in the absence of hunger appears to be reward-related. Especially visceral overweight subjects show augmented food 'wanting' and energy intake while satiated. BMI is important as shown by the fact that post-meal liking and wanting brain-signaling is inversely related with BMI and energy intake. Furthermore, pre-meal liking and wanting-signaling in the NAc is positively associated with cognitive dietary restraint and the post-meal change in liking-signaling in the NAc is a function of restraint.

To avoid reward deficiency, it is profitable to eat what you like, e.g., when a dessert consisted of highly liked chocolate mousse, wanting for the complete 'dessert category' significantly decreased, while it was still present when this dessert consisted of iso-energetic cottage cheese.

Furthermore, mode of conveyance plays a role in alleviating hunger and thirst, since food consumption alleviated hunger mainly by eating, while thirst was mainly quenched by drinking water separately. The majority of subjects required further consumption after drinking a meal, motivated by a mixture of hunger and thirst, showing that energy intake by drinking causes confusion implying a risk of over-consumption.

**Conclusions:** dietary restraint, eating what you want and using the appropriate mode of conveyance can avoid reward deficiency.

**Key Words:** reward deficiency, restraint, mode of conveyance

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### 27/339. Nutrition and Healthy Lifestyle

#### **Food consumption and nutrient intake in Germany - results of the German national nutrition Survey II**

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**Introduction:** National food consumption studies are important to provide representative data as a solid basis for scientific and political purposes. The German National Nutrition Survey II (NVS II) was conducted to assess current food consumption, nutrient intake and nutritional behaviour of the German speaking population.

**Objectives:** The aim is to present representative data on food consumption, energy and nutrient intake of the German speaking population.

**Method/Design:** Food consumption of the past four weeks was assessed by diet history interviews. Data of 15,371 participants aged 14-80 years were collected 2005/2006. Nutrient intake was calculated with the German Nutrient Database Version 3.01.

**Results:** The German speaking population shows a mean fruit consumption of 222g/d (men) and 270g/d (women). On the average men eat 231g/d and women 241g/d vegetables. The consumption of milk, dairy products and cheese adds up to 259g/d (men) and 237g/d (women). Men eat twice as much meat and sausages as women: 142g/d versus 76g/d. The mean fish/seafood consumption amounts to 28g/d for men and 22g/d for women. Of non-alcoholic beverages men drink 2.4l/d, women 2.3l/d (half as water, one third as coffee/tea). Men drink almost four times more alcoholic beverages than women (308 versus 81ml/d).

Median energy intake is 2,490kcal/d (men) and 1,891kcal/d (women). Energy from carbohydrates amounts to 46% (men) and 50% (women), from fat to 35% (men) and 34% (women), from protein to 14% (both sexes). Of the studied vitamins and minerals, intake of folate and vitamin D is critical for both sexes, calcium for women and iron for women during childbearing age.

**Conclusions:** In the German speaking population the consumption of food of plant origin falls below, of animal origin exceeds general and preventive recommendations. Intakes of vitamins and minerals meet the according recommendations, with the exception of folate, vitamin D and partly of calcium and iron.

**Key Words:** German National Nutrition Survey II, food consumption, nutrient intake, energy intake

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### 27/366. Nutrition and Healthy Lifestyle

#### **Research on bioactive hydrolysates from meat products with health benefits**

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**Introduction:** Diet plays a key role in improving health and reducing the risk of chronic diseases development such as obesity, diabetes and cardiovascular disease. Pork meat and its derivative products provide important nutrients such as proteins, amino acids, vitamins (group-B) and minerals (iron, phosphorus, zinc, selenium). Together with other minority substances (carnosine, anserine, L-carnitine, creatine, etc.), they are of great importance in optimal body state maintenance. New compounds with potential bioactivity, derived from meat muscle proteolysis, could provide beneficial effects by decreasing risk factors associated with lifestyle-related chronic diseases.

**Objectives:** Investigation on the generation of biological active hydrolysates by enzymatic proteolysis of different pork meats and

Spanish meat products.

**Method/Design:** Several raw pork meats and meat products (cured, fermented and cooked), usually consumed in the Mediterranean diet, were processed by two different enzymatic hydrolysis strategies: (a) combining two commercial endoproteases on defatted meat extracts and (b) simulating human digestion following an *in vitro* process by using pepsin and pancreatin.

Bioactivity of hydrolysates collection was characterized by analysis of the antioxidant activity (ORAC, protection of fibroblasts against oxidative stress), anticholesterogenic activity (fluoresterol absorption inhibition in HT29 cells) and inhibitory activity of angiotensin converting enzyme (ACE).

**Results:** Hydrolysates from protein-rich meats (loin and ham) and their derived processed products (cooked loin and dry-cured ham), possess a high antioxidant capacity (800-900  $\mu\text{mol TE.g ORAC}$ ), although insufficient to prevent oxidative stress in H2O2 cultured fibroblasts. Additionally, the hydrolysates from cooked loin and dry-cured ham also showed capability to reduce in 18%-27% fluoresterol absorption in HT29 cells. Finally, the same derivatives exhibited an important antihypertensive activity reflected by high levels (50%-75%) of ACE inhibition.

**Conclusions:** Pork meats and their richest protein derived products, within a balanced diet, may contribute to provide a kind of bioactive hydrolysates with healthy benefits and with preventive action on cardiovascular disease.

**Key Words:** Pork-meat products, bioactive hydrolysates, antioxidant, anticholesterogenic, antihypertensive.

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## 27/382. Nutrition and Healthy Lifestyle

### **Dietary guidelines for school catering: do they affect the cost of primary school meals?**

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**Introduction:** In France, school catering is subject to specific dietary guidelines, called GEMRCN, which define the portion size and frequency of serving of certain categories of nutritionally-defined dishes (e.g. starters containing more than 15% fat) in a series of 20 successive meals.

**Objectives:** Here, we estimated the impact of fulfilling GEMRCN on the cost of school meals.

**Method/Design:** A first, descriptive, part, was to analyse, from 42 series of 20 meals served in 2009 in schools, the relationship between the conformity with GEMRCN and the cost of meals. A second part, analytical, consisted of assessing, on the basis of prices for the final term of 2008, the cost of series of meals published since 1997 in professional journals (n=120 series) conforming either with the practices in force before 2001 or with GEMRCN.

**Results:** The results indicate that GEMRCN was very rarely

followed, and that the degree of conformity with it was not related to cost differences. Then, the variability in cost of meals was great in the series following GEMRCN: of the 800 meals making up the series conforming with GEMRCN, one third cost less than 1.23 €, one third cost between 1.23 € and 1.47 €, and one third cost more than 1.47 €. The results also show that series following GEMRCN cost significantly less (-0.10 €/meal) than series of meals published before the first definition of dietary guidelines for school catering in France, in 2001, and this was because GEMRCN recommends smaller quantities than those used before 2001. The present work suggests that an increase in quality (observing frequencies) is possible without increasing the price when moderate amounts are used (observing recommended portion sizes).

**Conclusions:** In conclusion, it is unlikely that applying the dietary guidelines for school catering in France would lead to an increase in the cost of meals.

**Key Words:** School catering, School, Dietary recommendations, Nutritional policies, Children, France

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## 27/427. Nutrition and Healthy Lifestyle

### **Antioxidant components and activity of gluten-free crackers based on buckwheat flour**

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**Introduction:** Buckwheat (*Fagopyrum esculentum* Moench) is highly nutritious pseudocereal known as a dietary source of protein with favorable amino acid composition and vitamins, dietary fiber and essential minerals. Phenolic compounds are also found in abundance in buckwheat. In comparison to most frequently used cereals, buckwheat has been reported to possess higher antioxidant activity, mainly due to high rutin content.

**Objectives:** The objective of this work was to determine the main antioxidant compounds and antioxidant activity of newly created gluten-free buckwheat crackers (refined and wholegrain) and compare them with wheat crackers (refined and wholegrain).

**Method/Design:** Crackers' bake trials were conducted under laboratory conditions.

Cracker powder was extracted with ethanol/water (80/20 v/v).

Total phenolic content and DPPH radical scavenging activity of crackers extracts was determined spectrophotometrically, and results were expressed as gallic acid equivalents (GAE) and IC50 values (mg/mL), respectively. Determination of phenolic compounds and tocopherols was performed by HPLC.

**Results:** Total phenolic content in crackers ranged from 84 mg GAE/100 g for refined wheat cracker to 292 mg GAE/100g for wholegrain buckwheat cracker. Protocatechuic and ferulic acid were quantified in all tested crackers, whereas two flavonoids, rutin and quercetin were found only in buckwheat crackers. The content of total

tocopherols in crackers ranged from 5.41 mg/100 g for refined wheat cracker to 6.99 mg/100 g for wholegrain buckwheat cracker. Buckwheat crackers were superior in scavenging activity on DPPH• in comparison to wheat crackers as evidenced by their lower IC50 value.

**Conclusions:** Formulated crackers made from buckwheat flours can broaden the utilization of buckwheat, increase supply of gluten-free products on the market and may be regarded as health-promoting functional foods, especially for celiac disease patients. 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.

**Key Words:** Buckwheat crackers, Phenolics, Tocopherols, DPPH radicals

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#### 27/432. Nutrition and Healthy Lifestyle

### A high protein diet prevents hepatic steatosis by inhibiting the lipogenic pathway

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**Introduction:** Hepatic steatosis caused by an high intake of dietary fat is the hepatic component of the metabolic syndrome, together with overweight, insulin resistance, glucose intolerance, and dyslipidemia. A diet high in protein is suggested to prevent hepatic triglyceride (TG) accumulation.

**Objectives:** We aimed to investigate the effect of a high protein intake on hepatic lipid accumulation, lipogenesis, lipid oxidation and inflammation.

**Method/Design:** Male C57BL/6J mice were fed a normal (NP) or high diet protein (HP) diet (15 or 50 energy% respectively) on a high fat (35 energy%) background for 12 weeks. Hepatic TG content was measured by enzymatic assay, systemic inflammation markers by ELISA and gene expression (TG synthesis, substrate oxidation & inflammation) by microarray and PCR.

**Results:** Triglyceride concentration in livers of animals fed the HP diet was significantly decreased compared to those fed the NP diet. This can be partly explained by a decrease in genes involved in lipogenesis. Gene set enrichment analysis additionally suggested an increase in protein turnover and energy metabolism such as mitochondrial oxidative metabolism and several pathways that feed intermediates into these processes. Furthermore a decrease in adaptive immune response was observed. Moreover, no systemic inflammation was detected as indicated from plasma analysis.

**Conclusions:** Feeding a high fat diet for 12 weeks leads to steatosis. A high protein diet successfully prevents this hepatic TG accumulation, probably by down regulation of lipogenesis and by increasing mitochondrial oxidation.

**Key Words:** liver, steatosis, protein, lipogenesis, energy metabolism

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#### 27/656. Nutrition and Healthy Lifestyle

### Study to assess water balance of a representative sample of the Greek population

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**Introduction:** There is a need to evaluate water balance in the general population. Being in water balance, defined as euhydration, is linked with physical and cognitive performance. Water balance reflects water intake and loss. Water intake may be estimated from solid and fluid food frequency intake, drinking water intake while water loss from excretion of sweat, urine and feces.

**Objectives:** To evaluate water balance in winter and in summer in a sample of a general population, age and gender stratified.

**Method/Design:** To evaluate water intake and loss, the Water Balance Questionnaire (WBQ), developed and validated in the past, was administered to 500 participants during summer and in another 500 participants during winter. The final sample was consisted of 897 participants (41.3±20.7 yrs, 48.4% males). Quartile cutoff points from the data collected in winter were used as cutoffs for data collected in summer.

**Results:** Mean water balance was -63±1478 ml/day during winter and -58±2150 ml/day during summer. There were no differences in water balance between the two seasons (p=0.531) but in summer more people were falling in the low (32.7%) and high (31.4%) categories. Differences in sources of water intake were also identified. In particular, during summer water intake from solid foods was lower than that in winter, while water intake from drinking water and beverages, particularly coffee, was higher.

**Conclusions:** The WBQ was employed to observe water balance in the general population during summer and winter. In hot weather conditions, more people were falling in the low and high categories, suggesting that needs may be more difficult to meet when the driving for water intake is thirst or the psychological urge to drink when hot.

**Key Words:** Water balance, winter, summer, questionnaire

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#### 27/747. Nutrition and Healthy Lifestyle

### Post Disaster child feeding and Caring Practices among <5 children in Barguna district, Bangladesh

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**Introduction:** There was a devastating cyclone Sidr in Bangladesh which affects livelihoods, healthy livings, child feeding and caring practices food crises as well as nutrition related status of

households.

**Objectives:** Thus two studies were initiated within the interval of five months to assess the changes occur on child caring practices after affecting Sidr in Bangladesh.

**Method/Design:** It was a cross sectional in design and followed mainly quantitative extended to qualitative in some extents as Focus Group Discussions. Key Informants Interview and Case Studies from 5 unions of Barguna district.

**Results:** There was no significant differences has been observed in exclusive breastfeeding rate between baselines and follow up. Qualitative findings show that mother started to give water, other liquids, rice, potato, biscuits obtained as aid to 0-6 months of children. About 60% of infants 0-6 months old were given plain water. About one-fifth (21.3%) of infants 0-6 month given rice and this rate has increased with ages. Similar pattern observed for potato and biscuit. FGDs and case studies shows that lack of time due to reconstruction of dwelling places, intention to participate in long cui to collect food and non food aid switched to caregivers to give other foods to children. As Sidr hits suddenly, significant number of women had noticed various physical and psychological problems. About (40%) respondents at baseline expressed that they wanted to live alone and did not want to go out. Women also reported hot temper (50%), unwilling to eat (54%) and work (65%), frustration (49%) in baseline and follow up. Physical and psychological problem along with poor time for children suppressed breastfeeding immediate after Sidr.

**Conclusions:** Child feeding and caring practices greatly effects by climate related hazards as people's attention divert to cope up with newly raised situation. Nutrition needs special emphasis during this period in Bangladesh.

**Key Words:** Child feeding practices, Post disaster, Psychosocial, Physical problems

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## 27/789. Nutrition and Healthy Lifestyle

### Lower educational level among senior Spanish women is associated with poorer adherence to the traditional Mediterranean diet.

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**Introduction:** Diet is one of the lifestyle factors associated with health inequalities. The Mediterranean diet (MeDiet) is increasingly recognized to prevent most major chronic diseases and rather low variability in the adherence to the MeDiet between social classes has been observed in the senior Spanish population in the past.

**Objectives:** Considering that the adherence to the traditional MeDiet is rapidly decreasing, the aim of this study was to compare the adherence to the MeDiet in a senior Spanish population according to levels of education.

**Method/Design:** A cross sectional analysis was done in 7447 men and women (aged 60-80y) included in the PREDIMED study. MeDiet adherence was assessed with two scores; one internationally frequently used score developed by Trichopoulou et al. derived from a 136-items food-frequency questionnaire; the other with the ME-DAS (Mediterranean Diet Adherence Screener) score, developed and validated in the PREDIMED study. Sociodemographic and dietary information was gathered during baseline face-to-face interviews by trained dietitians. Four levels of education were compared: illiterates, low, middle and high education.

**Results:** By nature of the study design, participants were older (52-84 y, mean age 67 y), mostly overweight (mean BMI 29.9 kg.m<sup>2</sup>) and with a sizeable burden of cardiovascular risk factors. No association between the adherence to the MeDiet and education was present among men, while women showed significant positive association in crude comparisons as well as in age-, geographic location- and BMI-adjusted models.

**Conclusions:** A higher educational level among women was associated with better adherence to the MeDiet, and may partially explain differences in mortality and morbidity of chronic disease in this population. Education should be taken into consideration when studying potential benefits of the MeDiet. Our data supports the need of education opportunities and activities to adopt healthier diets among senior women to reduce health inequalities.

**Key Words:** Health inequalities, women, education, Mediterranean Diet



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27/850. Nutrition and Healthy Lifestyle

**Diet and mental performance of children: A questionnaire survey of parents in four European countries.**

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**Introduction:** Diet is one of many factors influencing a child's mental performance, but little is known about the beliefs, attitudes and knowledge of parents, and how these affect food choices. A survey of parents of children aged 4-10 years was conducted in four European countries (England, Germany, Hungary, Spain) to explore their views about the effect of diet on children's attention and ability to learn.

**Objectives:** Diet is one of many factors influencing a child's mental performance, but little is known about the beliefs, attitudes and knowledge of parents, and how these affect food choices. A survey of parents of children aged 4-10 years was conducted in four European countries (England, Germany, Hungary, Spain) to explore their views about the effect of diet on children's attention and ability to learn.

**Method/Design:** A questionnaire was designed, translated and piloted in the four countries. Parents of children in mainstream education and without diagnosed pathologies such as Attention Deficit Hyperactivity Disorder were recruited through online panels accessed by a market research company. Background information was collected on respondents' personal characteristics (household composition and demography, socioeconomic status, education, ethnicity). The questionnaire explored views on the relationship between diet and physical and mental development, attention and ability to learn, and how such considerations affected food choices.

**Results:** 1604 parents completed the questionnaire (401 in England, Germany and Hungary, 403 in Spain); 61% female (range 54% Spain – 68% England). Most respondents had completed higher education (range 66% England – 39% Hungary). Almost one half were current smokers (range 42% England – 52% Germany). Many parents thought that a child's ability to learn was very much, extremely dependent on diet (71% overall, range 64% Spain – 78% Hungary), but smaller proportions reported that they considered this (very much, extremely) when providing food for their child (51% overall, range 47% England and Hungary – 55% Germany). Differences between views and reported behaviours of parents were smaller for other aspects of mental performance.

**Conclusions:** Parents may believe that diet affects mental performance but other factors, such as providing variety and overall healthiness of diet, may be more important in the food choices they make for their children.

**Key Words:** Diet, Learning, Parents, Performance, Survey,

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27/861. Nutrition and Healthy Lifestyle

**Barriers for health eating in females: a descriptive study from Jeddah, western Saudi Arabia**

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**Introduction:** The need for effective nutritional education for women has become increasingly important particularly in developing countries with different cultural backgrounds.

**Objectives:** To analyze the nutritional awareness among Saudi females and to identify barriers and difficulties in adopting healthier dietary habits.

**Method/Design:** A descriptive study on a convenience sample of Saudi females (N=151) living in Jeddah, Saudi Arabia using a pre-designed questionnaire.

**Results:** The majority of females were in the young age group. Awareness about different food groups were known by the majority of the participants (81.5%), and this was correlated to both education and monthly income. (29.9%) want to increase the amount of cereals intake while (65.6%) had no intention to change because they were satisfied with the current intake of cereals intake. (87.8%) want to increase the amount of vegetables taken. Moreover, (89.6%) of the participants want to increase the amount taken of fruits. While, (87.3%), of participants want to decrease the amount of fat taken. Among the participants (73.3%) want to increase the amount of dairy products taken. The amount of meat intake wanted to be decreased by (44.4%) of the participants. The main barriers for change were those related to taste and the local dietary habits.

**Conclusions:** Most of the studied females had adequate general nutritional knowledge. However, more efforts should be carried out in educating on how to improve their current dietary habits particularly in the young generations.

**Key Words:** Nutrition, Food groups, Awareness

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27/882. Nutrition and Healthy Lifestyle

**Decholesterolization of milk fat diets improve plasma and liver Long-Chain-omega3 profile (EPA,DHA) in hamsters**

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**Introduction:** In the athero-thrombotic process, saturated fat (SFA) associated to cholesterol are known to increase the risk of

atherogenesis by inducing the deposit of lipids in aorta and vessels, while omega3 could reduce the final thrombotic phase by limiting the aggregation mechanisms. Milk fat, rich in SFA and cholesterol, contains limited ALA levels (0.4-0.8%), but with a very low omega6:omega3 ratio (LA:ALA: 2.5) the potential of bioconversion to LCn-3 could be preserved.

**Objectives:** Evaluation of the impact on fatty acids, (i) of milk fat diets with or without cholesterol and (ii) of increasing dietary ALA by using blends including linseed oil.

**Method/Design:** 10-week-old hamsters received 20% fat diets for 12 weeks. Two groups (n=8) received either normal milk fat with normal cholesterol (280mg/100g fat) or low cholesterol levels (50mg/100g fat), both of them having normal low ALA level (0.4-0.8% FA). In 4 other groups, ALA (linseed oil) was added to normal and decholesterolized milk fat to increase ALA levels to 3% FA and 8% FA. Plasma, Liver FA were analysed.

**Results:** For equivalent dietary content of ALA (0.8%, 3%, 8%), a reduction of dietary cholesterol did not change ALA bioavailability but induced a better bioconversion, increasing EPA+DHA-LCn-3. Compared to classical pure milk fat, cholesterol removal increased EPA+DHA in plasma and liver by more than 50%. In plasma and liver, lowering the cholesterol content induced an EPA+DHA increase by more than 40% and by 30-20% for the 3% and 8% ALA-blend groups respectively.

However the bioconversion to DHA from pure decholesterolized milk fat (0.4% of dietary ALA) was, as good (even better) as those obtained with blends artificially supplemented with ALA, indicating that the negative impact of cholesterol is stronger than the positive one obtained with blends supplemented with ALA. The n6:n3 ratio and desaturases activities (SCD1, Delta6, determined by FA-Delta-Index) could play a role. Grants from SB-Alliance(F), Corman(Be)

**Conclusions:** For equivalent dietary content of ALA (0.8%, 3%, 8%), a reduction of dietary cholesterol did not change ALA bioavailability but induced a better bioconversion, increasing EPA+DHA-LCn-3. Compared to classical pure milk fat, cholesterol removal increased EPA+DHA in plasma and liver by more than 50%. In plasma and liver, lowering the cholesterol content induced an EPA+DHA increase by more than 40% and by 30-20% for the 3% and 8% ALA-blend groups respectively.

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## 27/885. Nutrition and Healthy Lifestyle

### **Folates: building blocks for life. Improving healthy lifestyle and good eating habits among Italian adolescents.**

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**Introduction:** "Folates: Building Blocks for Life" is a school-based nutritional intervention promoted in Italy by the Institute of Health and the National Institute of Research and Nutrition.

The aim of this programme aimed to increase the knowledge among Italian adolescents of the importance of a proper dietary intake of folates and of supplementation with folic acid in the periconceptual period to reduce congenital anomalies.

These messages included promoting good eating habits and reducing unhealthy behaviour (smoking, skipping meals, fast-food consumption, alcohol consumption).

The program included different steps:

- a) questionnaire on lifestyle and food intake
- b) questionnaire to evaluate knowledge about importance of folic acid
- c) education: dissemination of brochures, nutritionist-led courses, peer education, classroom working groups
- d) questionnaire to verify improvement in knowledge about importance of folic acid
- e) feedback forms for comments and suggestions for future activities

The initiative was carried out between 2007 and 2009 in fifty high school classes of Northern, Central and Southern Italy participating on a voluntary basis. 1,296 young adolescents completed all the questionnaires.

The study sample included 518 male and 466 female adolescents.

The results showed that educational intervention was successful: there was a significant increase in knowledge on folic acid and the importance of folates among adolescents.

The analysis of the questionnaires however was not very comforting: only 40% of Italian adolescents habitually practice physical activity and 23% are smokers. Furthermore, fruit and vegetable consumption is very low: less than 3 portions per day. Folate intake does not reach the recommended daily intake.

The results highlight the efficacy and the strong need for school-based nutritional intervention to improve eating and lifestyle habits in adolescents, even though the feedback from the teens made clear the desire for more interactive tools (e.g. video, websites) for better communication of messages.

### Optimisation of Basil extraction process considering its antioxidant properties

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**Introduction:** Basil is a widely use culinary and medicinal herb used not only for the cooking, but also in commercial fragrances and flavourings. It is widely distributed in folk medicines for its sedative, antimicrobial and antifungal properties. In terms of preventing oxidative stress, or in terms of use as preservatives in food industry, antioxidant properties of Basil extracts are of a great importance.

**Objectives:** To obtain the Basil extracts with desired and highest possible outputs of targeted compounds, total phenols and total flavonoides, objectives of this research was to explore the best possible inputs (extraction process parameters), extraction solvent and extraction temperature, that in this purpose could be used

**Method/Design:** Optimal process values of temperature and extraction solvent for obtaining the maximum content of total flavonoids in Basil extract were calculated as 63.07°C, and 60.35% ethanol. Same parameters for highest content of total phenols were 52.79°C and 82.414% ethanol. Optimal values for temperature and ethanol solution for preparation of extract with highest antioxidant activity were determined as 75.33°C and 73.66% ethanol.

**Results:** Because of highest value of all three response can not be obtained at the same process conditions, the analysis of process parameters for preparation of extract with high possible all three response is needed. All three response we can obtaine their intersection in the „second circle“. In this intersection high content of total phenols (from 17 to 18g GAE.100g), total flavonoides (from 4.5 to 5.0 g KE.100g) and high antioxidant activity of extract can be obtained.

**Conclusions:** These values are not so significantly different from calculated optimal, but input process parameters could be much lower, what could contribute to total efficiency and feasibility of industrial production.

**Key Words,** Basil, Optimisation, Extraction, Antioxidants

### Persons suffering from depression are less likely to follow a Mediterranean Diet

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**Introduction:** The Mediterranean diet (MeDiet) is characterised by high intake of vegetables, fruits, cereals, legumes, nuts and fish, moderate intake of dairy and lean meats, and sparse in sugary soft drinks or pastries. It is relatively high in fat (up to 40% of total energy intake), but with extra virgin olive oil as principal fat used for cooking. Recent publications suggest this diet could reduce the incidence of depression.

**Objectives:** The objective of this study was to compare the adherence to the MeDiet in persons with or without depression.

**Method/Design:** A cross sectional analysis was done in 7447 men and women (aged 60-80y) included in the PREDIMED study. The adherence to the MeDiet was measured by the MEDAS (Mediterranean Diet Adherence Screener) composed by 14 questions about food intakes and habits. Each question was scored 0 or 1. The score ranges from 0 to 14; the higher the score the better the adherence. This screener was developed and validated in the PREDIMED study. For the diagnosis of depression we considered the use of antidepressants.

**Results:** The prevalence of participants that used antidepressants was 25.6% (13.6% and 33.9% in men and women, respectively). The mean MEDAS score ( $\pm$ SD) in depressed persons was lower ( $p < 0.001$ ) than in the group without depression;  $8.43 \pm 2.00$  and  $8.67 \pm 2.02$ , respectively. The differences between the groups was stable when further stratifying by sex and adjusting by age and BMI ( $p < 0.05$ ).

**Conclusions:** Our results showed that persons suffering from depression are less likely to follow a MeDiet. Our cross sectional design does not allow us to draw conclusions about causality, nevertheless, we urge the promotion of this diet in the prevention of depression, a disease that might affect a quarter of the elder population.

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**27/28. Nutrition in the Management of Non-Communicable Diseases**  
**Diet and content of Copper in serum of patients with cerebral aneurysm**

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**Introduction:** Copper (Cu) is an important component of several oxidative enzymes in human metabolism. Cu has a significant role in the development and functioning of nervous system, it affects metabolism of lipids, connective and elastic tissue in membranes of blood vessels.

**Objectives:** The aim of this study was to determine serum levels of Cu in patients with cerebral aneurysm (CA) and estimate the influence of dietary habits on Cu status in examined patients.

**Method/Design:** The content of Cu in serum was determined in 78 patients (aged 16-73 years, average age 51.3±11.9) and in 22 healthy people – control group (aged 20-58 years, average age 37.1±10.9). Food-frequency questionnaires were implemented to collect the dietary data. The content of Cu in deproteinized serum was analyzed by electrothermal atomic absorption spectrometry (ETAAS) on a Z-5000 instrument (Hitachi) with Zeeman background correction. Certified reference material - Seronorm Trace Elements 0608414 was used to test the accuracy of his method. Statistical analyses were performed using Statistica 9.1 software.

**Results:** The average content of Cu in serum of patients with CA was significantly ( $p < 0.00003$ ) lower ( $0.777 \pm 0.32$  mg/L) than in the control group ( $1.132 \pm 0.41$  mg/L). We have not observed correlation between content of Cu in serum and gender, age and BMI, and we have not observed differences between content of Cu in serum of death and survive patients. Frequent consumption of ham, wholegrain bread, flour products and vegetable oil has the greatest influence on the content of Cu in serum of patients; but consumption of butter, jam, cottage cheese, tea and offal was inversely correlated with serum content of Cu. The independent variables included in the model accounted for about 66% of the variance.

**Conclusions:** Patients with CA have lower content of Cu in serum than healthy people and it depends on diet in about 66%.

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**27/59. Nutrition in the Management of Non-Communicable Diseases**  
**Effects of simultaneous supplementation of green tea and protein on energy balance**

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**Introduction:** Green tea (GT, 270mg epigallocatechin gallate+150mg caffeine/day) and protein each have been shown to stimulate diet-induced thermogenesis (DIT) and improve weight maintenance (WM) after body-weight loss.

**Objectives:** Investigation of the effect of GT added to (a high-) protein (diet), on DIT and WM.

**Method/Design:** Study 1: 35 subjects (age: 18-60 years; BMI:  $23.0 \pm 2.1$  kg/m<sup>2</sup>) participated in an experiment with a randomized, 6 arms, crossover design where DIT, and respiratory quotient (RQ) were measured for 3.5hrs. GT vs. placebo (PL) capsules were either given in combination with water or breakfasts containing milk protein (MP) in two dosages: 15 gram(15MP) (energy%P/C/F: 15/47/38; 1.7MJ/500ml), and 3.5 gram(3.5MP) (energy%P/C/F: 41/59/0; 146.4 kJ/100ml).

Study 2: A randomized placebo-controlled double-blind parallel trial in 80 overweight and moderately obese subjects, (age:  $44 \pm 2$  yrs; BMI:  $29.6 \pm 2.0$  kg/m<sup>2</sup>). A very low energy diet during 4 weeks was followed by 3 months WM; during the WM period subjects received GT or PL in addition to an adequate-protein diet (AP: 50-60 g protein/day) vs. a high-protein diet (HP: 100-120 g protein/day).

**Results:** Study 1: There was an overall significance between conditions ( $p < 0.001$ ). Post-hoc, areas under the curve (AUCs) for DIT were significantly different for GT+water vs. PL+water, GT+3.5MP and PL+3.5MP ( $P \leq 0.001$ ) and vs. GT+15MP and PL+15MP ( $P < 0.001$ ). No differences were found between PL+water, GT+3.5MP and PL+3.5MP and GT+15MP and PL+15MP.

Study 2: Subjects lost  $7.0 \pm 1.6$  kg body-weight ( $p < 0.001$ ). During the WM phase, WM, REE, fat free mass (FFM) were relatively increased, in both the HP groups and in the AP+GT group ( $p < 0.05$ ), while RQ and body-fat (FM) were reduced, all compared to the AP+PL group. Satiety was only increased in both HP groups ( $p < 0.05$ ). The GT was only effective in the AP diet.

**Conclusions:** GT as well as (a high-)protein (diet) improved energy balance independently; a possible synergistic effect failed to appear.

**Key Words:** catechins, protein, polyphenol-protein complexes, weight maintenance, energy expenditure

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**27/94. Nutrition in the Management of Non-Communicable Diseases**  
**Oxidative stress and vascular calcification in the elderly**

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**Introduction:** Low levels of fetuin A which is an endogenous liver-derived inhibitor of vascular calcification have been associated with an increased risk for cardiovascular morbidity and mortality. Oxidative stress may directly stimulate vascular calcification, the mechanism is, however, still poorly understood.

**Objectives:** This study aimed to investigate the influence of oxidative stress on the cardiovascular risk factor fetuin A in elderly people.

**Method/Design:** A total of 102 subjects (men:  $n=45$ , BMI:  $28.3 \pm 3.9$  kg/m<sup>2</sup>; women:  $n=57$ , BMI:  $27.8 \pm 4.1$  kg/m<sup>2</sup>) were re-

cruited and divided into three groups according to age: A (70-74y/n=48), B (75-79y/n=35) and C ( $\geq 80$ y/n=19). Plasma levels of fetuin A were determined with ELISA, malondialdehyde (MDA) and conjugated dienes (CD) with HPLC. Plasma concentrations of the total antioxidant capacity (TAC) and advanced oxidation protein products (AOPP) were analyzed photometrically.

**Results:** With increasing age, plasma levels of fetuin A ( $A > B$ :  $p < 0.01$ ;  $B > C$ :  $p < 0.05$ ) and TAC ( $A > C$ :  $p < 0.001$ ;  $B > C$ :  $p < 0.05$ ) decreased significantly, while oxidative parameters as MDA ( $A < C$ / $B < C$ :  $p < 0.01$ ), CD ( $A < C$ / $B < C$ :  $p < 0.01$ ) and AOPP ( $A < C$ :  $p < 0.05$ ) increased significantly. Moreover, significant negative correlations between fetuin A/MDA ( $A$ :  $r = -0.454$ ,  $p < 0.01$ ;  $B$ :  $r = -0.460$ ,  $p < 0.05$ ;  $C$ :  $r = -0.618$ ,  $p < 0.05$ ) and fetuin A/AOPP ( $A$ :  $r = -0.581$ ,  $p < 0.05$ ;  $B$ :  $r = -0.462$ ,  $p > 0.05$ ;  $C$ :  $r = -0.746$ ,  $p < 0.05$ ) were observed.

**Conclusions:** This study indicates a significant age-related increase in oxidative stress, which negatively influences the cardiovascular risk factor fetuin A and hence vascular calcification in elderly people.

**Key Words:** oxidative stress, fetuin A, vascular calcification, elderly

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### 27/160. Nutrition in the Management of Non-Communicable Diseases Analysis of patients with malnutrition

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**Introduction:** Malnutrition is a state of deficiency, which is a result of impaired food intake, maldigestion and malabsorption, and the prognosis is different depending on the etiology, the duration and the evolution of the main disease.

**Objectives:** To analyze the usual food intake of patients with chronic malnutrition who were admitted for diagnosis and treatment in the Clinic of Metabolic Diseases and Dietetics at University Hospital "Queen Jovanna – ISUL" and to compare it with their current physical and neuropsychological state.

**Method/Design:** We investigate a group of 57 malnourished patients, 46 women and 11 men, we explore their usual food intake with 24 hour re-call for 3 days period of time, also we do anthropometric measurements - bioelectrical impedance analysis with "Tanita TBF – 401A", we investigate the hand-grip strength by dynamometer "SAE-HAN". We assess the memory function by Mini mental cognitive test.

**Results:** The analyses show abnormalities of the energy intake of 45 patients (78,9%), 39 of them (68,42%) eat less than the references of the average daily energy intake according to the sex, age and physical activity. By bioelectrical impedance analysis we find out 38 (66,67%) patients with underweight and 45 (78,95%) – with reduced fat mass. Dynamometry shows values under the range to 40 patients (70,18%). The results of Mini mental cognitive test show that 28 (49,12%) patients have preserved cognitive function, 27 (47,37%) have mild disorder and 2 (3,51%) of them – moderate disorder.

**Conclusions:** Low energy value of food intake and the subsequent deficiency of macro- and micronutrients have unfavorable consequences on the normal physical and neuropsychological state of patients with chronic malnutrition.

**Key Words:** energy deficiency, malnutrition, anthropometry, cognitive test

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### 27/184. Nutrition in the Management of Non-Communicable Diseases Efficacy of six-food elimination diet in adult eosinophilic esophagitis: a prospective study

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**Introduction:** Eosinophilic esophagitis (EoE) is a chronic, immune-antigen mediated, allergic disease characterized by esophageal dysfunction symptoms and dense eosinophil inflammation. Its incidence has risen in last years but no commonly accepted treatment strategies exist at present. Endoscopic esophageal dilation and topic steroids are proposed as therapies, together with the exclusion from the diet of those responsible foods. However, dietary management remains controversial since usual allergic tests are not sensible methods to identify offending foods. The elimination from diet of those more suitable of hypersensitivity foods, also call six-food elimination diet (SFED), resulted efficient in paediatric EoE, but no data are available for adults.

**Objectives:** To define the efficacy of SFED in resolving EoE in adults.

**Method/Design:** A SFED (avoiding cereals, dairy products, eggs, nuts, legumes, fish, seafood, and soya) was set up in 44 EoE adult patients. Endoscopies and esophageal biopsies were carried out under conscious sedation after 6 weeks. If pathologic endoscopic findings and eosinophilic infiltrate resolved, sequential challenge by reintroducing every individual food and subsequent endoscopy and biopsies were repeated. A food was considered causative for EoE if inflammation recurred.

**Results:** EoE solved in 30 out of the 44 patients (75%) after SFED. Two patients discontinued the dietary reintroduction protocol, and 28 completed the study 13 patients showed sensitization to an only causative food, while in 15 two or more different foods were independently demonstrated as cause for EoE. Milk challenge was positive in 32.14% of patients, and wheat in 21.43%, being both in 14.28% of patient. Other foods were involved with lower frequency.

**Conclusions:** SFED was efficient to achieve histopathological remission in most adult EoE patients. Specific causes for EoE can be known by sequential challenge by reintroducing foods. Since repeated endoscopies and biopsies were needed, new methods for detecting causative antigens for EoE should be developed.

**Key Words:** Eosinophilic esophagitis, 6-food elimination diet, treatment, antigens

**Prebiotic approach contributes to metabolism improvement in obese women by changing the gut microbiota composition**

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**Introduction:** Gut microbiota is a novel target to take into account when assessing the influence of nutrition on energy metabolism and adiposity. Inulin type fructans (ITF) are non digestible, fermentable carbohydrates that promote changes in the gut microbiota composition, improve glucose and lipid homeostasis and decrease inflammation and adiposity in obese rodents. Few recent studies report that ITF prebiotics decrease body weight in overweight and obese humans and modulate the production of gut peptides implicated in satiety and insulin secretion. However, the link between gut microbiota modulation in obese human and the metabolic effects of ITF has not been studied yet.

**Objectives:** To study the effect of ITF prebiotics on inflammation and metabolism in obese women and to highlight correlations between these events and the changes in gut microbiota composition and metabolomic approach.

**Method/Design:** Randomized, double-blind study in obese women treated with ITF prebiotics (Synergy 1) or placebo (maltodextrin) during three months (8g twice a day). Blood, feces and urine sampling as well as OGTT, HOMA and fat mass measurement were performed before and after the treatment.

**Results:** Treatment with ITF prebiotics in obese women lead to an important modulation of gut microbiota (increase of total bacteria, bifidobacteria and lactobacilli). ITF also modulated some biomarkers related to glucose homeostasis (decreased post-OGTT glycemia and HbA1c, increased GIP) and decreased the serum level of pro-inflammatory cytokines (IL-6, TNFalpha, IFNgamma and MCP-1).

**Conclusions:** The first data suggest that the prebiotic approach is able to improve glucose metabolism and low tone inflammation in obese women. Metabolomic (1H-NMR) analysis of urines samples is in process in order to assess the relationship between microbial-related metabolites and the improvement of metabolism.

**Key Words:** prebiotics, obesity, gut microbiota, clinical study

**New nutritional challenge: lack of dietary recommendation for infancy nephrolithiasis**

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**Introduction:** Although Nephrolithiasis is a rare but a serious problem for children's health, recent data has shown that the prevalence of pediatric Nephrolithiasis has increased in both developed and developing countries. In addition, we have already reported the highest incidence of infancy Microlithiasis and Nephrolithiasis in the world, from a city at Western Asia (located at northwest of Iran). The rate of observed Nephrolithiasis was 484.1 and 514.9 times more than its incidence in New Zealand and Iceland, respectively. However, nutrition can be as either preventive or promoters factor in Nephrolithiasis.

**Objectives:** To find out updated nutritional recommendation for infancy Microlithiasis and Nephrolithiasis.

**Method/Design:** All dietary recommendations regarding prevention or treatment of infancy Microlithiasis and Nephrolithiasis (from Jan 1985 to Dec 2010) were reviewed from scientific databases and journals.

**Results:** Pediatric Nephrolithiasis might be as a result of rapid variations in eating habits. However, the number of studies on infancy Nephrolithiasis (aged less than one year) was very limited and there was not any dietary recommendation for this special aged-group.

**Conclusions:** In the case of infancy and pediatric Nephrolithiasis, our knowledge is much rare than in adults. Although nutritional demands of infants are different in compare to adults, there was not any specific dietary recommendation for those infants. Emergent population-based and case-control studies are needed to find out its etiology as well as to present applicable nutritional recommendations for those infants of developed and developing countries (by considering different local factors such as breast-feeding and availability of nutritional education).

**Key Words:** Nephrolithiasis, Dietary Recommendation, Nutritional Challenge.

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**27/324.** Nutrition in the Management of Non-Communicable Diseases

**The influence of dietary intervention on TGF- $\beta$ 1 and type IV collagen in diabetic nephropathy patients**

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**Introduction:** TGF- $\beta$  plays an integral role in the pathogenesis of diabetic nephropathy (DN), causes an increase in mesangial matrix (MM) deposition as well as glomerular basement membrane (GBM) and is the central mediator of fibrosis. Type IV collagen (IVC) is the main component of GBM and MM. It is postulated that urinary IVC can be a useful marker of renal injuries in diabetic patients. The influence of a dietary treatment on serum TGF- $\beta$  and urinary IVC in obese DN patients remains unknown.

**Objectives:** To evaluate the effects of low energy and adequate protein diet on the serum TGF- $\beta$ 1 and urinary IVC concentrations in obese patients with type 2 diabetes and nephropathy.

**Method/Design:** 16 patients with DN (mean age 67 yr; BMI 33,8; estimated glomerular filtration rate 52.5 ml.min) were studied before and after 2 months of a diet therapy (20% energy deficit, protein 0.8 - 1.0 g.kg of ideal body mass, 30% energy from fat) and body composition, serum TGF- $\beta$ 1 as well as urinary IV collagen were examined.

**Results:** Dietary treatment significantly lowered BMI ( $p = 0.005$ ), fat mass ( $p = 0.001$ ), serum TGF- $\beta$ 1 concentration ( $p = 0.001$ ) and urinary IVC excretion ( $p = 0.032$ ). Alterations in fat mass, serum TGF- $\beta$ 1 concentration and urinary IVC excretion correlated negatively with its baseline value ( $r = -0.590$ ,  $p = 0.021$ ;  $r = -0.506$ ,  $p = 0.045$ ;  $r = -0.731$ ,  $p = 0.001$ - respectively) indicating the strongest effect of dietary treatment in the patients with highest initial TGF- $\beta$ 1 level and urinary IVC excretion.

**Conclusions:** Low energy diet with protein intake of 0.8-1.0 g.kg body mass has a positive effect on serum TGF- $\beta$ 1 level as well as urinary IVC excretion and thus will have a positive effect on the inhibition of renal fibrosis in obese DN patients.

**Key Words:** Diet, Cytokines, Type Iv Collagen, Diabetic Nephropathy

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**27/403.** Nutrition in the Management of Non-Communicable Diseases

**Whole grains in weight management - a systematic review of randomized human intervention studies**

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**Introduction:** The role of whole grains in health and disease has become clearer in some cases. but still generates controversy in others. Overweight and obesity are key features of the metabolic syndrome and closely linked to risk of disease development. thus with obesity and overweight reaching epidemic levels. wholegrain-rich foods have received increased attention for their potential role in weight regulation. A high intake of wholegrain foods has consistently been associated with a smaller weight gain in prospective observational studies.

**Objectives:** The aim of the present review was to assess the effects of whole grains on body weight in adults. including the effect of the individual grains (oat. barley. wheat. rice. rye).

**Method/Design:** We conducted a systematic literature search in PubMed. The search period was set between January 1980 and March 2011. The reference lists of all included studies and of review articles were screened in order to identify additional studies of interest. Selection criteria included original research articles. as well as short communications. written in English. Trials were included in the review if they were controlled randomised trials of whole grains for a minimum of four weeks duration in adults. Authors of included studies were contacted for additional information on body weight and grain type and amount where appropriate.

**Results:** Twenty five trials met the inclusion criteria. Analyses indicated that whole grains do not result in a significantly greater weight loss compared with control although the estimated amount of whole grains administered in most trials exceed that of current national recommendations.

**Conclusions:** There is little evidence from randomized trials that whole grains are more effective than control in prevention or treatment of overweight and obesity. However. many trials to date have not aimed specifically at assessing effects on body weight and study designs have been variable.

**Key Words:** whole grain. obesity. body weight. cereal

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**27/461.** Nutrition in the Management of Non-Communicable Diseases

**Reasons for poor weight loss and drop-out during very-low-energy diet treatment**

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**Introduction:** In obesity treatment programmes. very-low-calorie diets (VLED) can replace all ordinary foods for 12–16 weeks to enhance weight reduction. However. while some patients find VLED treatment convenient. others face various problems. Few studies have described patients' experiences during VLED treatment and little is known about reasons for VLED failure.

**Objectives:** To examine reasons for VLED failure.

**Method/Design:** 267 patients (177 women, 90 men, mean (SD) age 40.2 (9.7), BMI 41.9 (6.4) kg.m<sup>2</sup>) participating in an obesity intervention study including a 12-w VLED. Attrition or weight loss smaller than 10% of initial weight at week 12 was classified as VLED failure. After known outcome, patients with VLED failure were contacted for a telephone interview. Interviews were also conducted with a subsample of patients with successful VLED outcome. Open, indirect questions were asked concerning diet convenience, perceived difficulties related to the diet, and perceived wellbeing during treatment. Patient's reflections were written down and one main VLED failure description was identified by the interviewer. Similar problems were grouped in categories and counted.

**Results:** Interviews were carried out with 87 of the 96 patients who failed treatment (91%). Six categories of failure reasons were identified: illness-related (n=24), hunger and VLED aversion (n=22), mood effects (n=15), no cause given (n=10), miscellaneous (n=9), and critical life events (n=7). In the 31 interviewed patients with successful outcome (31 of 171, 18%), reported VLED experiences were: uncomplicated (n=15), critical life events (n=8), mood effects (n=4), hunger (n=2), repeated infections (n=1), and social problems (n=1). VLED failure rates did not differ between women and men (37% versus 33%, p=0.59).

**Conclusions:** Various co-morbidities and negative mood effects were commonly reported problems in patients with VLED failure. This highlights the need of careful monitoring and that a clinical measure of psychiatric morbidity should be included when treating severely obese patients with VLED.

**Key Words:** Obesity, Weight loss, VLED, Outcome, Interview,

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### 27/479. Nutrition in the Management of Non-Communicable Diseases **Vitamin D status in healthy volunteers during autumn and winter**

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**Introduction:** During the last years, vitamin D has gained considerable interest beyond bone health. A number of studies have shown that vitamin D deficiency is common, and may be related to risk factors of cardiovascular disease.

**Objectives:** This study was a pilot study to assess the association of vitamin D deficiency with cardiovascular risk factors in healthy subjects, and to investigate the contribution of vitamin D<sub>2</sub> to serum vitamin D status. In addition, subjects had the possibility to participate in a vitamin D supplementation trial on different forms of vitamin D. (This part was not completed at the abstract deadline).

**Method/Design:** We measured vitamin D status as 25(OH)D<sub>3</sub> and 25(OH)D<sub>2</sub> in healthy volunteers (n=119, aged 19-67 years,

mean age 34 years). 25(OH)D<sub>3</sub> and 25(OH)D<sub>2</sub> were measured using a LC-MS/MS method. Participation in the DEQAS quality assurance programme revealed good agreement with other laboratories. One quarter of the subjects were overweight or obese (BMI > 25 kg.m<sup>2</sup>). The average BMI was 23±4 kg.m<sup>2</sup>, and systolic and diastolic blood pressure were 120±14 mmHg and 77±9 mmHg, respectively.

**Results:** The mean 25(OH)D level in November was 18±8 ng/ml, and in January it was 15±7 ng/ml. In November, 66% of the subjects had serum levels lower than 20 ng/ml, and in January, 79% of the subjects had serum levels lower than 20 ng/ml. 25(OH)D<sub>2</sub> was only measured at concentrations below the detection limit of 5 ng/ml. There was no association with the body mass index, systolic or diastolic blood pressure in this group.

**Conclusions:** This study showed an alarming degree of vitamin D deficiency in healthy volunteers during the winter. The failure of an association with BMI and blood pressure is probably due to the relatively low age of our study groups, and the BMI and blood pressure within the reference ranges, combined with a low variance of these parameters.

**Key Words:** Vitamin D, cardiovascular risk factors

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### 27/485. Nutrition in the Management of Non-Communicable Diseases **Study of the effect of hazelnut on lipid profile. Apob, ApoA-1, Hs-crp. Serum paraoxonase-1 activity in type 2 diabetic patients**

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**Introduction:** Diabetic dyslipidemia can be considered as one of the important risk factors of cardiovascular disease episodes, which its control and management has been under intensive research. It has been reported that seeds have positive effects on lipid profiles of these patients.

**Objectives:** To study the effect of hazelnuts on fasting blood glucose, insulin levels and lipid profile of type 2 diabetic patients.

**Method/Design:** In a randomized clinical trial, following approval by University Ethics Committee, 50 type 2 diabetic patients (34 females and 16 males) aged: 55.60±7.74 and BMI: 28.32±3.53 kg.m<sup>2</sup> referring to Tehran University of Medical Sciences' Institute of Endocrinology and Metabolism were allocated to the control group (n=25) and intervention group (n=25) in which 10% of daily energy intake was replaced by hazelnut (approximately 30 grams), using a Blocked Randomization Method. 10 ml fasting blood was withdrawn before



and after 8 weeks of trial from each subject. Fasting blood glucose, hs-CRP, insulin levels, lipid profile (TC, LDL-c, HDL-c and TG), ApoB, ApoA-1, Total Antioxidant Capacity (TAC), Paraoxonase-1 (PON-1) activity, systolic and diastolic blood pressure, anthropometric indices (weight, height, BMI, waist circumference) were measured and intake questionnaire (24 hours recall) were obtained. Data were processed using SPSS software version 15.

**Results:** After 8 weeks intervention, HDL-c levels of hazelnut group was significantly higher than control group ( $P=0.01$ ). In the control group itself, the same parameter was significantly increased at the end of trial, as well ( $P=0.003$ ). There were no significant changes of other aforementioned measured parameters after hazelnut intervention compared to control group.

**Conclusions:** Based on our study, substitution of 10% of daily energy intake with Hazelnut in type 2 diabetic patients can improve HDL levels. However further research recommended.

**Key Words:** Hazelnut, Type 2 Diabetes, Lipid Profile, Paraoxonase-1

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### 27/534. Nutrition in the Management of Non-Communicable Diseases **Influence of chemotherapy on the nutritional status, Body composition and quality of life in breast cancer**

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**Introduction:** Breast cancer is the second type of cancer that affects the Brazilian population and the leading cause of death among women. Adjuvant chemotherapy has been linked to changes in nutritional status, because it can modify the weight and body composition, and contribute to the development of food aversions and changes in quality of life

**Objectives:** To evaluate the impact of chemotherapy on the nutritional status, food intake and quality of life in breast cancer women.

**Method/Design:** Were assessment 25 patients, 46(9) years, pre and post-menopausal women with breast cancer in clinical staging I and II, of Hospital AC Camargo - Sao Paulo, at T0-before chemotherapy; T1-the end of chemotherapy and T2-two months after chemotherapy. Were conducted: nutritional assessment (weight, body mass index and body composition), evaluation of food intake with three 24-hour records (24HR), of food aversion and quality of life.

**Results:** Chemotherapy was associated with increased on weight (2.2 kg,  $p < 0.0001$ ). This variation was confirmed by differences in BMI (1.0 kg.m<sup>2</sup>,  $p = 0.00$ ) and increased the percentage of obese patients (4%) after chemotherapy (T1 and T2. Between T1 and T2, we found a significant increase in fat percentage (1.5%,  $p = 0.013$ ). The phase angle showed a decrease (-0.40,  $p = 0.00$ ). There was significant reduction in food consumption of fruit and juice group ( $p = 0.03$ ) and 52% of patients cited at least one food or group as indicative of aversion. Quality of life reduction was observed in the aspect of

physical well-being (-3.5,  $p = 0.00$ ). Nutritional status was not significantly correlated with quality of life.

**Conclusions:** Combination chemotherapy in women with breast cancer caused weight gain associated with the reduction in phase angle. These variables, associated with changes in food consumption and reduced quality of life aggravate the clinical and social prognosis of this population.

**Key Words:** Breast cancer, chemotherapy, nutritional status, life quality

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### 27/578. Nutrition in the Management of Non-Communicable Diseases **Influence of excessive weight on lipid profile in recyclable material collectors in Brazil**

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**Introduction:** In Brazil there are about 200 000 recyclable material collectors who work without receiving employment benefits and face economic hardship, but many are organized into cooperatives with the objective of improving working conditions and economic. Allied to this, Brazilian studies show that excess weight increased in low-income population.

**Objectives:** To determine the prevalence of excess weight and alteration in lipid profile and the association between them in a population of economic and social vulnerability.

**Method/Design:** Cross-sectional descriptive study with 118 collectors of recyclable material coming from six cities in the northwest of Paraná, Brazil. The outcome was the excess weight (overweight and obesity) by body mass index (BMI) and the other variables was the lipid profile (T-Col, HDL-cholesterol, LDL-cholesterol and triglycerides). Statistical analysis was performed using Epi Info by Odds Ratio (OR) with confidence interval 95% (CI95%), being used to analyze possible associations between BMI and lipid profile.

**Results:** The sample consists of 89.8% adults, 64.4% women, 61.8% non-white and 57.6% with less than 4 years of schooling. The excess weight was identified in 40.8% and lipid profile showed that 6.7% was alteration for LDL-cholesterol, 14.4% for triglycerides, 38.9% for HDL and 27/1% for Col-T. The OR showed an association between excess weight and abnormal lipid levels of triglycerides, HDL-cholesterol and Col-T respectively 2.37 (CI95% :0.75-7.63), 1.4 (CI95% : 0.62 to 3.18) and 1.26 (95% CI 0.51 to 3.12).

**Conclusions:** The results show that excess weight and lipid changes are present in the sample and that there is risk association between outcome and triglycerides, HDL-cholesterol and Col-T.

**Key Words:** overweight, low-income population, recyclable material collectors

27/607. Nutrition in the Management of Non-Communicable Diseases

### Treatment of a nutritional disease -Type II Diabetes Mellitus - by Indigenous Plants in Bangladesh: An Assessment

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**Introduction:** Death due to chronic diseases is increasing in an alarming rate in Bangladesh. The prevalence of diabetes is significantly higher in the urban than in the rural community of Bangladesh. Plants have always been an exemplary source of drugs, and ethnobotanical information reports about 800 plants that may possess anti-diabetic potential. Thus, a study was initiated, in collaboration with the Department of Nutritional Medicine, Technical University of Munich and Eminence to assess the status of treating type II diabetes using traditional plants in Bangladesh.

**Objectives:** Describe the use of indigenous plants for the treatment of type II diabetes in Bangladesh.

**Method/Design:** The study followed cross-sectional design using qualitative method for data collection. It covered both rural and urban areas and conducted 65 interviews with relevant stakeholders i.e. The study also followed review of relevant literatures from relevant national & international journals and used search engines. i.e. pub-med.

**Results:** The findings revealed that the use of traditional plants was a widespread phenomenon in both urban and rural areas in Bangladesh. Diabetic patients mostly are using modern drugs prescribed by qualified and specialized doctors as well as home-made remedies and herbal plants. Plants prescribed by street-healers, private practitioners, and qualified indigenous medical graduates were similar to some extent. Highly used plants were *Swietenia mahagoni* (popularly known as Mehogony), *Tinospora cordifolia* Hook (popularly known as Gulancha Lota), *Syzygium cumini* Linn (Black Berry or Kalo Jam), *Coccoloba indica* Cogn (Ivy Gourd or Telekucha), *Azadirachta indica* A Juss (Neem). Poor and long duration patients are main consumers for these herbal drugs. Plants and medicines are similar in China, India, and other developed countries.

**Conclusions:** The use of traditional plants seems to be a widespread practice in Bangladesh, and many practices match with those from developed world.

**Key Words:** Herbal medicine, Plants, Traditional, Type II diabetes, Bangladesh

27/622. Nutrition in the Management of Non-Communicable Diseases

### oHo®. A formulation of olive oils. Shows potent antiatherogenic activities in inflammatory conditions in humans

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**Introduction:** Due to chronic inflammation and dyslipidemia, patients with chronic kidney disease (CKD) are at the highest risk of cardiovascular disease (CVD). Mixtures of diverse olive extra virgin oils (OOs) exhibit more potent antioxidant and anti-infectious in vitro activities than each particular OO. oHo® (Bioaveda, Spain) is the first rational standardized formulation of at least 3 different organic Spanish OOs.

**Objectives:** To evaluate the anti-inflammatory and antidyslipidemic activities of oHo formulation in CKD patients.

**Method/Design:** As reported elsewhere (Pérez-Bañasco V. et al. *Nefrología* 2007;27:472-81, Segura-Torres P. et al. XXXIX Congr SAN. Jaén 7-9 abr 2011, Villarrubia VG. et al. *Actas Dermosifiliogr* 2010;101:585-99), 19 CKD patients at predialysis (PD), and 15 at hemodialysis (HD), received oHo for 30 or 60 consecutive days at respective doses of 50 or 60 ml.day. Twelve CKD patients at PD, and 10 at HD, received conventional OOs in a similar schedule of treatments. Lipid and cytokine serum profiles were measured at baseline and at the end of treatments (days 30 or 60 respectively).

**Results:** Only patients taking oHo showed (a) significant increases of HDL-cholesterol, IL-10, IFN-gamma and insulin growth factor binding protein-3 (IGFBP-3) serum levels (b) significant decreases of total cholesterol, LDL-cholesterol, lipoprotein(a) [Lp(a)], IGF-1, IGFBP-3 and TNF-alpha serum levels. Decreases of triglycerides, IL-6 and IL-12 serum levels were also seen in 77% of patients. IGF-1 remained unchanged. Constipation disappeared in 92.5% of patients taking oHo, and skin xerosis (dry skin) highly improved in these patients.

**Conclusions:** The intake of oHo reverses dyslipidemia and diminishes the inflammatory-atherogenic state in CKD patients. Due to dramatic decreases of constipation and xerosis, the quality of life was significantly ameliorated in all patients taking oHo. Results on Lp(a) and IGFBP-3 are exciting, and deserve of further investigations in the respective fields of atherogenesis or cancer. No side effects were seen.

**Key Words:** Olive-Oils, Hdl-Cholesterol, Lipoprotein A, Il-10, Igfbp-3

### Association of metabolic syndromes features with biochemical markers and dietary intakes

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**Introduction:** Metabolic syndrome is probably the most common coronary risk factor. Researchers are not sure whether metabolic syndrome is due to one single cause. but all of the syndrome's risk factors are related to obesity.

**Objectives:** There are few data to look at the association between the features of metabolic syndrome and biochemical markers and dietary intake. Therefore. we wish to investigate the association between number of metabolic syndrome's features (from 0 to 5 criteria) and biochemical markers and dietary intakes.

**Method/Design:** This cross-sectional epidemiologic study was conducted among 748 men aged 20-69 years old who were employees of Shahid Hasheminejad Gas Processing Company (S.G.P.C) northeast of Iran. We categorized them into six groups from cases without any criteria to cases with all five criteria which includes zero criteria (n=100.13.4%). one criteria (n=195.26.1%). two criteria (n=198.26.5%). three criteria (n=160.21.4%). four criteria (n=68.9.1%) and five criteria (n=27/3.6%). Demographic and anthropometric data and also biochemical markers including lipid profile. Fasting Blood Sugar (FBS). cell blood count. High Sensitive C-Reactive Protein (hsCRP) were measured for all subjects. Diagnosis of metabolic syndrome was done by the International Diabetes Federation criteria.

**Results:** The analysis of biochemical factors and dietary shows a step-by-step growth from subjects without any criteria to subjects with all 5 criteria in many factors such as age. uric acid. white blood cells (WBC). weight and body fat percentage (p<0.001) also hsCRP. red cell distribution width (RDW) (negative growth). nightly sleep. selenium and carotene dietary intake (p<0.05). As it would be expected

the metabolic syndrome criteria including systolic and diastolic blood pressure. waist circumference. HDL-cholesterol. triglyceride and FBS become worsen gradually.

**Conclusions:** An increase in the number of metabolic syndrome's features was associated with age. uric acid. WBC. weight. body fat percentage. RDW. nightly sleep. selenium and carotene dietary intake. Therefore. more attention must be put on these risk factors in subjects with metabolic syndrome.

**Key Words:** Metabolic Syndrome, Biochemical Markers and Dietary Intake,

### Health professionals, undernutrition and nutritional supplements in oncology: A Pilot Survey

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**Introduction:** The link between cancer and nutrition has been well established

**Objectives:** Our aim was to appraise the knowledge of oncology health professionals (HP) about undernutrition & nutritional supplements (NS). & assess how their use was valued

**Method/Design:** Arbitrary population of 103 HP in Portugal: 36% oncologists. 15% paediatric oncologists. 50% nurses. Statistics: frequency analysis. chi-square test; significance established at p<0.05.

**Results:** For HP undernutrition was mainly related to cancer(95%). deficient intake(88%). psychiatric diseases(86%). p<0.001; 85% HP considered undernutrition to increases cancer severity (p<0.002). Also. 42% physicians & 49% nurses assessed all their patients' nutritional status. p<0.05. Once undernutrition was diagnosed. special measures were undertaken: 80% nurses reported patients to their physician. p<0.05; 69% physicians & 65% nurses emphasized the importance of a "healthy diet" (p<0.01); 46% physicians and 45% nurses advised the use of NS(p<0.05); 89% physicians were NS prescribers & based their choice on composition (100%). taste (96%) & energy value (94%).p<0.002. For 82% HP. cancer specific supplements were important. but most said that they were only used by <50% patients; reasons being cost (30%) & lack of information on NS (20%). The better known NS were Fortimel®(86%). Forticreme®(21%) and FortiCare®(15%).

**Conclusions:** For these HP. cancer is a major risk factor for undernutrition & nutritional deterioration worsens the disease; half of these HP assess patients' nutritional status & attempt to improve their nutritional intake. For these professionals. NS' prescription should be determined by composition & taste. but price was a major limitation for their use. National Health Service subsidisation of NS would allow their cost reduction. crucial for the implementation of an effective nutritional therapy.

**Key Words:** undernutrition, cancer, health professionals, nutritional supplements

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**27/817.** Nutrition in the Management of Non-Communicable Diseases  
**Undernutrition and nutritional supplements in oncology: What do family and caretakers know?**

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**Introduction:** In cancer, caretakers play a central role in the prevention or treatment of undernutrition.

**Objectives:** We aimed to assess caretakers' awareness regarding undernutrition & nutritional supplements (NS) in oncology, to assess the relevance given to NS.

**Method/Design:** An arbitrary population of 394 adult caretakers of cancer patients was interviewed. Statistics: frequency analysis, chi-square test; significance established at  $p < 0.05$ .

**Results:** 65% defined undernutrition as a deranged food intake ( $p < 0.01$ ) & 57% view cancer patients at a higher undernutrition risk ( $p < 0.05$ ). For 69% disease severity increased in undernourished patients ( $p < 0.01$ ); for 82% undernutrition decreased anti-neoplastic treatments' efficacy & increased other complications susceptibility ( $p < 0.002$ ) & for 59% it increased the risk of mortality ( $p < 0.02$ ). Only 35% were satisfied with the nutrition information received & learning how to prevent undernutrition was perceived as a priority ( $p < 0.01$ ). NS existence was known by 79% ( $p < 0.003$ ), but seldom characterized; only 14% knew cancer NS ( $p < 0.001$ ). Major limitations for low NS consumption were price (60%,  $p < 0.009$ ) & lack of information (57%,  $p < 0.01$ ). For the majority (87%) diet was the best treatment for undernutrition, but NS were considered important ( $p < 0.001$ ) & 91% would use NS if they were advised to,  $p < 0.002$ .

**Conclusions:** The lack of knowledge about nutrition & prevention of undernutrition among these caretakers is obvious. It is essential to provide information about the consequences of undernutrition & on how to improve nutritional intake. Supplements can be an effective strategy when intake is limited though cost can be limiting.

**Key Words:** undernutrition, cancer, nutritional supplements, caretakers

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**27/842.** Nutrition in the Management of Non-Communicable Diseases  
**The beneficial effect of some proposed functional foods in adjuvant arthritis**

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**Introduction:** Adjuvant arthritis is an animal model that closely resembling rheumatoid arthritis in human. It is a successful working model used to study new anti-inflammatory agents. In previous studies (animal and clinical) we have shown that evening primrose oil and alcoholic extract of date fruits and fenugreek seeds have anti-inflammatory activity and that the alcoholic extract of date has antioxidant activity.

**Objectives:** Based on these studies, the aim of the present research was to prepare 5 functional foods containing such bioactive fractions separately or in combination and to evaluate them in adjuvant arthritis in rats, study the stability of bioactive ingredients and evaluate their sensory properties.

**Method/Design:** The studied biochemical parameters were erythrocyte sedimentation rate, erythrocyte superoxide dismutase, plasma glutathione peroxidase, copper, zinc and interleukin 2. Nutritional parameters including body weight gain, food intake and food efficiency ratio were followed during feeding the functional foods. The assessed bioactive ingredients were total phenolic contents and polyunsaturated fatty acids.

**Results:** showed improvement of biochemical parameters, body weight gain and food efficiency ratio of arthritic rats fed on the functional foods with different degrees. Functional food containing date extract with primrose oil was superior. All the prepared functional foods were sensory accepted. The active ingredients showed stability during storage.

**Conclusions:** All the tested functional foods showed promising anti-inflammatory activity and were accepted through sensory evaluation recommending their potential beneficial use as dietary supplements in rheumatoid arthritis patients.

**Key Words:** Functional food, adjuvant arthritis, primrose oil, date fruit and fenugreek seed.

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**27/868.** Nutrition in the Management of Non-Communicable Diseases  
**Assessment of nutritional status of critical patients**

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**Introduction:** The nutritional status of hospitalized patients interferes with their clinical evolution and malnutrition contributes to increased mortality. Studies that most ready develops or enhances

the deterioration of their nutritional status during the course of hospitalization. In the Intensive Care Unit (ICU) malnutrition can occur in 30% to 50%. Therefore, nutritional therapy aims to prevent major loss of lean body mass and maintaining body weight.

**Objectives:** Delineate the clinical profile and nutritional status of patients admitted to the ICU and coronary general in a hospital in Santos, Brazil.

**Method/Design:** Retrospective study by analyzing the records of nutritional assessment applied to all patients admitted between January to December, 2010. The characterization of the nutritional status was done by the Body Mass Index. In addition, data were checked for sex, age, clinical diagnosis and principal use or not of enteral nutrition therapy.

**Results:** Elected to 107 patients, of whom 60% were female and 40% male. As for age, there was prevalence of elderly (58%), while 38% of the sample showed 22 to 59 and only 4% were younger than 21 years. The conditions of entry were presented more related to cardiology (23%), nephrology (18%), neurology (15%) and digestive (14%). Others such as respiratory diseases, cancer, infectious disease and hepatology, had summed up 30% of the sample. Most analyzed (65%) were on enteral nutrition therapy. It was found that the nutritional status of ICU admission was studied in half the normal weight, underweight and overweight in 29% to 21%

**Conclusions:** The nutritional status of hospitalized patients is part of their comprehensive care. When it comes to critical patients special attention should be given, considering that the prevalence of malnutrition is a common problem among these. Hence the importance of adequate nutritional therapy, once set up, preferably early, avoid the deleterious effects to patients.

**Key Words:** Nutritional Status, Intensive Care Unit, Critical Patients.

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### 27/888. Nutrition in the Management of Non-Communicable Diseases **Immunoreactivity to gliadin and milk proteins in patients with metabolic syndrome**

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**Introduction:** Low grade, subclinical chronic inflammation correlates significantly with features of the metabolic syndrome. Immunoreactivity to food antigens is recently proposed as one of the factors involved in low grade inflammation. It is also linked to other chronic diseases such as chronic fatigue, migraine, gastrointestinal disturbances, depression.

**Objectives:** The aim of this study was to investigate the levels of IgA, IgG and IgE antibodies to gliadin and milk proteins in patients with metabolic disease, participating in a weight loss program and to determine correlation with biochemical parameters, weight loss

dynamics and compliance.

**Method/Design:** Thirty patients with metabolic syndrome (according to WHO criteria) including obesity (BMI $\geq$ 30) and thirty healthy people without any of symptoms of metabolic syndrome were included in study. Levels of serum IgA, IgG and IgE antibodies to gliadin and milk proteins were determined by home-made ELISA test. Weight loss dynamics and compliance were followed during the period minimum 2 months. Diet regimen was based on low calories, low fat diet.

**Results:** The levels of IgA, IgG and IgE antibodies to gliadin and milk proteins were higher in patients with metabolic syndrome in comparison to controls ( $p < 0.005$ ). The increased immunoreactivity to gliadin was found in 12 out of 30, and to milk in 7 out of 30 patients. There is no correlation of detected immunoreactivity with parameters of lipid status, but all patients with elevated IgA, IgG or IgE levels were in the group of patients with poor dynamics of losing weight and compliance.

**Conclusions:** Elevated levels of IgA, IgG or IgE antibodies to milk and gliadin in patients with metabolic disease and their correlation with weight loss and compliance indicate that simple home-made ELISA test could provide information that could benefit patients, outcome of the weight loss program and elucidate putative mechanisms of scoped interactions.

**Key Words:** Metabolic Syndrome, Immunoreactivity, Gliadin, Milk

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### 27/977. Nutrition in the Management of Non-Communicable Diseases **High prevalences of hypertriglyceridemia and stunting in HIV infected children from El Salvador**

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**Introduction:** Hypercholesterolemia and hypertriglyceridemia in healthy childhood and adolescence may result in an increased risk of cardiovascular disease in adulthood. The HIV infected children and adolescents are at particular risk because the virus itself and the antiretroviral treatment (ARV) can cause such metabolic disorders. However, epidemiological studies on this particular population are very scarce.

**Objectives:** To describe the nutritional status and prevalence of dyslipidemias in the children infected by VIH-1 in El Salvador, and to identify the associated risk factors.

**Method/Design:** Fasting triglycerides, cholesterol and glucose tests as well as anthropometric assessments were performed to the 339 children (0-18 years old) infected by HIV-1 attended at the children

HIV reference center in El Salvador (CENID). Dyslipidemias and nutritional status were defined according to international references. Logistic regression models were used for the identification of associated risk factors.

**Results:** Cholesterol results were obtained in 301 patients, triglycerides in 262 and glucose in 295. Mean age was 9.3 years (3.7 SD) and sex distribution even. 26.3% of the children were identified as being stunted. 2.9% as being wasted. 8% as being overweight and 2.4% as being obese. Hypertriglyceridemia was diagnosed in 50.4% of the children, hypercholesterolemia in 11.2% and hyperglycemia in 2.1%. Associated factors with hypertriglyceridemia were increasing Body Mass Index for Age Z Score (BMAZ) [odds ratios (95% CI): 1.36 (1.03, 1.80)] and being treated with protease inhibitors [odds ratios (95% CI): 7.77 (4.00, 15.07)]. This last factor was the only one found to be associated with hypercholesterolemia [odds ratios (95% CI): 2.72, 11.92]. No significant association was found with age, gender, duration of treatment, or being overweight or obese.

**Conclusions:** More than 50% of the HIV infected children analyzed present hypertriglyceridemia. Treatment with protease inhibitors seems to be the most important risk factor although nutrition may also be playing an important role. Further research on the subject is encouraged in order to understand the etiology of the problem and to propose effective treatment and prevention strategies for its management.

**Key Words:** Hypertriglyceridemia, hypercholesterolemia, HIV, children and adolescents,

problems. Some studies with children have reported an inverse association between dietary calcium intake and adiposity.

**Objectives:** To analyze the association between nutritional factors and body fat percentage (%BF) in pre-school children.

**Method/Design:** This study was a cross-sectional analysis. It was observed a total of 240 children (131 boys) aged 3-7y. In all children, anthropometric measurements were recorded (weight, height, biceps, triceps, subscapular and suprailiac skinfolds). Children's food intake was reported in a 3-day food record. The %BF was calculated using Westrate and Durenberg equation. Calcium intake was expressed as the calcium-to-protein ratio. Data was analyzed separately for girls and boys, and linear regression analysis was used to estimate the association between calcium intake and %BF adjusting for energy intake and potential confounders.

**Results:** The prevalence of overweight/obesity was 45.4% (boys: 40.5% and girls: 51.4%,  $P>0.05$ ). Participants had a %BF mean of  $20.1\pm 5.5\%$  (boys:  $17.9\pm 4.9\%$  and girls:  $22.9\pm 4.7\%$ ,  $P<0.05$ ), a calcium intake mean of  $61.7\pm 376.3\text{mg}$  (boys:  $884.2\pm 382.8\text{mg}$  and girls:  $833.1\pm 367.9\text{mg}$ ,  $P>0.05$ ) and a calcium-to-protein ratio mean of  $10.8\pm 4.4\text{mg}$  (boys:  $10.9\pm 4.4$  and girls:  $10.8\pm 4.4$ ,  $P>0.05$ ). Calcium-to-protein ratio was significantly associated with %BF in boys, even after adjusting for age, energy intake, dietary fiber, and body mass index (boys:  $\beta = -0.128$ ,  $P<0.05$  and girls:  $\beta = 0.111$ ,  $P>0.05$ ).

**Conclusions:** In our sample, calcium intake seems to be inversely related to %BF in boys. Further studies are needed to test the effects of dietary calcium intake on body fat mass in pre-school children.

**Key Words:** dietary calcium intake; pre-school children; body fat mass.

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## 227/66. Nutrition in the Prevention on Non-Communicable Diseases

### Association between calcium intake and body fat among pre-school Portuguese children

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**Introduction:** Obesity is the condition in which abnormally large body fat mass accumulates and causes a broad range of health

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## 27/124. Nutrition in the Prevention on Non-Communicable Diseases

### Immuno-modulating properties of $\beta$ -glucans from different sources on THP-1 macrophages

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**Introduction:**  $\beta$ -Glucans are one of the main components in the cell walls of cereals, plants, fungi and yeasts. Most  $\beta$ -glucans are considered as nondigestible carbohydrates and as Pathogen-Associated Molecular Patterns (PAMPs). These PAMPs can be recognized by Pattern Recognition Receptors (PRRs), for instance Toll-Like Receptors (TLRs) on innate immune cells like macrophages, neutrophils and natural killer cells. The immunomodulating effects of  $\beta$ -glucans on human and animals are mediated via the innate immune system resulting in up-regulation of cytokine genes and stimulation of humoral and cell mediated immunity.

**Objectives:** In this study, we investigated immunomodulating

properties of  $\beta$ -glucans extracted from different sources on THP-1 monocyte-derived macrophages.

**Method/Design:** Gene expression kinetics of pro- and anti-inflammatory genes of THP-1 macrophages stimulated with different  $\beta$ -glucans were analyzed using Real Time-PCR. Fold induction or suppression of pro- and anti-inflammatory gene expression from pre-incubated THP-1 macrophages with  $\beta$ -glucans prior to lipopolysaccharide (LPS) exposure and co-stimulated THP-1 macrophages with  $\beta$ -glucan together LPS were investigated and compared. Expression of  $\beta$ -glucan receptor genes were also analyzed.

**Results:** Chemical composition of extracted  $\beta$ -glucans from different sources and commercially purchased  $\beta$ -glucans were investigated. Exposure of THP-1 macrophages to  $\beta$ -glucan extracts up-regulated expression of pro- and anti-inflammatory genes. Different gene expression patterns were observed from different  $\beta$ -glucan extracts applied. Pre-incubation THP-1 macrophages with  $\beta$ -glucan and co-stimulation THP-1 macrophages with  $\beta$ -glucan and LPS showed different stimulatory effects. Subtle up-regulation of  $\beta$ -glucan receptor genes were observed in our study.

**Conclusions:** Our findings suggested that different  $\beta$ -glucan can have different immuno-stimulatory function towards innate immunity. As a next step, the in vitro observed  $\beta$ -glucan specific effects should be studied in vivo using dietary products with maintained bioactivity in order to support the hypothesis that  $\beta$ -glucans are effective in enhancing immune function and reducing susceptibility to inflammation.

**Key Words:**  $\beta$ -glucan, THP-1, immunomodulation

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**27/186.** Nutrition in the Prevention on Non-Communicable Diseases  
**Iodine status among children in two Belgian regions is associated with prevalence of thyroid diseases**

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**Introduction:**

**Objectives:** To explore whether there are regional differences in iodine status and in prevalence of thyroid diseases in the two main regions of Belgium.

**Method/Design:** A national survey of iodine status among children (6-12 years) was performed in winter 1998, based on the determination of thyroid volume and urinary iodine concentrations. The study showed a median urinary iodine concentration of 80  $\mu\text{g/L}$  and a goiter prevalence of 5.7% (mild iodine deficiency). The raw data of this survey were reanalyzed to explore regional differences. The total number of thyroidectomies, carried out for multinodular goitre (MNG) or solitary nodules was obtained from the Minimal Clinical Summary (MCS) hospital discharge database. Percentage of people with thyroid diseases going to the general practitioner or the specialist was assessed by means of data about the number of adults using

anti-thyroid medications. Food consumption patterns for both regions were explored using national food consumption data from 2004.

**Results:** In Flanders, median urinary iodine concentration (UIC) was higher than in Wallonia; 84  $\mu\text{g.l}$  (n=1316) and 78  $\mu\text{g.l}$  (n=1268) respectively (p<0.001). There were no differences in goitre prevalence and thyroid volume between the regions among children. Data from the food consumption survey showed a significant higher consumption of fish, crustaceans and molluscs in Flanders (27 $\pm$  15 g.day; n=1923) compared to the Walloon region (20  $\pm$  10 g.day; n=1160). Further it was observed that the number of thyroidectomies, carried out for MNG or solitary nodules, and the use of anti-thyroid medication was significantly higher in the Walloon region than in Flanders (p<0.001).

**Conclusions:** Iodine status in children was found slightly different in both regions of the country. This finding is in agreement with a higher incidence of thyroidectomies and more extensive use of anti-thyroid medications in the adult population in the region with the lowest iodine excretion.

**Key Words:** Iodine deficiency, children, thyroid diseases, Belgium

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**27/187.** Nutrition in the Prevention on Non-Communicable Diseases  
**Iodine status among children in Belgium: before and after salt in bread iodization**

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**Introduction:** Several surveys during the last 50 years repeatedly indicated that Belgium is affected by Mild Iodine Deficiency (MID). In the scope of the National Plan for Nutrition and Health, a selective, progressive and monitored salt iodisation program was launched. Salt in the production of bread is systematically iodized.

**Objectives:** To assess effectiveness of the salt iodization program by organizing a nation-wide representative survey on iodine status in school-aged children and comparing the results with a similar nation-wide study performed 10 years ago.

**Method/Design:** All over the country 60 schools were selected using a multistage, stratified proportionate-to-size sampling design. In each school 50 children (6-12 years) were invited to participate in the study. Upon informed consent of the parents, a urine sample was collected and thyroid volume was measured using real-time sonography. Further a sample of household salt was collected from the children and the parents were asked to complete a questionnaire. Urinary iodine concentrations (UIC) were measured by a colorimetric method based on the Sandelle-Kolthoff reaction and iodine in salt using iodometric titration.

**Results:** The results will be available during the conference in October 2011. It will be assessed to which extent there is still iodine deficiency in Belgium using the indicators of the World Health Organiza-

tion: prevalence of goiter will be determined, median UIC, percentage of the population with UIC below 100 µg.L and 50 µg.L and percentage of households using adequately iodized salt. Further the results will be compared with a similar survey 10 years ago to assess whether the first salt iodization program in Belgium has been effective.

**Conclusions:** This survey is an important step towards elimination of MID in Belgium. Further it should be stressed that future monitoring will be necessary independent of the results of this study.

**Key Words:** Iodine deficiency, children, salt iodization, Belgium

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**27/189.** Nutrition in the Prevention on Non-Communicable Diseases  
**Evaluation of menu nutrition labeling on clients' food choices and calorie consumption in full service restaurants**

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**Introduction:** Recently, the World Menu Report 2011, showed an overwhelming 70% of diners want more information about the sourcing and nutritional value of their meals when dining out, with nearly two-thirds (64 percent) agreeing they would choose healthier meals if more information was provided to them. This is a clear call to action for those in the food service industry to provide the consumers with delicious and healthy food with the transparency needed for them to make an informed decision.

**Objectives:** This study aims to assess the impact of menu calorie labeling on clients' food choices, to determine the difference in client population who use menu labeling in their food choice, and finally to compare the sales and calorie consumed during menu labeling vs. no menu labeling.

**Method/Design:** The recipes of a full service restaurant menu were evaluated using Nutribase TM software for nutritional content and the calories of each dish was indicated next to the price on the menu. The clients of the restaurants were asked to complete a 15 question survey after they placed their order for a three week period. Information on the factors influencing their food choice that day, their general approach to healthy eating, as well as their demographic information and their BMI was analyzed. The respondents were stratified based on the answers into proactive and reactive groups.

**Results:** There was a significant difference between the proactive type clients and reactive clients with respect to the impact of calorie labeling on their food choice. The sales of the low calorie items increased while those of the higher calorie items decreased during the menu labeling phase.

**Conclusions:** The health conscience consumer which is a growing segment of the population will make healthier food choices if the nutritional information was made available to them in full service restaurants.

**Key Words:** restaurant menu, nutrition labeling, calorie intake, food industry and obesity prevention

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**27/282.** Nutrition in the Prevention on Non-Communicable Diseases  
**Identification of gene expression microarray in patients with type 1 diabetes mellitus by milk intake**

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**Introduction:** The gene expression through microarray's technique is a current topic in the field of nutrigenomics for researching the complex gene networks and relationship with the nutrition. A study of gene's intensity expression level identifies genes involved in the oxidative metabolism, glucose and lipids. Today there is isolated evidence about the changes in type 1 diabetes mellitus (T1DM) and as consequence the level of gene expression associated with the milk proportion on a diet.

**Objectives:** Identify the genes associated to the T1DM susceptible to modify their level of expression in a profile of microarray data by effect the interaction with bioactive components present in the milk.

**Method/Design:** The search of genes expression was made in several international data bases. Were identified responsible genes of T1DM and reviewed the possible role of milk in the expression in some specific genes for studying the interaction patterns between them.

**Results:** It was identified and compared through of WGAS (Whole Genoma Association Studies) and microarray data bases, the specific expression, his polymorphisms in the HLA genes and their association with T1DM in different population around the world.

**Conclusions:** The identification and comparison of genes expression levels associated with T1DM and their polymorphisms will help to guide future research work focus on effective treatments for patients with this disease. As well, this identification may help to control dietary variables associated with milk intake, to prevent health problems like the T1DM and to obtain evidence of their interaction with certain human genome modules based on their analysis of the expression microarray data.

**Key Words:** Diabetes, Gene expression, Microarray

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**27/298.** Nutrition in the Prevention on Non-Communicable Diseases  
**The shortest way to reach nutritional goals is to adopt Mediterranean food choices**

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**Introduction:** Dietary guidelines can be derived from dietary patterns known to be healthy such as the traditional Mediterranean



diet. They can also be deduced by translating a set of nutrient recommendations into food combinations. However, the latter may vary depending on the decisions made by different expert committees. In addition, the intensity of the debate on some nutrient goals, especially total fat intake, but also total carbohydrates, MUFA and cholesterol, suggests that such recommendations could have a huge impact on the definition of healthy eating.

**Objectives:** The objective of the present study was therefore to compare the impact of removing or adding selected nutrient recommendations on the necessary minimal food changes needed to fulfill a whole set of nutrient recommendations.

**Method/Design:** For each adult participating in the French INCA dietary survey (n=1171), a nutritionally adequate diet was modeled that simultaneously met a whole set of nutrient goals (proteins, fiber, essential fatty acids, 10 vitamins, 9 minerals, sodium, saturated fatty acids, free sugars), while deviating the least from the observed diet in terms of food content. Eight sets of models were developed, depending on the inclusion, or not, of constraints on total fats, total carbohydrates, total MUFA and cholesterol.

**Results:** Compared with the observed intakes, fulfilling the whole set of nutrient constraints systematically decreased total fats and increased total carbohydrates, even in the absence of specific constraints on those macronutrients. Whatever the models used, a strong consistency was observed in the dietary changes needed to fulfill the constraints, and the greatest increases were seen for nuts, unrefined grains, legumes, fruit, fish/shellfish, and vegetables.

**Conclusions:** In conclusion, whether recommendations on total fats, MUFA or total carbohydrates are included or not in the definition of overall nutrient adequacy, typical foods from the Mediterranean diet are needed to reach this overall nutrient adequacy.

**Key Words:** Mediterranean diet, nutrient recommendations, linear programming, MUFA

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#### 27/385. Nutrition in the Prevention on Non-Communicable Diseases

### **Influence of high iodine intake on breast milk concentration of refugee lactating women and on the iodine status of their children**

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**Introduction:** The Saharawi population has been exposed to high dietary iodine intakes and enlarged thyroid volume has been shown in 22% of the women and in 56% the children. Adequate iodine nutrition is crucial for infant's health and development.

**Objectives:** The aim was to examine breast milk iodine concentration (BMIC) and urine iodine concentrations (UIC) among lactating mothers, and further investigate how the BMIC and infant

feeding practices affects the children's UIC.

**Method/Design:** The study was conducted in 2010 in the Saharawi refugee camps and 110 lactating women with children from 0 up to 7 months of age were included. Breast milk and spot urine samples were collected from the women, together with 24 hours recall of iodine intake. Spot urine samples were collected from the children as well as data on feeding practises.

**Results:** Median BMIC was 479 µg.L, and iodine intake from drinking water seemed to affect the breast milk iodine most. The women's median UIC was 349 µg.L. The children had a median UIC of 728 µg.L. Even though only 6% of the children were exclusively breast fed, no other foods or drinks but breast milk showed any influence of the children's UIC.

**Conclusions:** The BMIC were not favourable for children 0-7 months of age, which have a daily recommended intake of 90 µg iodine/day (WHO). The children's UIC indicate that the iodine intake from breast milk is very high, with 89% of the children having a urinary iodine concentration  $\geq 300$  µg.L. According to WHO median urinary iodine of  $\geq 300$  µg.L for school-age-children indicates excessive iodine intake. For infants there are no upper limits for iodine excretion in urine, but an iodine intake  $>180$  µg. day is considered excessive with risk of adverse health consequences.

**Key Words:** iodine, breast milk, infant feeding, urine

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#### 27/414. Nutrition in the Prevention on Non-Communicable Diseases

### **Low-carbohydrate high-protein diet promotes atherosclerosis in apoE.LDLR-/-mice**

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**Introduction:** Atherosclerosis is a progressive disease characterized by the accumulation of lipids and fibrous elements in the intimal layer of arteries. Many observations have shown that profound interactions between diet and genetic factors influence atherogenesis. Therefore, diets as an atherosclerosis agent have been intensively studied in animals and humans due to their various effects.

**Objectives:** The objective of this study was to evaluate the effect of different modifications of diets on body mass, plasma lipid profile and atherosclerosis in apolipoprotein E and low-density lipoprotein receptor double-knockout mice (apoE.LDLR-/-).

**Method/Design:** Four-month old apoE.LDLR-/- mice, with pre-established atherosclerosis, were assigned to experimental groups and fed for the next 2 months. The experimental diets were: Control (AIN-93G), Margarine (AIN-93G+ 7% margarine), Fructose (62% Fructose), Egg (17% Egg Yolk), WD (Western diet) and LCHP diet (Low-Carbohydrate High-Protein). Plasma samples were analyzed using commercially available kits. Histological analysis of hearts and brachiocephalic artery were performed. Cross-section analysis of

heart was used to assess quantification of atherosclerosis. 10 µm-thick serial cryo-sections were stained with Oil-red-O. Plaque rupture was identified in paraffin sections of brachiocephalic artery by elastin staining.

**Results:** No difference in the mice's body weight was observed. Egg and LCHP diet fed to mice significantly increased total plasma cholesterol (62% and 11%, respectively). The plasma triacylglycerols were increased in Egg (39%), WD (56%) and LCHP diet (98%). There were significant effects of LCHP vs Control diet on the area of atherosclerotic plaque in the aortic root (2023918 vs 1170464, respectively). Additionally, in LCHP diet thin fibrous cap was shown and buried fibrous caps were observed as a plaque rupture confirmation.

**Conclusions:** In conclusion, the diet which promoted atherosclerosis was LCHP diet. Histological analysis confirmed that LCHP diet induced plaque rupture.

**Key Words:** Apoe.Ldlr, Diet Modifications, Atherosclerosis, Plaque Rupture

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### 27/475. Nutrition in the Prevention on Non-Communicable Diseases **Sugar-sweetened beverage consumption among Canadian youth**

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**Introduction:** Sugar-sweetened beverages (SSBs) may play a role in the increased rates of obesity. Consumption rates of SSBs have risen concurrently with obesity rates in countries such as Canada; however, recent trends in SSB consumption among Canadian youth have not been assessed.

**Objectives:** This study examined patterns and frequencies of beverage consumption among youth in three distinct regions in Canada. The study examined associations between beverage consumption and age, gender, BMI, physical activity and dieting behaviour, as well as beverage displacement with increased SSB consumption.

**Method/Design:** Cross-sectional surveys were conducted with 10,216 youth (ages 13 to 18) from Hamilton and Thunderbay, Ontario, and Prince Edward Island, using an in-school self-reported survey with 12 questions regarding beverage consumption in the previous day.

**Results:** Overall, 80.3% of youth consumed at least one SSB in the previous day, with 44.1% consuming three or more SSBs. Males consumed more SSBs than females. Older students ( $p < 0.001$ ), those who met the recommended daily physical activity guidelines ( $p = 0.007$ ) and those who were currently dieting ( $p = 0.004$ ) consumed fewer SSBs. No significant association between BMI and SSB consumption was observed. There was a minimal positive correlation between SSB consumption and milk or 100% fruit juice ( $r = 0.06$ ,

$p < 0.001$ ).

**Conclusions:** This study demonstrates that a high proportion of the Canadian youth sampled consumed SSBs, many at high levels. This evidence suggests that trends in Canada may be consistent with trends seen in the US. High consumption rates were associated with gender and survey location, but not with BMI. There was no evidence of decreased milk or 100% fruit juice consumption with increased SSB consumption, as has been shown in some previous literature from the US and Canada. Future studies should include more rigorous longitudinal evaluation of beverage consumption patterns and health outcomes to examine this current health issue in a Canadian context.

**Key Words:** sugar-sweetened beverages, beverages, youth, body mass index (BMI), consumption

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### 27/494. Nutrition in the Prevention on Non-Communicable Diseases **Coriander ingestion effect in no levels in endothelium of intact rat aorta**

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**Introduction:** The vegetables contain high levels of phenolic compounds, flavonoids and other compounds with antioxidant activity. The drugs of natural origin have been used during centuries, nevertheless in the last years commercialization and ingestion of these products have been increased. Different vegetal reports indicate that a polyphenol rich diet contributes in the treatment of diseases. The flavonoids beyond the antioxidant capacity act as an anti-inflammatory, antihistamine with cardio protector, cardiovascular, antiviral, antibacterial, anti-fungal, anti-mutagenic and anti-carcinogenic effects. Coriander has been used in the traditional medicine as an anti-diabetic product. The nitric oxide (NO) is a bioactive molecule that regulates a great amount of physiological and molecular processes in diverse organisms including bacteria, animal and plants. Experimental and clinical studies indicate that polyphenols improve the capacity of endothelial cells to control vascular tone, due to an increase of non-endothelial cells. In our laboratory we have observed that cholesterol levels decrease and HDL levels increase in diabetic rats that has added them Coriander in their diet.

**Objectives:** To determine the effect of Coriander intake on the nitric oxide levels in intact aorta endothelium of diabetic rats.

**Method/Design:** Normal and diabetic rats was fed with food added with coriander seeds (50mg/Kg/day). Six months later isolated the in endothelium of intact aorta. The detection of NO incubating with fluorocromo diacetato of diamino fluorescein (DAF-2DA) 10 µM. The detection of the fluorescence was realised using emission 505-550-nm of and 488-nm.

**Results:** Our preliminary results show an atheromatous plaque aorta in diabetic rats with out coriander diet, and increase in no levels in diabetic rat with coriander diet.

**Key Words:** Coriander, Polyphenols, Nitric Oxide, And Hypertension.

### Introduction of the Danish iodine fortification program: Impact on drug and treatment costs

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**Introduction:** Initiation of iodine fortification (IF) is associated with clear benefits such as a reduced occurrence of thyroid disorders. IF is therefore expected to be associated with reduced costs in relation to treatment. Treatment activity can be readily monitored in Denmark by use of existing nationwide registers. In Denmark IF was initiated in 1998 because of mild-to-moderate iodine deficiency.

**Objectives:** The aim of this study was to analyze the impact of introducing IF on the costs related to treatment of thyroid disorders.

**Method/Design:** Every Dane is given a personal identification number at birth or immigration. The ID number is used in all contacts with public services and is used in the compilation of data in nationwide registers on dispensed prescription drugs and hospital contacts. We extracted data on all dispensing of thyroid medication, operations for thyroid disorders, and treatments with radioiodine from these nationwide registers between 1995 and 2008. Costs were adjusted to the age- and sex composition of the Danish population in year 2000.

**Results:** Treatment costs increased in the first years following initiation of IF (max. 22% in the previously moderately deficient region) and remained 14% higher in 2008 - 11 years after the initiation of IF (1997:404.434€.100.000 inhabitants; 2008:461.144€.100.000 inhabitants). The costs for radioiodine increased only temporarily and ended up lower than before initiation of IF. Cost for antithyroid medication also declined after an early increase, but costs were still higher than before initiation of IF. Costs of surgery remained almost constant, while costs of thyroid replacement therapy increased throughout the period.

**Conclusions:** Even though iodization of salt in Denmark has had a beneficial effect on the occurrence of thyroid disease, such as goitre and autonomous hyperthyroidism, treatment costs are still above the pre-iodization level. The full beneficial effect of IF may only become apparent decades after initiation.

**Key Words:** iodine fortification cost evaluation prevention

### Risk factors for metabolic syndrome is increased in obese adolescent

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**Introduction:** Obesity is a one of the main nutritional disorder worldwide, clearly associated with metabolic syndrome (MetS) in adults and important condition for early cardiovascular diseases.

**Objectives:** Our goal was to evaluate obesity and its relationship with risk factors for MetS in adolescents.

**Method/Design:** Adolescents (n=242) from public school, 14.0±2.3 years old and male 38.8%. Body mass index (BMI), waist circumference (WC), body fat mass (%FM) and sexual maturation were monitored. From plasma, analysis of glucose, insulin, lipid profile and non-esterified fatty acids (NEFAs), and LDL(-) plasma were performed.

**Results:** Adolescents were distributed according body mass index in normal weight (NW, n=77), overweight (OW, n=82) and obese (OB, n=83). Sex, sexual maturation, glucose, triglycerides (TRG), total cholesterol (TC) and LDL-C plasma were similar between groups. However, WC (p≤ 0.001), %FM (p≤ 0.001), triglycerides, HDL-C ratio (p≤ 0.001), TC:HDL-C ratio (p= 0.016), insulin (p≤ 0.001), HOMA (p≤ 0.001), NEFAs (p= 0.04) and LDL(-) (p= 0.04) changed proportionally of BMI. Opposite profile was observed in HDL-C (p≤ 0.001). The negative impact of BMI on risk factors for MetS was reinforced by correlation with TRG (r= 0.18; p= 0.006), HDL-C (r= -0.23; p≤ 0.001), TRG:HDL-C ratio (r= 0.30; p≤ 0.001), TC:HDL-C ratio (r= 0.28; p≤ 0.001), insulin (r= 0.46; p≤ 0.001), HOMA (r= 0.44; p≤ 0.001), NEFAs (r= 0.20; p= 0.002).

**Conclusions:** Therefore, adolescent obesity show increased risk factors for MetS in comparison with overweight and obese adolescents.

**Key Words:** Metabolic Syndrome, Adolescent, Obesity

### Resting metabolic rate (RMR) prediction among women

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**Introduction:** Resting metabolic rate (RMR) is a major component of energy requirement and is defined as the energy needed for maintenance of vital organ functions. Although RMR can be measured by different methods (direct calorimetry, indirect calorimetry and double labeled water), the complexity of tools and lack of experienced staffs has led researchers to develop various formulas for estimating RMR.

**Objectives:** To measure the resting metabolic rate in a sample of Iranian women, and to compare this value to RMR calculated by different formulas in order to evaluate the validity of each formula in estimation of RMR in normal, overweight and obese subjects

**Method/Design:** A total of 187 healthy women aged 18 - 45 years were included in this cross-sectional study. Using a metabolic analyzer, metabolic rate oxygen consumption (VO<sub>2</sub>) was measured for 15 minutes following an overnight fast while subjects were relaxed and stable and a mask covered their nose and mouth. RMR was then calculated from VO<sub>2</sub> using a modified Weir equation. In addition, RMR was also calculated using various formulas based on subjects' weight, height, age and fat free mass, which was measured by bioelectrical impedance (BIA) method.

**Results:** The mean±SD measured RMR was 1468±294.0 kcal/day. The abbreviation formula overestimated RMR (1574.3±325.0) while other formulas underestimated it (p<0.01). Harris-Benedict formula was valid among all BMI categories by producing the lowest discrepancy between measured and predicted RMR value (mean bias: 21.9). Two Schofield formulas were valid in RMR calculation for normal weight, overweight and morbid obese subjects, while Cunningham formula was not valid in overweight and obese women (p<0.001).

**Conclusions:** Harris-Benedict formula provides a valid and precise estimation of RMR in all BMI categories. However, it is suggested that in situations where the exact measurement of RMR is targeted, more credible methods instead of equations are used.

**Key Words:** Resting Metabolic Rate, Prediction Equations, Validity and Energy Consumption

### Esophageal cancer and micronutrient intakes

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**Introduction:** Esophageal squamous cell carcinoma (ESCC) is the sixth most common type of malignancy in the world with the highest incidence rate occurring in Iran. Nutrients have consistently been found as important determinants of esophageal cancer; however, the impact of overall nutrient intake on ESCC risk has not been thoroughly investigated.

**Objectives:** To examine the association between nutrient patterns and risk of ESCC in a high-risk region in Iran

**Method/Design:** Forty-seven patients with ESCC and ninety-six hospital controls were frequency matched for age, sex and residence in the present study. Trained interviewers evaluated the dietary intakes of individuals using a validated food-frequency questionnaire.

**Results:** Two major nutrient patterns were identified in the present study. Factor 1 was high in pantothenic acid, vitamin C, potassium, vitamin B6, magnesium, folate, thiamin, copper, carbohydrate, vitamin K, niacin, alpha tocopherol, zinc, total fiber, fluoride and polyunsaturated fatty acids and explained 32.2% of the total variance. Factor 2 was high in saturated fatty acid, biotin, selenium, monounsaturated fatty acids, riboflavin, sodium, fat, cholesterol, calcium, phosphorus, protein, iron, vitamin E, manganese, vitamin D and vitamin B12 and accounted for 31.98% of total variability. Participants in the highest category of both factors had higher total energy intake relative to those in the lowest category (p<0.001). After adjustment for confounding variables, factor 2 was inversely associated with ESCC risk (OR=0.06, 95% CI: 0.01-0.28), whereas no significant association was found for factor 1 (OR=0.45, 95% CI: 0.11-1.82).

**Conclusions:** This study showed that the high prevalence of ESCC in certain geographic regions could result from interactions between several nutrients. We conclude that a diet with high loads of biotin, selenium, monounsaturated fatty acids, riboflavin, sodium, fat, cholesterol, calcium, phosphorus, protein, iron, vitamin E, manganese, vitamin D and vitamin B12 may induce a protection against ESCC.

**Key Words:** Esophageal Squamous Cell Carcinoma, Factor Analysis and Nutrient Pattern

**One year follow-up of biochemical and cobalamin status among Spanish institutionalized elderly**

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**Introduction:** Cobalamin (Cbl) deficiency is common among the elderly due to absorption problems. The deficiency itself, as well as the resulting elevated homocysteine levels, are of special public health interest because of their impact on cardiovascular diseases together with other risk factors such as lipid profile. Its relationship with the incidence of dementia/cognitive impairment is also discussed.

**Objectives:** To evaluate the cobalamin status among institutionalized Spanish elderly during one year of residence in Madrid. Spain.

**Method/Design:** In this longitudinal study lasting over one year of 60 institutionalized elderly (41 women), mean age 82, blood samples were collected at four time points at 3 month intervals for biochemical profile, cobalamin (Cbl), folate (serum and red blood cell folate), holo transcobalamin and homocysteine levels. They were measured using the AxSYM system.

**Results:** Cbl levels tended to decrease in women, with a parallel tendency of mean corpuscular volume values to increase. Deficiency prevalence for Cbl (<200 pg/mL) increased from 7 to 12 % in women, 58% of men and 69% of women had elevated homocysteine concentrations (> 15 µmol/L) which remained stable over the year but within risk levels. Triglycerides, total cholesterol, LDL and HDL-cholesterol levels were higher in women compared to men in all four periods of time. Men showed a slight increase of total cholesterol and LDL-cholesterol from point three to four. Mean albumin concentrations showed a tendency to decrease in men (4.2-3.7 mg/dL) and women (4.0-3.6 mg/dL), respectively.

**Conclusions:** Cbl concentrations were quite stable during a one year follow up in Spanish institutionalized elderly. The high prevalence of elevated homocysteine concentrations makes its determination advisable in the routine assessment of cardiovascular risk factors. The decrease of albumin levels in both genders could be taken as an indicator of increasing malnutrition in people living in homes for the elderly.

**Key Words:** cobalamin, dependent, residence, vitamin B12

**Food portion sizes and their relationship with fibre intakes in Irish children aged 5-12 years.**

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**Introduction:** It is now widely accepted that food portion sizes may influence energy intake. However data are sparse on the relationship between food portion sizes and dietary quality.

**Objectives:** To investigate associations between portion sizes of selected foods and dietary fibre intakes in Irish children using data from the Irish National Children's Food Survey (NCFS). The NCFS used a 7-day weighed food record to collect intake data from 594 Irish children aged 5 to 12 years. Analysis of nutrients was carried out using WISP© (Tinuviel Software, Anglesey, UK) which contains data from McCance and Widdowson's The Composition of Foods, 6th Edition.

**Method/Design:** Portion size (g), defined as the weight of food consumed per eating occasion, was estimated for each day the food was consumed. Where a food was consumed on more than one occasion on one day, the largest portion size was used. The portion size data were split by tertile, with dietary fibre intakes (g/10MJ) (mean values) examined across tertiles for the days on which the foods were consumed.

**Results:** Larger portions of pasta, white and brown bread, boiled potatoes, chips, breakfast cereals, fruit, vegetables and baked beans were positively associated with dietary fibre intakes on the days in which the foods were consumed ( $p < 0.05$ ), while larger portions of chocolate confectionary and sugar-sweetened beverages showed negative associations ( $p < 0.05$ ). No associations were observed between portions of milk, yoghurt, luncheon meats, biscuits, crisps and pure juice and dietary fibre intakes.

**Conclusions:** Dietary fibre has been identified internationally as a nutrient of public health importance and Irish children are known to have a high prevalence of inadequate intakes. Consideration of food portion sizes may be useful in the development of food-based dietary guidelines for Irish children in the future.

**Key Words:** Food Portions, Fibre, Irish Children

### **Nutrition related diseases in corporate sector: The case of Bangladesh**

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**Introduction:** Data about how to assess the NCD risk factors among specific group of professions are very scarce. Thus, an effort was made by Eminence in Bangladesh.

**Objectives:** To assess the NCD risk factor status in corporate sectors of Bangladesh.

**Method/Design:**The information has been collected by providing free health check up among the executives working in six (6) multinational corporate industries. Structured questionnaires (SQ) were used to get the risk behaviours following proper consent form. The SQ were followed by anthropometrical – height, weight, waist circumference, hip circumference – and biochemical assays – blood glucose, lipid profile, blood pressure, pulse rate and ECG outcome for a total of 270 participants.

**Results:** The mean age was 35 years and most of them were males (82%). Half of the respondents had smokers living in their family and around one third (37%) were smokers themselves. The habit of taking fruits was relatively high with around 37% taking it for 3-5 days. Similar kind of habits was found in case of taking green and leafy vegetables as well. However, the level of physical activity (working hard) either in workplace (4%) or in leisure time (10%) was found to be low. The prevalence of being overweight (24%) and obese (51.3%) was very high. The lipid profile were mostly abnormal, with high levels of TG (57%), total cholesterol (34%), and LDL (24.1% high) and low levels of HDL (49%).

**Results:** The mean age were 35 years with majority (82%) being male. Half of the respondents had smokers living in their family and around one third (37%) were smokers themselves. The habit of taking fruits was relatively high with around 37% taking it for 3-5 days. Similar kind of habits was found in case of taking green and leafy vegetables as well. However, the level of physical activity (working hard) either in workplace (4%) or in leisure time (10%) was found to be low. The prevalence of being overweight (24%) and obese (51.3%) were very high. The lipid profile were mostly abnormal, with TG (57% high), total cholesterol (34% high), HDL (49% low) and LDL (24.1% high).

**Conclusions:** The status of NCD risk factor has been found to be very high. Further comprehensive study on this issue is very essential.

**Key Words:** NCD risk factor status, corporate sector, Bangladesh

### **Chicoric acid is a potent antioxidant regulating the AMPK pathway**

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**Introduction:** Several studies suggest that type 2 diabetes is associated to an oxidizing stress inducing the development of insulin resistance. Polyphenols, such as chicoric acid, are considered as promising compounds useful to prevent insulin resistance.

**Objectives:** The aim of this study is to investigate the influence of chicoric acid (CA) in myoblasts with a particular attention for oxidative stress and the AMPK pathway.

**Method/Design:** The effects of CA were studied in 7-day differentiated L6 myotubes cultured in a DMEM medium supplemented with 2% horse serum. Akt, AMPK, ACC, mTOR phosphorylation and PGC-1 $\alpha$  expression were determined by western-blotting after CA treatment. Cellular ROS levels were analyzed by fluorimetric assay using the 2',7-dichlorofluorescein fluorescent probe.

**Results:** In L6 myotubes, CA ( $\geq 10\mu\text{M}$ ) treatment increased AMPK and ACC phosphorylation in less than 1 hour. We also observed that, in the presence of insulin, CA ( $50\mu\text{M}$ ) decreased Akt and mTOR phosphorylations.

In parallel experiments, we observed that CA ( $\geq 5\mu\text{M}$ ) sharply decreased intracellular ROS levels in less than 15 min. The same effect was observed in L6 myoblasts after a 5-day incubation in the presence of 25mM glucose or 50 $\mu\text{M}$  palmitate in order to increase ROS production.

In addition, CA ( $50\mu\text{M}$ ) significantly increased PGC-1 $\alpha$  (a ROS detoxification enzymes and mitochondrial biogenesis inducer) expression after a 6-hour treatment. Citrate synthase activity, a marker of mitochondrial biogenesis, was also increased after 10 days ( $50\mu\text{M}$ ). However, CA had no effect on glucose uptake.

**Conclusions:** Chicoric acid is a potent natural antioxidant compound able to stimulate the AMPK pathway and reduce ROS level through an immediate direct scavenging effect and a longer-term induction of detoxifying enzymes through PGC-1 $\alpha$  expression stimulation. It is probable that PGC-1 $\alpha$  increase is also involved in the long-term stimulation of mitochondrial biogenesis.

**Key Words:** Chicoric acid, antioxidant, AMPK, PGC-1 $\alpha$ , myotubes

**Food consumption of working adolescents and chronic diseases prevention. Rio de Janeiro. Brazil.**

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**Introduction:** Feeding behavior in adolescence is the basis of diet profile and nutritional status in adulthood. Food habits are influenced by friends, values, lifestyle, autonomy and identity. Understanding teenagers' habits is fundamental, considering the importance of nutrition for growth and development, beyond the prevention of chronic diseases.

**Objectives:** The objective of this paper is to measure food consumption of working adolescents. Rio de Janeiro, Brazil.

**Method/Design:** Was conducted a cross-sectional study with teenagers of both sexes. October 2010 to May 2011. The sample included 42 adolescents, aged 16-17 years, from the project "Making and Learning" at Oswaldo Cruz Foundation. To measure the weight, we used a digital scale platform type with capacity of 150kg and 0.1 kg graduation; adolescents standing barefoot and wearing light clothing. Height was measured with a tape attached from one meter of the floor, wall smooth and using Frankfurt position. Nutritional Status was ranked by percentile cutoff points for the distribution of BMI for age and sex according NHCS standard. We applied a food frequency questionnaire to investigate daily meals.

**Results:** The anthropometric measurements reveals that 73.81% are in the normal range, 11.90% are overweight and 14.29% obese. Analyzing usual diet was observed a substantial consumption of foods high in fat. About 17% eats potato chips 5 times/week, 7.14% consumes burger 3-4 times/week and 24% takes cookies 5 times/week. Sodas frequency is high, 57.14% consume 2-5 times/week and 17% consume everyday, and coffee is used daily by almost 40%. Vegetables are regularly consumed by 24%, fruits are consumed once/week by 52.38% and everyday for 21.43%. Over 25% reported some gastric problem.

**Conclusions:** The results shows the importance of promoting nutrition education among these adolescents as the most appropriate foods' choice. Promote healthy lifestyle in adolescence is crucial to prevent obesity epidemic in adulthood.

**Key Words:** Adolescents, Nutritional Status, Food Habits, Non-Communicable Disease

**Perception of weight during adolescence**

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**Introduction:** The stigma of overweight has worsened in the last years. A high body mass index (BMI) is usually associated with higher risk for eating disorders, higher body dissatisfaction and poorer body image quality of life, as well as with more irrational food beliefs. Misperception of overweight-obesity among adolescents of normal weight can cause body dissatisfaction that predicts dieting, which is a clear risk factor for developing eating disorders.

**Objectives:** The aims of the current study were to explore possible gender differences with respect to weight misperception, and to analyze the relationship between that misperception and other variables as self-esteem, body appreciation and food beliefs among adolescents.

**Method/Design:** The sample comprised 85 students (53 females and 32 males; mean age of 17.4 ± 5.55), all of them recruited from a high school of Écija (Seville). Instruments: Perceived overweight, BMI, Irrational Food Beliefs Scale (IFBS), Body Appreciation Scale (BAS), Self-Esteem Scale (SES), General Health Questionnaire (GHQ-28).

**Results:** Overall, 23.5% of the participants misperceived their weight. Considering only the participants with a normal BMI, there was a significant gender difference with respect to the participants who perceived their status as overweight. In this case, 13.90% of females perceived themselves as overweight, while the percentage of males was 7.90% ( $\chi^2 = 3.957$ ;  $p < 0.05$ ). There was a significant difference with regards to the age, with a mean age of 16.34 (3.17) among participants who perceived the weight adequately, and a mean age of 18.50 (4.02) among those who misperceived their weight ( $F = 3.112$ ;  $p < 0.05$ ).

**Conclusions:** Misperception of overweight seems to be more frequent in female adolescents, and mainly among elder adolescents. Overweight misperception is associated with a less positive body image, and the perception of the weight status as very underweight is associated with higher scores on general psychopathology.

**Key Words:** weight misperception, self-esteem, positive body image, psychological distress, food beliefs.

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**27/975.** Nutrition in the Prevention on Non-Communicable Diseases

**Positive association between systolic blood pressure and weight gain in obese mice**

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**Introduction:** A prolonged imbalance between the levels of energy intake and expenditure can lead to the development of obesity. Hypertension is frequently observed in obese individuals and is the major risk factor for cardiovascular pathologies. Animal models are used to study obesity and alterations in blood pressure. In this study we evaluated changes in blood pressure of ICR mice which were treated with a high fat diet for 13 weeks.

**Objectives:** To investigate the effects of diet-induced obesity on blood pressure in ICR mice.

**Method/Design:** Females ICR mice (8 weeks old) were fed with an adjusted calories diet with 60% of total calories supported from fat (Harlan Laboratories). *ad libitum*. Mice fed with a diet of maintenance (Harlan Laboratories) were used as controls. Food and water intake as well as weight levels were determined twice per week. Blood pressure was measured in warmed and restrained mice, by the tail-cuff method (Panlab – Havard apparatus), after 6 and 13 weeks of the treatment.

**Results:** Significant differences between obese and control mice were found after 5 weeks of treatment (42.16±6.39, n=8 and 33.30±2.78, n=8, respectively, P=0.007). Systolic blood pressure was higher in obese mice (300.7mmHg±31.20, n=8) than in controls (240.6mmHg±41.21, n=8, P=0.011) after 13 weeks of treatment with the high fat diet, although no differences were found between both groups at 6 weeks of treatment (280.0mmHg±38.89, n=8 and 247.0mmHg±38.26, n=8, respectively). A positive association between weight gain and systolic pressure levels was found (r=0.534, P=0.049, n=16).

**Conclusions:** The treatment with a hypercaloric diet induces changes in weight and blood pressure in ICR mice. However hypertension was only shown after prolonging the treatment for 13 weeks.

**Key Words:** Diet-Induced Obesity, Hypertension, ICR-Cd1 Mice

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**27/1000.** Nutrition in the Prevention on Non-Communicable Diseases

**Preoperative nutrition in gastric cancer surgery**

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**Introduction:** Gastric cancer patients often have weight loss, anorexia, fatigue, feeling of fullness, vomiting, nausea and abdominal discomfort, factors that negatively, increasing the complications, hospitalization time and costs.

**Objectives:** To evaluate the nutritional intervention through oral supplementation in patients with gastric cancer and surgical indication admitted to a public hospital in the city of Santos, Brazil.

**Method/Design:** The sample consisted of 25 adult patients. Data were collected for identification, anthropometric (weight, height, arm circumference and calf), biochemical tests, prescribed and acceptance diet. The classification of nutritional status was made according to criteria of World Health Organization, 1997 for adults and Pan American Health Organization, 2002 for the elderly. The supplement used was specific to cancer patients, the intervention lasted on average 11 days in the preoperative period and the dosage used was 2 units daily. All signed a consent form and the present study was approved by the ethics committee of the hospital.

**Results:** The nutritional status assessed by anthropometric parameters showed increasing or maintaining body weight in most patients (75%). There was also improvement in the acceptance of hospital diet at 55% and laboratory abnormalities were normalized in 46% due to early intervention and effective.

**Conclusions:** Therefore, the monitoring and institution of nutritional support is crucial and has proved beneficial, contributing to the maintenance, evolution of nutritional status and improvement in clinical outcome predecessor the surgical procedure.

**Key Words:** Preoperative Nutrition, Nutritional Status, Gastric Cancer, Surgery,

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**27/19.** Nutrition Research and Education in Europe

**Inhibitory effect of Caffeic Acid Phenethyl Ester on human SVGp12 astroglia cell line**

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**Introduction:** CAPE (caffeic acid phenethyl ester) is an extremely active compound of propolis. The usefulness of CAPE through its anti-inflammatory, immunostimulatory and antitumor activity was described. Strong antiproliferative effect of CAPE on the colorectal cancer cells and C6 glioma cells may be potentially useful as chemopreventive anticancer drugs. All these results are based on cancer cells, but, up to now, the influence of such an ester on the normal cells has not been shown.

**Objectives:** The aim of this study was to present the effect of CAPE used in different concentration for 24h, 48h or 72h on the survivability of astroglia cell line (SVGp12).

**Method/Design:** We used cytotoxicity test (MTT test).

**Results:** CAPE in all the studied concentrations 5 μM, 10 μM,



20  $\mu$ M, 30  $\mu$ M and 50  $\mu$ M reduced the survival of astrocytes: at 24 h exposition about 20%, after 48 h about 40% and at the end of observation reduced to about 60% of the control cells. The number of astrocytes exposed to 5  $\mu$ M CAPE was higher than after other concentrations of CAPE.

**Conclusions:** Concluding, the unfavorable effect of CAPE on the survival of human astroglia cell line (SVGp12) may limit the application of such ester in the prevention or treatment of brain cancers.

This study was supported by the Polish Ministry of Science and Higher Education Grant N N405 625438.

**Key Words:** Cape, Astrocytes, Survival

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### 27/58. Nutrition Research and Education in Europe **Smartphone application for real-time dietary assessment and physical activity analyses in dietary counseling**

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**Introduction:** Many overweight/obese EU adults need reliable, personalized advice/support to enhance compliance with dietary counseling. A new system (smartERB) that links an individualized dietary assessment and physical activity (PA) analysis Android Smartphone application with a computer-based data analysis program has been developed for logging/analyzing/displaying dietary intake and PA data over time.

**Objectives:** Test feasibility/suitability/plausibility of integrated use of the smartERB system in face-to-face dietary counseling of overweight/obese clients. Synchronize real-time assessment of dietary intake and automated PA logging and analysis, and visualize the resulting energy data as a motivational component.

**Method/Design:** Discriminant analysis will be used to compare the quality of smartERB dietary/PA patterns assessed by two groups: (G1) registered dieticians (RD), applying smartERB followed by a guided group discussion (expert reference group); (G2) overweight/obese adult volunteers participating in personalized three-week dietary counseling led by a single, non-G1 RD, applying smartERB twice for 6 consecutive days followed by a structured individual interview (client comparison group).

**Results:** The smartERB system comprises administrative and user characteristics modules, a semi-quantitative food record, and an automated PA level recorder. Since December 2010, 5 local RDs and 20 clients (14 women, 6 men; 28-36 yrs; BMI 25-36 kg/m<sup>2</sup>) have participated in the ongoing test. Before counseling, all data are exper-

ted for further analysis with specific dietary software. Specifically, a comparative bar chart depicting energy intake and expenditure over 6 days is employed during counseling. Results of the comparative discriminant analysis will be presented. Group discussion/interviews to date reveal positive motivational experiences, good data plausibility, and empowerment, but also certain factors limiting use.

**Conclusions:** The study will determine if use of the smartERB system in dietary counseling of overweight/obese individuals can be supported. If needed, technical and logistical features will be improved before introducing smartERB to the RD market. Further areas of application will also be discussed.

**Key Words:** Dietary Counseling, Dietary Intake, Overweight/Obesity, Physical Activity, Smartphone Application

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### 27/70. Nutrition Research and Education in Europe **Voluntary nutritional label: effects on prices, nutritional quality and brands' strategies**

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**Introduction:** A preliminary work on biscuits/pastries studied the relationship between nutritional label, food composition and prices.

**Objectives:** This work goes further in the assessment of this relationship and also discusses the opportunity to implement or not mandatory nutritional label in the EU.

**Method/Design:** Nutrient content and prices have been compared on 1427 items of biscuits and pastries, with and without extended nutrition label, coming from the French Observatory of Food Quality database in 2008. Hedonic price functions were also estimated on products either with or without nutrition/health claims to evaluate the willingness-to-pay of consumers regardless the characteristics of products (nutrient content, nutritional label, type of brand, product range and category). Finally, on products without nutrition/health claims, Maximum-Likelihood estimates of Logit models by nutritional label were considered to measure the determinants of the choice of basic or extended nutritional label.

**Results:** In France, nutrition labelling is rather well developed for biscuits and pastries. Products with extended nutritional information are not of a better nutritional quality and are not significantly more expensive. The estimation results of hedonic price functions confirm that nutritional label has few or no significant impact on products prices. Furthermore, prices increase with energy, sugars and saturated fatty acids contents.

Moreover, consumers are obviously willing to pay more for national brands and for top-of-range products compared to retailer brands and to middle-range products.

Finally, voluntary nutritional label (extended or not) is few or no explained by nutrient content or prices. By contrast, some brands are strongly associated with extended nutritional label.

**Conclusions:** Further analyses have to be done to decide of an implementation of mandatory nutritional label in the EU. Indeed, for biscuits and pastries, giving Logit models estimates, it seems that the decision of nutrition labelling results from brands' strategies rather than a signal of highest nutritional quality.

**Key Words:** nutritional label, brand strategies, price, nutrient content

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**27/177. Nutrition Research and Education in Europe**  
**One year of free school fruit - 7 years of follow-up**

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**Introduction:** It is important to get children to eat more FV. However, few school-based intervention studies do evaluate longer term follow-up than one year after the end of the intervention.

**Objectives:** The aim of the present study is to evaluate the 7 year follow-up effect of a pilot project with a free piece of fruit or vegetable every school day for one school year.

**Method/Design:** A total of 38 randomly drawn elementary schools participated in the Fruits and Vegetables Make the Marks (FVMM) project, and nine schools were selected as intervention schools and participated for free in the Norwegian School Fruit programme for one school year (October 2001 until June 2002). A baseline questionnaire surveys was conducted in September 2001. follow-up surveys were conducted in 2002, 2005 and 2009. FV intake was assessed by a written 24-h recall (portions/day) and by four food frequency questions (FFQ, times/week). The FVMM cohort includes 1950 pupils with an average age of 11.8 years at baseline. A total of 320 pupils (16%) participated also at the follow-up survey in September 2009, and constitute the study sample for the present study.

**Results:** In repeated measures analyses, significant interactions between time and intervention group were seen for both the 24-h recall measure ( $p=0.04$ ) and FFQ ( $p=0.01$ ), and FV intake in the intervention group did increase from baseline to follow-up measures compared to the control group. Analysing the difference between intervention and control groups at the follow-up survey in 2009, adjusting for baseline levels, the effect of the intervention was 0.3 portions/day ( $p=0.12$ ) and 0.8 ( $p=0.44$ ) times/week.

**Conclusions:** The results show that a pilot project with one year of free school fruit indicates long-term effects seven years later with a continued higher FV intake compared to the control group.

**Key Words:** School fruit scheme, free fruit, fruits and vegetables, intervention, long term effect

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**27/132. Nutrition Research and Education in Europe**  
**The development of ethnic-specific Food Frequency Questionnaires to measure diet of non-western migrants in the Netherlands**

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**Introduction:** The prevalence of cardiovascular disease (CVD) is often higher in non-western migrants compared to the host population. Diet is an important modifiable determinant for CVD. The increasingly ethnically diverse nature of many populations in Europe complicates the assessment of representative dietary intake data. In the Netherlands, research is limited by a lack of validated instruments to measure habitual diet and no comprehensive picture of the dietary patterns of the main non-western migrants exists.

**Objectives:** In this study we aimed to develop ethnic-specific Food Frequency Questionnaires (FFQs) in order to study the dietary patterns of Surinamese of African and of South Asian origin, Turkish and Moroccan individuals residing in Amsterdam, the Netherlands.

**Method/Design:** Food items were selected according to their percentage contribution to, and variance in the nutrients of interest based on data from 24 hour recalls collected in the LASER-study, the SUNSET-study and a study about nutrition and health among migrants in The Netherlands by TNO. Tests of face-validity and cognitive interviews were performed to pinpoint problems in design and comprehension of the FFQs. A nutrient database was constructed based on data in the Dutch Food Composition Table.

**Results:** Three FFQs including approximately 200 food items have been developed to reflect usual intakes of Turkish, Moroccan and Surinamese migrants. Overall the FFQs cover more than 90% of the intake of the nutrients at interest in this study.

**Conclusions:** With the development of the ethnic-specific FFQs, this study provides an opportunity to move the field of nutritional and health epidemiology forward. The FFQs will be applied to participants in the HELIUS study, a multi-ethnic cohort in Amsterdam, and will enable us to gather dietary intake data of 1000 participants (18-70 year old) per ethnic group. This will allow research into the main determinants and health consequences of habitual diet.

**Key Words:** Diet, ethnicity, Food frequency questionnaires

### The fake food buffet's examination of the influence of nutrition guidelines on meal composition

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**Introduction:** Nutrition guidelines such as the food pyramid and recommendations like 5-a-day may help to establish a balanced meal. So far it is however not known how consumers practically implement current recommendations and how nutrition information affects their meal composition. The Fake Food Buffet (FFB) - a new method using food replicas - is used to investigate how the food pyramid affects consumers' meal composition.

**Objectives:** We aimed to examine if receiving information on the food pyramid has an influence on meal composition.

**Method/Design:** 124 participants (59m,65f, mean age 26.1 years, SD=6.0) were instructed to serve themselves a lunch from an FFB, containing 48 food items. Individuals were randomly given one of the following instructions; A) Choose a normal meal; B) Choose a healthy, balanced meal; C) Read info brochure and choose a healthy, balanced meal.

**Results:** Participants provided with nutrition information (C), were significantly better informed than people in the other two groups (A, B), ( $F(2,121)=25.862$ ,  $p=.000$ ). They also served themselves significantly less energy, than did people in the normal group (A), ( $F(2,121)=4.187$ ,  $p=.017$ ). However, participants in the healthy group (B), as well as participants in the informed group (C) served themselves significantly more energy from fruit and vegetables and made fewer indulgent choices compared to participants in the normal group (A).

**Conclusions:** The FFB is a useful tool to study the effect of nutritional guidelines on meal composition. We found that consumers have a good intuitive understanding of how a healthy meal should be composed, and that the food pyramid brochure did not have an extra effect on meal composition. Our findings imply that consumers may benefit from additional nutritional information, as it increases knowledge. The major task lies in motivating people to choose a healthy meal, as it seems that consumers have a good understanding of how to compose a healthy meal.

**Key Words:** Meal Composition, Food Pyramid, Fake Food Buffet, Nutritional Information, Food Choice

### A satiating message influences appetite but not food intake in high disinhibited low restraint women

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**Introduction:** The launch of food products with a satiety message has been increasing in the last few years. The relationship between food behaviour and perceived label is often unclear as it could vary according to individual differences. Factors others than nutritional messages may influence subsequent satiety, like cognitive restraint and disinhibition scores. Conflicting results were obtained concerning a potential cognitive label effect on satiety. Indeed, it seems to also depend on subjects' food behaviour state.

**Objectives:** The aim of our work was to evaluate the psychological influence on satiety of a message delivered before eating and to analyze whether this result will vary according to disinhibition and restraint scores.

**Method/Design:** In a crossover randomized design, 81 lean women attended the laboratory on 2 occasions to test the same control biscuit as a fixed breakfast with either a satiating or a control message. Five groups of subjects were recruited according to their combined restraint and disinhibition scores, including high restraint high disinhibited (HRHD), low restraint low disinhibited (LRLD), high restraint low disinhibited (HRLD), low restraint high disinhibited (LRHD) and a median group, respectively.

**Results:** There was no significant effect of the satiating message on food intake at the next ad libitum meal served 3h after breakfast. However concerning appetite sensations, LRHD group had lower appetite, hunger, prospective consumption and desire to consume with the satiating message, mainly between 2 and 3 h after breakfast. Independently of the message, prospective consumption and desire to eat were higher for HD vs. LD volunteers.

**Conclusions:** These results showed a message effect on appetite feelings for LRHD women who might be the more responsive to environmental cues. Furthermore, the higher prospective consumption observed in high disinhibited volunteers confirmed the importance of considering the level of disinhibition in studies on appetite sensations, especially in free living conditions.

**Key Words:** satiety, message, disinhibition, restraint, appetite

**27/290. Nutrition Research and Education in Europe**  
**AGEs from bread crust: metabolic transit and effects on food intake and body weight**

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**Introduction:** Although early Maillard reaction products (MRP) improve food palatability, advanced final products can transmit undesirable flavour to the food and conditioning the food acceptance. MRP metabolic transit is unclear, but there are evidences supporting that absorption rate depends on molecular weight and solubility in the intestinal tract.

**Objectives:** To study the influence of bread crust MRP intake and of its different fractions on food consumption, final body weight and metabolic transit.

**Method/Design:** Soluble and insoluble fractions of bread crust were obtained after enzymatic hydrolysis. The soluble was ultrafiltered (5 kDa cut-off), obtaining compounds with molecular mass > 5 kDa (HMW) and < 5 kDa (LMW). The AIN-93G diet was the control diet and bread crust and bread dough were individually incorporated to it to a final concentration of 10% (bread crust and bread dough diets). The LMW, HMW and insoluble fractions were also individually added to the control diet in the proportion corresponding to bread crust (LMW, HMW and insoluble diets).

Seventy-two weanling rats were involved in an 88-d study, distributed into six groups and assigned to one of the dietary treatments. Food intake and body weight were weekly controlled. During the last week of assay feces and urine were collected to analyse AGEs-associated fluorescence.

**Results:** Food intake decreased in all groups fed MRP, therefore body weights were lower, especially in the HMW and insoluble groups. Animals fed bread crust and fractions excreted slightly darker feces and with higher amount of fecal fluorescent compounds, especially in the bread crust group. Consequently, in this group AGEs urinary elimination was lower.

**Conclusions:** MRP consumption reduced food intake and body weight of animals. The lower fecal excretion of AGEs observed after consumption of diets containing the fractions compared with the consumption of the complete bread crust would indicate increased absorption when compounds are administered in isolate form.

**Key Words:** Maillard reaction products, food intake, body weight, fluorescent compounds.

**27/299. Nutrition Research and Education in Europe**  
**Pilot study for assessment of nutrient intake and food consumption among kids in Europe (PANCAKE)**

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**Introduction:** At present the national food consumption data collected in Europe are heterogeneous, e.g. with respect to dietary assessment methodology. This hampers comparing results across countries. The PANCAKE project is one important component out of EFSA's many initiatives to harmonise the food consumption data collection across Europe in order to prepare a pan-European survey, the EU menu.

**Objectives:** To develop, test, and evaluate tools and procedures for a future harmonized pan-European food consumption survey among infants, toddlers, children (up to 10 y), and breastfeeding women.

**Method/Design:** In the first phase of the project, tools and procedures for the collection of food consumption data among the required age groups were developed; and a food picture book was validated. In the second phase two pilot studies are conducted for two alternative dietary assessment methods; each in about 100 participants in Belgium and Czech Republic. Finally, the tools and procedures used and the data collected will be evaluated providing recommendations for improvements and a choice in dietary assessment method for infants, toddlers and children.

**Results:** The developed dietary assessment methods are 1. the three-(consecutive) day food diary which is checked with the parent. caretaker and data entry is done afterwards using EPIC-Soft; and 2. two non-consecutive one-day food diaries followed by a completion interview with the parent.caretaker using EPIC-Soft. A questionnaire on background characteristics, a food propensity questionnaire, and validated food picture book for portion size estimation were developed. The protocols include instructions for random sampling, recruitment, administration and data handling of the food records, anthropometry, and evaluation. The pilot studies are half-way; the first evaluation of results will be available during the conference.

**Conclusions:** The proposed project is an important step towards fully harmonised food consumption data at European level among the younger age groups.

**Acknowledgement:** The project was funded by EFSA (project CFP.EFSA.DATEX.2009.02).

**Key Words:** Europe, food consumption survey, dietary monitoring, children, infants

**Adherence to Mediterranean diet reduces the risk of metabolic syndrome: a prospective study**

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**Introduction:** A Mediterranean diet pattern is beneficial against some cardiovascular risk factors and might lower the risk for developing metabolic syndrome, a major public health challenge.

**Objectives:** The objective of this analysis was to evaluate the predictive value of adherence to Mediterranean diet on the risk of metabolic syndrome (MetS) and on its components in adults in a prospective design.

**Method/Design:** Several scores aiming to evaluate adherence to Mediterranean diet were used. Mediterranean diet score (MDS), f-MED (new score developed by the authors) and MSDPS (Mediterranean style-dietary pattern score) were estimated through repeated 24-h records among participants of the Supplémentation en Vitamines et Minéraux Antioxydants study (SU.VI.MAX).

The association between Mediterranean scores and 6-y risk of MetS was evaluated among the 3,232 subjects free of MetS at baseline using logistic regression. MetS was defined according to the new Joint Interim Societies (JIS) definition. The association between Mediterranean scores and MetS components at the end of follow-up was estimated in 4,888 participants using covariate analysis.

**Results:** In multivariate model accounting age, gender, supplementation group, energy intake, education, tobacco smoking status, physical activity, baseline BMI and change in BMI during the follow-up, a lower risk of MetS was observed with increasing MDS ( $p=0.03$ ) and f-MED ( $p=0.001$ ).

Highest versus lowest adherence to f-Med was associated with a 49% (95%CI: 32%- 76%) reduction of risk of MetS.

A higher f-MED was inversely associated with waist circumference ( $p=0.03$ ), systolic blood pressure ( $p=0.001$ ), triglycerides ( $p=0.0001$ ) and HDL-cholesterol ( $p=0.02$ ). A higher MDS was inversely associated with waist circumference ( $p=0.0002$ ) and triglycerides ( $p=0.001$ ) and a higher MSDPS was associated with lower HDL-cholesterol ( $p=0.01$ ).

**Conclusions:** A Mediterranean diet pattern has a beneficial role on primary prevention of MetS in adults and thus helps reduce the burden of CVD disease.

**Key Words:** Mediterranean diet, dietary index, metabolic syndrome, cardiovascular risk factor

**Potential and requirements for a standardized pan-European food consumption survey using the epic-soft 24-h recalls**

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**Introduction:** Reliable and harmonized food consumption data across Europe are important for exposure assessment and the development and evaluation of nutrition policies for the European population. Several projects recommended EPIC-Soft as software for standardized 24-h recalls in pan-European dietary monitoring.

**Objectives:** To describe the strengths, limitations, and requirements of using EPIC-Soft in pan-European food consumption surveys, and to discuss potentials and barriers for a harmonized pan-European food consumption survey.

**Method/Design:** Lessons from the 'European Food Consumption Validation' (EFCOVAL) project, which aimed at (1) updating six existing and preparing one new country-specific EPIC-Soft version, (2) applying EPIC-Soft in validation and feasibility studies, and (3) estimating the intake of nutrients and flavouring substances, were integrated. The experience was discussed in the September 2009 workshop 'Pan-European Food Consumption Surveys – for Standardized and Comparable Transnational Data Collection'.

**Results:** EPIC-Soft is suitable for detailed and standardized food consumption data collection in pan-European food consumption surveys. A thorough preparation of all aspects of the food consumption survey is important for the quality and efficiency during data collection and processing. The preparation and data handling phase of working with EPIC-Soft is labour-intensive and requires trained, motivated and qualified personnel, and tools like food composition databases, and picture books.

**Conclusions:** Given the suitability of EPIC-Soft as standardized dietary assessment tool in European dietary monitoring, the proposed strategy towards a pan-European food consumption survey is to make thorough preparations, to allow flexibility in national extensions and

to start with a limited number of countries that are interested.

The Community funding under the Sixth Framework Program for the EFCOVAL project is acknowledged (FOOD-CT-2006-022895).

**Key Words:** Europe, dietary surveys, 24-h diet recall, EPIC-Soft, EFCOVAL

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**27/349.** Nutrition Research and Education in Europe  
**Moderate caloric restriction during gestation in rats impairs Insulin and Leptin sensitivity in the offspring**

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**Introduction:** We have previously described that 20% caloric restriction in rats during the first half of gestation results in higher food intake in their offspring and this concludes in higher body weight in males but not in females.

**Objectives:** Here, we aimed to assess the mechanisms responsible for hyperphagia and metabolic alterations caused by maternal caloric restriction during gestation in offspring.

**Method/Design:** Male and female offspring of 20% caloric restricted rats (from 1 to 12 days of pregnancy) (CR) and from controls were studied. These animals were, after weaning, fed a normal-fat (NF) diet until the age of 4 months, and then moved to a high-fat (HF) diet until the age of 6 months. Blood parameters and expression of selected genes in hypothalamus, retroperitoneal white adipose tissue (rWAT) and liver were analyzed at 25-days and 6-months of age. Plasma leptin was also measured during suckling.

**Results:** CR animals ate more calories than controls, but only males gained more weight. A peak in plasma leptin was found in control pups at the age of 9 days, but was absent in CR animals. 25-day-old CR animals showed lower mRNA levels of InsR in hypothalamus, rWAT and liver, and of ObRb in hypothalamus. At the age of 6 months, HOMA-IR index was higher in CR rats than controls, and CR males also displayed hyperleptinemia. Adult CR animals also showed lower ObRb mRNA levels in the hypothalamus (only females, but both showed altered NPY.POMC mRNA ratio), rWAT, and liver (males).

**Conclusions:** These results suggest CR rats are programmed for insulin and central leptin resistance, which may explain the dysregulation of appetite and other metabolic alterations, leading to a context favorable to obesity and diabetes development. These early programming effects could be associated with the absence of leptin surge during lactation.

**Key Words:** insulin and leptin sensitivity, caloric restriction, gestation, early programming, leptin.

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**27/368.** Nutrition Research and Education in Europe  
**Characterization of the early molecular events of adipose tissue development during overfeeding in humans**

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**Introduction:** Facing the current obesity epidemic, there is an urgent need to better understand the molecular processes occurring in adipose tissue (AT) during weight gain. The identification of the early steps of fat cell recruitment and/or enlargement in human should allow developing novel strategy to fight obesity.

**Objectives:** To better define the mechanisms involved in the early phase of AT development during weight gain induced by 56 days of lipid overfeeding in healthy men (n = 44).

**Method/Design:** Anthropometric (DXA, MRI) and metabolic parameters (carbohydrate and lipid parameters and energy expenditure) and global changes in gene expression in subcutaneous abdominal AT (Affymetrix chips) were followed during the overfeeding protocol (Day0, Day14 and Day56).

**Results:** Lipid overfeeding induced a weight gain of  $2.5 \pm 0.4$ kg (p=0.001) with significant increase in body fat mass (p<0.01). As estimated by HOMA change, insulin sensitivity decreased during the diet (p=0.01). Transcriptomic analysis revealed the kinetics of the changes in gene expression occurring during the initial phase of weight gain. About 180 genes were regulated at D14, most of them related to lipid metabolism and storage. Gene changes at D56 demonstrated that others functions and pathways progressively raised during weight gain, including extracellular matrix remodelling, blood vessel development, Wnt signalling pathway and adipogenesis.

**Conclusions:** Our data demonstrated, for the first time in human, that during the initial phase of weight gain in men, there is a strongly regulated induction of genes patterns, initiated by a rapid increase of lipid metabolism and followed by major remodelling of the tissue. It appears that inhibition of the canonical Wnt.β-catenin pathway, associated with extracellular matrix remodelling are crucial events in these processes. Our data provide therefore evidence for the implication of important molecular actors contributing to the development of AT in physiological situation of excessive energy intake in healthy subjects.

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**27/396.** Nutrition Research and Education in Europe  
**The standardized EPIC-Soft 24-hour recall software adapted for pan-European dietary monitoring and other dietary studies**

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**Introduction:** Standardized methodologies to collect and monitor dietary intake in Europe are needed to harmonize dietary surveillance and policies as well as nutrition research across the EU member states. Within EFCOVAL, the pre-existing standardized EPIC-Soft program was adapted and further developed to respond to specific needs of future pan-European dietary monitoring and to optimize its use.

**Objectives:** To present the concept of standardization and structure of the adapted EPIC-Soft program as the reference methodology for future pan-European monitoring surveys and other international nutritional projects.

**Method/Design:** The overall concept of the EPIC-Soft program is to combine “common” files, controlling for the standardization (e.g. common food classification, level of detail for food description, common photos of portion sizes and other quantification methods), with “country-specific” files, which capture the actual variability in dietary intake between countries (e.g. food and recipe lists). In addition, the same graphical user interface, algorithms to calculate final quantities and a set of probing and quality controls are used. The system is flexible enough to develop new country versions or to implement new specifications for targeted objectives or projects (e.g. level of detail needed in describing foods).

**Results:** The main functions and facilities implemented into the software to ensure high level of standardisation for data collection, description, quantification and quality controls across countries are presented. In addition, the stepwise procedures followed in the EFCOVAL project to identify, evaluate and implement new specifications are presented.

**Conclusions:** The adapted EPIC-Soft, evaluated and validated as described elsewhere, meets specific requirements for pan-European dietary monitoring.

**Acknowledgements:** The Community funding under the Sixth Framework Program for the EFCOVAL project is acknowledged

(FOOD-CT-2006-022895).

**Key Words:** EPIC-Soft. 24-hour dietary recall. standardization. Europe. EFCOVAL

## 27/412. Nutrition Research and Education in Europe **Dietary pattern affects blood levels of environmental pollutants in elderly Swedish men and women**

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**Introduction:** Food intake contributes substantially to our exposure of environmental pollutants such as Persistent Organic Pollutants (POPs) and numerous metals. Still little is known about exposure variability and studies associating diet and blood levels of pollutants in humans are scarce.

**Objectives:** To assess whether the overall dietary pattern determines blood levels of environmental pollutants in an elderly Swedish population.

**Method/Design:** Reliable dietary data and quantities of environmental pollutants were obtained from 639 70-year-old Swedish subjects (51% women, 49% men). Dietary data was collected from 7-d food records and dietary patterns were assessed with established methods, determining adherence to a Carbohydrate-Restricted-diet (CR), a Mediterranean-like-diet (MDS) and a WHO-recommended diet (by using the Healthy-Diet-Indicator, HDI). Blood levels of 21 POPs (including 14 PCBs, five pesticides, one dioxin and one brominated compound) were analysed by high resolution chromatography, mass spectrometry and 11 metals (Al, Cd, Co, Cr, Cu, Hg, Mn, Mo, Ni, Pb and Zn) by double-focusing mass spectrometry. Associations were analysed in multivariate regression models.

**Results:** PRELIMINARY RESULTS: Global exposure assessment showed significant differences between dietary patterns and overall quantities of environmental pollutants (all  $p < 0.01$ ). Dietary pattern-specific analyses revealed the CR diet to be positively associated with two PCBs and three pesticides. The MDS was positively associated with five PCBs, one pesticide, one brominated compound as well as higher levels of Cd, Pb and Hg. Conversely, HDI was negatively associated with one PCB, dioxin as well as Cd and Pb.

**Conclusions:** This unique study on multiple environmental pollutants in elderly Swedish men and women indicates a higher exposure pressure in individuals that adhere to either a Mediterranean or a carbohydrate restricted diet, whilst a WHO-recommended diet was associated with a lower exposure pressure of these pollutants. The origin of these pollutants as well as health consequences of the

observed associations remains to be established.

**Key Words:** Diet, environmental pollutants, PCBs, metals

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**27/433.** Nutrition Research and Education in Europe  
**The type of dietary fat influences breast milk fatty acid composition and offspring circulating levels**

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**Introduction:** Specific fatty acids (FA) during critical periods of early life have been proposed to play an important role in offspring development.

**Objectives:** To evaluate the effects of maternal dietary supplementation with different fat sources on the FA composition of breast milk and on the plasma profile of FA in offspring.

**Method/Design:** Pregnant Wistar rats were supplemented from day 14 of gestation and throughout the suckling period with 30% of the normal caloric intake in form of different fat sources: olive oil, butter or margarine. The control group received only water. The FA composition of the different fat sources, of milk samples (on day 12 of lactation), as well as of maternal and offspring plasma (at weaning) was measured by gas chromatography.

**Results:** Olive oil-fed dams showed the highest proportion of monounsaturated FA, particularly oleic acid, in breast milk, with no changes in plasma. Their offspring also showed the highest proportion of oleic acid in plasma; in turn they presented lower levels of polyunsaturated FA (PUFA) compared to the butter and margarine groups. The milk with the highest percentage of PUFA was the one of margarine-fed dams, which was rich in the most abundant FA of margarine (linoleic and alpha-linolenic acid). The offspring of margarine-fed dams also showed the highest proportion of PUFA in blood, compared with the other groups. Butter-supplemented dams displayed a higher proportion of saturated FA (SFA) in milk compared to olive oil and margarine dams, with no changes in their plasma levels, whereas their offspring showed lower proportion of SFA compared with control and olive oil groups.

**Conclusions:** These results illustrate the important role of the dietary source of fat during gestation and lactation on FA milk composition and on circulating FA profile in offspring, with the potential effects on their development and later metabolic health.

**Key Words:** fatty acid profile, breast milk, diet, gestation, lactation

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**27/437.** Nutrition Research and Education in Europe  
**Effects of Leucine supplementation ON mTOR activation of heart tissue of young rats**

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**Introduction:** in both animals and humans L-leucine can activate protein synthesis in skeletal muscle by mTOR thus stimulating body growth. Currently, however, it is not clear if heart tissue is also subject to the same regulatory mechanism of protein synthesis.

**Objectives:** The purpose of this study was to assess heart mTOR activation, heart mass, growth and liver function in young Wistar rats fed the standard AIN93-G diet supplemented with leucine at three levels (+3, +4.5 and +6% of the diet)

**Method/Design:** Twenty-four weanling male Wistar rats were divided into four groups and fed one of the following diets for 30 days: a) Control (AIN 93-G); b) 3% (AIN93-G +3% L-leucine); c) 4.5% (AIN93-G +4.5% L-leucine); d) 6% (AIN93-G +6% L-leucine). In the supplemented diets, energy was adjusted at the expense of carbohydrate. mTOR was quantified by the Westernblot technique. Serum insulin, uric acid, glucose, AST, ALT, and cardiac mass, total and relative protein were also determined. ANOVA and pos-hoc Duncan were applied to compare the means (significance  $p < 0.05$ ).

**Results:** mTOR activation (phosphorylated mTOR, total mTOR) peaked at L-leucine 4.5% (4.24-fold increase), but other blood parameters did not, except for glucose, which increased 7.1 and 12.5% with diets 4.5 and 6%, respectively. Supplementation did not adversely affect liver function as determined by AST, ALT, but body mass in the 6% group was significantly lower than that of the 4.5% group, showing a negative effect of the highest dose on body mass accretion. Either absolute heart mass or adjusted heart mass showed no difference between any two groups.

**Conclusions:** mTOR activity in the heart of Wistar rats was increased by supplementing the AIN 93-G diet with L-leucine, and its effect was highest at 4.5% supplementation, without affecting heart mass. Even 6% supplementation did not alter liver function, but adversely affected normal growth.

**Key Words:** L-leucine, growth, dose-response, protein synthesis, heart tissue

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**27/458.** Nutrition Research and Education in Europe  
**Fast food consumption and influencing factors in British and Greek adolescents**

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**Introduction:** During the last decades evidence suggests that adolescents' fast food consumption is increasing. However, types of



fast food as well as adolescents' factors for engaging in this behavior have not been assessed.

**Objectives:** The aim of this study is to assess types of fast food British and Greek adolescents consume and to investigate factors that affect their consumption using a qualitative approach.

**Method/Design:** Interviews were conducted with 10 boys and girls aged 16-17 from Greece and 8 boys and girls aged 15-16 from the UK, all frequent fast food consumers. The structure of interview was based on the Theory of Planned Behaviour (TPB), which investigated attitudes, social norms and perceived behavioural control of adolescents over fast food.

**Results:** Despite the different food cultures in Greece and the UK, adolescents seem to have a higher preference for westernized types of fast food, in other words fast food which can be found in American fast food chains. However, ethnic fast food such as Chinese, Indian and the Greek souvlaki is also particularly popular. Adolescents in both countries had positive attitudes towards fast food, mostly because of its good taste and the feeling of enjoyment that it offers. It was also found to serve as a way of escaping from their usual diet at home. In addition, social activities which usually accompany fast food and peers' social interactions seem to increase adolescents' preference for it. On the other hand, future health problems, weight gain and bad quality of fast food were all mentioned by adolescents, although they were not considered to be important at that age. Family's and peers' influence was little, as adolescents wanted to be nutritionally independent and make their own food choices.

**Conclusions:** Fast food consumption in adolescence may be better driven by internal and motivational factors, although further investigation is needed.

**Key Words:** Fast Food, Adolescents, Theory Of Planned Behaviour (Tpb), Qualitative

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### 27/477. Nutrition Research and Education in Europe **Adults' food safety awareness and behavior in Turkey**

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**Introduction:** Food safety is an essential public health issue for all countries. Consumers misperceived the nature of food borne illness and the most likely pathogen source. They believed food borne disease was a minor illness without fever that occurred within a day of eating a contaminated food.

**Objectives:** This paper seeks to determine the awareness and behavior of adults towards food safety.

**Method/Design:** 400 adult (200 female and 200 male) who agreed to take part in the study and who worked in four ministries in Ankara, from which consent was taken, constituted the sample of the study. The research data were collected through a questionnaire and face-to-face interviews. These food safety behavior points have been

analyzed in terms of gender, age, marital status and educational level of the adults involved.

**Results:** The mean age of adults was 35.88±8.78 years. Adults believe that agricultural drug residue is the most harmful issue in nutrition, while plastic-packaged foods are the least harmful in their opinion. *Brucella melitensis* is the bacteria most commonly known by adults. The mean behavior point of adults was 44.42±5.17. There is a significantly meaningful relation between food safety behavior points and gender, in addition to the relation with educational levels ( $p=0.000$ ).

**Conclusions:** Certain rules should be watched during buying, storing, preserving, preparing, cooking and serving stages in order to provide food safety. Food safety awareness should be promoted in every segment of society.

**Key Words:** Food Safety, Behavior, Adult, Nutrition

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### 27/482. Nutrition Research and Education in Europe **A first look about food supplements consumption habits in a Portuguese public higher school**

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**Introduction:** In Portugal, there is a lack of knowledge about food supplements consumption habits since very few studies were published about this important subject. By this, our work attempt to contribute to clarify the knowledge and behaviors of undergraduate students about food supplements.

**Objectives:** The main objective of this research study was to evaluate the food supplements consumption habits of undergraduate students.

**Method/Design:** the data collection was performed through an anonymous, confidential and voluntary original questionnaire to 505 undergraduate students from a public higher school. The test-retest method was used in the reliability study of the questionnaire. All statistical analyses were performed using SPSS software v. 17.0.

**Results:** Since the statistical results of test-retest method revealed an high reliability of the majority of the questions, the questionnaires were applied. The majority of the volunteers who participated in the survey, presented between 18 and 29 years old, were mainly Portuguese, and 64.8% were females and 34.9% males. Almost every students know or ever heard about food supplements (94.1%). Despite this great value, only half of those students affirmed that used use food supplements. The main categories of supplements known by students

are vitamins, products to enhance academic performance, minerals, weight loss products and products to enhance athletic performance. The commercial brands of food supplements used by the students inquired were various and around 40. Despite this, it's important to underline that some of the students revealed that they don't know the difference between medicines (drugs) and food supplements.

**Conclusions:** Since this study was restricted only to one public higher school, future research is required and it should examine food supplements use by students from different schools and scholar levels and, if possible, by the Portuguese population in general.

**Key Words:** questionnaire, food supplements, undergraduate students,

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## 27/646. Nutrition Research and Education in Europe Dietary data and mortality patterns in countries of the Black Sea region

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**Introduction:** Worldwide dietary data for nutrition monitoring and surveillance are commonly derived from Food Balance Sheets (FBS) and Household Budget Surveys (HBS).

**Objectives:** To identify and monitor dietary patterns in six countries surrounding the Black Sea (Bulgaria, Georgia, Romania, Russian Federation, Turkey and Ukraine) based on comparable data and to explore possible effects on mortality rates in the region.

**Method/Design:** In the context of the "Sustainable exploitation of bioactive components from the Black Sea Area traditional foods" (BaSeFood) project, food supply data from FBS, food availability data from HBS and age-standardised mortality rates from the WHO database were retrieved and analysed.

**Results:** Both food supply and availability data indicate plant-based dietary patterns in the area, with cereals and cereal products, fruits, vegetables and vegetable oils being mostly consumed. Nonetheless, the availability of staple plant foods decreased in years following political changes in the region. Due to religious and other cultural norms, pork meat is preferred in Bulgaria, Romania and Ukraine; poultry in Turkey; and, beef in the Russian Federation and Georgia. With respect to socio-economic inequalities, HBS data of

the last decade clearly indicate the high dependence of diet on the participants' residential area, educational attainment and income. Mortality indices retrieved from the WHO databases show that diseases of the circulatory system are the main cause of death in the region, with rates being substantially higher than the EU averages.

**Conclusions:** The change in the regime, the economic crisis following the USSR dissolution in 1991 and the opening of the food market have largely affected the population dietary choices and mortality rates. Targeted public health nutrition policies encouraging the consumption of health promoting traditional foods particularly among individuals of low socio-economic status are in need in the region.

**Key Words:** Black Sea area, diet, mortality

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## 27/702. Nutrition Research and Education in Europe Dietary sources and socio-demographic and economic factors affecting Vitamin D and calcium intakes in preschoolers

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**Introduction:** Low calcium and vitamin D intakes have been associated with health risks in childhood and adulthood. Previous findings on calcium and vitamin D intakes of Flemish preschoolers suggest that <70% of the children comply with the recommendations for vitamin D intake and <15% with the recommendations for calcium intake.

**Objectives:** This study aims to investigate dietary sources of calcium and vitamin D intake, and its associated socio-demographic, economic and lifestyle factors among preschoolers.

**Method/Design:** Three-day estimated diet records from 696 Flemish preschoolers 2.5-6.5 years old (51% boys) were used (66% of 1052 collected diaries). Contribution of 58 food groups to calcium and vitamin D intake were computed. Multiple linear regression was used to examine associations of intakes with socio-demographic, economic and lifestyle factors.

**Results:** Mean calcium intake (844 mg.d) was above, and mean vitamin D intake (2.0 µg.d) largely below the Belgian recommendations. Milk, sweetened milk drinks, and cheese were the main sources of calcium intakes (26%, 25% and 11%, respectively). Butter and margarine were the main vitamin D sources (26%), followed by growth milk (=fortified milk) (20%) and fish (15%). Calcium and vitamin D intake were negatively associated with participants' age, and calcium positively with parental education and family size. The child's gender, supplement use and physical activity level, and the

employment status and smoking behaviour of the parents were not associated with calcium or vitamin D intake.

**Conclusions:** Flemish preschoolers had too low vitamin D intakes while most had adequate calcium intakes. Milk (including sweetened, fortified, growth milk) was the main food source of calcium intake and the second important source of vitamin D intake after butter and margarine. Calcium and vitamin D intakes were negatively associated with age, and calcium intake was positively associated with the educational level of the mother and the father and family size.

**Key Words:** vitamin D, calcium, child, socio-demographic, economic

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## 27/814. Nutrition Research and Education in Europe Are nutrition and cataract linked?

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**Introduction:** Few studies have examined links between nutrition and cataractogenesis, although there's a suggestion of a significant association

**Objectives:** This pilot study aimed to analyze the pattern of nutritional status, body fat and usual dietary intake among patients referred to cataract surgery

**Method/Design:** 46 patients were evaluated. Nutritional parameters: weight(kg), height(m), body mass index(BMI) categorized according to WHO's criteria, waist circumference(cm), %body fat(%BF) with bipolar bioimpedance analysis. Usual dietary intake was collected with an 86-item semi-quantitative food frequency questionnaire, validated for the Portuguese population. Descriptive analysis was performed

**Results:** Mean age was 67±9 (42-80) years; 54% of patients were women and 70% were ≥65 years. Regarding nutritional status, 78% of patients were overweight, obese and 71% of men and 92% of women had a %BF higher than the cut-off limits of 25% and 30%, respectively. Waist circumference was higher than the recommended cut-off values in 65% patients. Food frequency analysis showed a low intake in vegetables: only 56% patients had a daily intake of vegetable soup. Moreover, 63% report an intake of <3 fruits/day. Although a regular intake of starchy foods was reported, 65% of patients had a daily intake of sugar, sweets & desserts.

**Conclusions:** Our findings showed a high prevalence of overweight, obesity, excessive body and abdominal fat amongst cataract patients. Dietary pattern was characterized by a low intake in potentially protective foods, with a high content in fiber and antioxidant nutrients. It was also reported a high intake in poor nutritional foods, with a high content in sugar. Uncontrolled hyperglycemia along with chronic inflammation status due to excessive body adiposity is thought to cause lens tissue damage, which may conduce to early

cataract development.

**Key Words:** cataract, obesity, diet, body fat, waist circumference

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## 27/871. Nutrition Research and Education in Europe

### CHANCES: a chance to assist health and ageing research

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**Introduction:** The population is ageing both in Europe and the United States, and while the prolonged life expectancy is an asset, it brings along a full range of public health issues which need to be addressed in order to ensure that the extra years of life are as good as possible, without limited health and social involvement opportunities

Quality data on health of ageing populations is essential for nowadays public health research. The Consortium on Health and Ageing: Network of Cohorts in Europe and the United States (CHANCES) is a multinational large scale project funded by the European Commission under the FP7 framework. The CHANCES consists of 13 cohorts from different countries including large multicenter cohorts like: (Epic-Elderly, MORGAM etc.) The main idea of the project is to standardize and harmonize the data on health and ageing available from the different participating cohorts and to create a large database for current and future analyses.

**Objectives:** The main objectives of the project include research analyses on the main chronic conditions affecting elderly population: cancer, cardio-vascular diseases and diabetes, fractures and osteoporosis; cognitive decline and the Alzheimer's disease. Many other indicators like: multimorbidity, all cause mortality, nutrition, biomarkers and genetic data will be studied as well.

**Method/Design:** Pooled or parallel analyses will be considered for the CHANCES data. In both cases the process will be assisted by the network of statisticians created within the CHANCES.

**Results:** The first year of the project was dedicated to data assessment and harmonization issues. Availability of the data in different cohorts was assessed through the questionnaires created for specific topics of interest.

**Conclusions:** The CHANCES is open for collaboration with other existing Health and Ageing cohorts. This collaboration will be considered in case by case bases.

**Key Words:** health, ageing, consortium, cohorts, harmonization

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## POSTER SESSIONS

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### 27/9. Gut: An open door to Nutrition

#### Effects of probiotics on natural killer cell activity in vitro

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**Introduction:** Probiotics have the potential to modulate immune function, especially in older people. However, the exact mechanisms are not clearly understood.

**Objectives:** The current study aimed to compare the effects of a novel probiotic, *B. infantis* CCUG 52486, with three commercial strains, *B. longum*.SP 07/3, *L. rhamnosus*.GG and *L. casei*. Shirota (LcS), on natural killer (NK) cell function and activation using cells from young and older subjects in an in vitro model.

**Method/Design:** PBMCs from 8 healthy young subjects (23-30yrs) and 8 healthy old subjects (65-76yrs) were incubated with medium (control), Con A (positive control), or each probiotic strain for 24hrs. NK cells were identified by antibody staining. NK cell activity and activation markers (CD69 and CD25) were measured by flow cytometry.

**Results:** In young subjects, NK activity was significantly increased by *B. infantis*, *B. longum* and LcS, whereas L.GG had no effect. In the older subjects, all four probiotics increased NK activity, although L.GG had the least stimulatory effect. Activation of NK cells was also increased by probiotics. There were two clear examples of age-specific effects of *B. infantis*, but not other strains. First, enhancement of NK activity by *B. infantis* was greater in the young than the older subjects. Second, NK cell activation was enhanced by *B. infantis* to a greater degree in the older group.

**Conclusions:** Probiotics were potent stimulators of NK cell activity and activation in both young and older subjects, although L.GG had the least potent effect on NK activity. *B. infantis* was the only probiotic to modulate NK cell function and activation differentially in young and older subjects.

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### 27/14. Gut: An open door to Nutrition

#### Ability of three probiotic strains to modulate immune system

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**Introduction:** Probiotics seem to modulate the immune system. This effect is specific of each strain. Three probiotic strains (*L. paracasei* CNCM I-4034, *B. breve* CNCM I-4035 and *L. rhamnosus* CNCM I-4036) were isolated from faeces of exclusively breastfed infants.

**Objectives:** The aim was to test the ability of these strains to modulate the immune response performing different in vivo and in vitro assays.

**Method/Design:** Male BALB/cJ mice (6-8 weeks old) distributed in four groups received probiotic strains (10<sup>9</sup> ufc/ml PBS) or placebo by oral gavage for 4 weeks. The main outcomes were: gained weight; presence of probiotic strains tested by RT-PCR after isolation of DNA from faeces (Kit DNA Stool minikit Qiagen) and IgA tested by ELISA test (Mouse IgA ELISA quantitation set, Bethyl Laboratories) in faeces; Cytokines production (IL-2, IL-4, IL-10, IL-12, IFN- $\gamma$ ) (measured by flow cytometry) in spleenocytes stimulated with ionomycin and phorbol myristate acetate and cytokine production in bone-marrow-derived macrophages (BMDM) after incubation with probiotic strains with and without presence of lipopolysaccharides (LPS).

**Results:** Not significant differences in weight among groups and with respect to control group were observed. All strains were detected in faeces from mice treated with them. Total IgA in faeces from group fed with *B. breve* showed statistically differences with respect to control group ( $p < 0.05$ ). IL-10 production from group fed with *B. breve* was higher than the other groups. TNF- $\alpha$  production was increased in BMDM treated with the strains.

**Conclusions:** *B. breve* could have an anti-inflammatory effect due to higher IL-10 production and it could have an effect over immune system due to higher production of total IgA.

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### 27/36. Gut: An open door to Nutrition

#### Carotenoid exposure of inflammatory stimulated caco-2 cells- impact on inflammatory mediators and the proteome

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**Introduction:** Carotenoids are strong dietary antioxidants found in a variety of plant and vegetable foods. Their consumption has been linked to a variety of health beneficial effects. However, no data is

available on their action on the intestinal epithelium, which is exposed to the highest concentrations of carotenoids in the human body. Carotenoids could act in a preventive way on intestinal inflammatory diseases such as Crohn's disease and Ulcerative Colitis.

**Objectives:** The objectives were to investigate whether lycopene and  $\beta$ -carotene, at concentrations that can be reached via the diet (10 mg/L and 25 mg/L), could aid in reducing the inflammatory response of inflamed Caco-2 cells. This was measured via biomarkers of inflammation, including IL-8, nitric oxide, prostaglandin 2, and signalling molecules NF- $\kappa$ B and MAPK. Furthermore, proteomic analyses from exposed cells vs. a control (empty micelles) were conducted to investigate the general influence of the exposure.

**Method/Design:** Differentiated Caco-2 cells were stimulated for inflammation with a TNF- $\alpha$ /IL-1 $\beta$  mixture and were then exposed to artificial micelles containing either lycopene or  $\beta$ -carotene in two different concentrations (10mg/ml and 25mg/ml). The inflammatory response was then measured via different inflammatory mediators (IL-8, PGE-2 and NO) and signalling molecules (NF- $\kappa$ B and MAPK). The proteome response was determined by using 2-dimensional differential in-gel electrophoresis (2D-DiGE).

**Results:** The study revealed that isolated carotenoid standards, under the conditions and concentrations used, had no statistical significant anti-inflammatory effect on the biomarkers and signalling molecules observed. Nevertheless, analyses of the proteome suggested that 15 proteins were differentially regulated following carotenoid exposure.

**Conclusions:** Beta-carotene and lycopene were not able to show any significant effects on inflammatory mediators, albeit the proteomic results indicate that several pathways that could result in potential inflammation, such as antioxidative enzymes, were involved. More studies in this domain, examining different carotenoids, and perhaps mixtures representing more natural conditions, are warranted.

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### 27/37. Gut: An open door to Nutrition

#### **Exploiting molecular diversity in legume Bowman-Birk inhibitors to dissect their potential as colorectal chemopreventive agents**

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**Introduction:** Keywords: Bowman-Birk Inhibitors, Chemoprevention, Colorectal Cancer, Legumes, Serine Proteases

Bowman-Birk inhibitors (BBI) from legumes, including soybean, pea, lentil and chickpea, belong to a class of naturally-occurring serine protease inhibitors with potential anti-inflammatory and chemopreventive properties within the mammalian gastrointestinal tract (GIT). These proteins, which are extensively disulphide-linked within molecules, have been shown to be structurally and functionally resistant to the challenges of the GIT in vivo, retaining significance as a

bioactive compound in the large intestine.

**Objectives:** The potential exploitation of certain plant protease inhibitors in human health-promotion programmes depends on elucidation of the molecular basis for the variation in biological activities among variant forms.

**Method/Design:**

**Results:** Recent studies have demonstrated a significant concentration- and time-dependent decrease in the growth of HT29 human colon adenocarcinoma cells when treated with a mixture of isoinhibitors corresponding to soybean BBI. These anti-proliferative effects extend to BBI from other legume sources, including those from pea and lentil, where IC50 values fall in the range between 32 and 73  $\mu$ M; in contrast, the growth of non-malignant colonic fibroblastic CCD18-Co cells is unaffected by BBI.

It has been demonstrated recently that IBB2, a major isoform of soybean BBI which inhibits trypsin-like proteases only, exerts anti-proliferative effects on colon cancer cells.

**Conclusions:** This is the first indication of the involvement of the trypsin inhibitory domain of BBI in potential health benefits within the GIT and, together with earlier work, suggests that both trypsin- and chymotrypsin-like proteases involved in carcinogenesis should be considered as potential targets of BBI and related proteins. A better understanding of the action mechanism of these dietary proteins on cell proliferation, together with the identification of their potential therapeutic targets, may be expected to open up possibilities for their use in human health-promoting programmes.

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### 27/39. Gut: An open door to Nutrition

#### **The food contaminant deoxynivalenol modifies the absorption at the intestinal level**

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**Introduction:** The gastrointestinal tract represents the first barrier against food contaminants as well as the first target for these toxins. Deoxynivalenol (DON) is a mycotoxin produced by different species of *Fusarium* genera that may contaminate feed and food. Through consumption of contaminated cereals and cereal products, swine are particularly exposed to this mycotoxin

**Objectives:** In the present study we investigated the capacity of DON to modify the epithelial intestinal functions: the trans-epithelial electrical resistance (TEER) and the absorption using an insert model.

**Method/Design:** IPEC-1 were cultivated in DMEM-F12 media in polyethylene inserts and treated or not after differentiation with 10  $\mu$ M DON and the TEER was measured during 14 days with a Millicell-ERS Voltohmmeter. Apical and basolateral IPEC-1 media was collected every two days for 16 days after starting treatment and DON concentration was measured using an HPLC assay.

**Results:** We demonstrated that, in the intestinal porcine epithelial cell line (IPEC-1), 10 $\mu$ M DON decreased in a time dependent manner

the TEER from 12.34 kΩ×cm<sup>2</sup> (day 0) to 2.69 kΩ×cm<sup>2</sup> (day 16) in the toxin treated inserts, comparing with the control where the TEER maintained constant between 11.4 kΩ×cm<sup>2</sup> (day 0) and 14 kΩ×cm<sup>2</sup> (day 16). This showed that DON is able to damage the integrity of the intestinal epithelial cells monolayer. Indeed, the assessment of DON absorption measured in the apical versus basolateral side of the inserts, showed a 2.83 fold increase of DON absorption in the toxin treated cells compared to that of the control.

**Conclusions:** Taken together, our results showed that the toxic action of DON can modify the trans-epithelial electrical resistance and the epithelial absorption, facilitating the increase of the concentration of undesirable compounds in the blood stream.

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#### 27/44. Gut: An open door to Nutrition

### Perinatal antibiotic treatment influences intestinal enzymes involved in endotoxin detoxification and inflammation in adult offspring

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**Introduction:** Intestinal alkaline phosphatase (IAP), aminopeptidase N (APN) and dipeptidyl-peptidase IV (DPP4) have important roles in gut homeostasis with regard to bacteria and inflammation. Bacterial colonisation of the gut may influence its susceptibility to insults later in life. However, little is known on long-term effects of disturbances in gut colonisation on key intestinal enzymes in adulthood.

**Objectives:** We hypothesized that peripartum antibiotic treatment of mothers affects offspring intestinal enzymes in adulthood.

**Method/Design:** Sows (11 antibiotic-ATBQ, 12 controls-C) were treated with amoxicillin (40 mg/kgBW/d) orally around parturition (day -10 to +21) in order to disturb sows' microbiota and offspring gut colonisation. At the age of 5 months, pairs of offspring of similar BW within litters from each sows' group (10 pairs/treatment) were randomly offered a low (LF) or high (HF) fat diet (2 and 11% fat) for 4 weeks. Then, jejunal mucosa was collected and activities of IAP, APN and DPP4 (plus sucrase as a marker enzyme sensitive to dietary energy source) were analysed using specific substrates. Data on specific (SA) and total (TA) activities were analysed using a MIXED model (SAS).

**Results:** APN SA decreased in HF controls but increased in HF ATBQ pigs (interaction, P=0.058). DPP4 SA and TA were higher in ATBQ pigs than controls (P<0.05 and P<0.01). IAP SA and TA were lower in ATBQ pigs compared to controls (P<0.05). LF-ATBQ pigs had lower IAP activities than the other groups (interaction, P=0.055 and P<0.05). Sucrase SA and TA were lower in HF than LF controls (P<0.05) without significant differences in ATBQ pigs (interaction, P=0.087 and P<0.05).

**Conclusions:** Perinatal antibiotic treatment of mothers has long-lasting influence on intestinal enzymes with key roles in gut homeostasis. Disturbed intestinal enzyme activity profiles in individuals born from antibiotic-treated mothers may account for higher susceptibility

to bacterial endotoxins and inflammation.

**Key Words:** intestine, alkaline phosphatase, aminopeptidase, dipeptidyl-peptidase, perinatal antibiotics

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#### 27/45. Gut: An open door to Nutrition

### Bacterial lipopolysaccharide modulates gut mucosal permeability and absorptive and secretory physiology dose- and site-dependently

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**Introduction:** Bacterial endotoxins like lipopolysaccharide (LPS) alter gut absorptive and secretory physiology and are suspected to induce metabolic inflammation following increased gastrointestinal permeability. However, little is known on regional variations in gut barrier and physiological responses to LPS.

**Objectives:** Our aim was to evaluate permeability, absorptive and secretory physiology of jejunum and ileum (small intestine, SI) and colon to LPS.

**Method/Design:** Four overnight fasted 30-kg pigs were slaughtered and their jejunal, ileal and colonic mucosa randomly exposed to graded doses (0, 1, 5, 25 µg/ml) of Escherichia coli O55:B5 LPS on both sides in Ussing chambers for 2h. Permeability to small (FD4) and large (HRP) markers, electrical resistance (TEER), short-circuit current (Isc), Na<sup>+</sup>-glucose absorption and carbachol-induced chloride secretion were determined. Data were analysed by SAS using a MIXED model (site, LPS dose, interaction).

**Results:** FD4 permeability increased from jejunum to colon (P<0.0001) with no significant effect of LPS dose or interaction. HRP permeability was higher in colon than in SI (P<0.001). Colonic HRP flux doubled with LPS 1µg/ml only (P<0.05). TEER was higher in jejunum than ileum or colon (P<0.05). Jejunal TEER was reduced by LPS (all doses, P<0.05). Basal Isc was not influenced by LPS dose or gut site. Glucose absorption was higher for LPS 5 µg/ml only (P<0.05) essentially in the ileum (P<0.05). Carbachol-induced secretion was higher in colon than SI (P<0.05). Colonic secretion was higher with LPS 1 µg/ml (P<0.05).

**Conclusions:** LPS dose is critical in modulating gut permeability and absorptive and secretory physiology regionally. All LPS doses increased jejunal ionic permeability but only the medium dose stimulated ileal glucose absorption. Colonic mucosa was sensitive to the lowest LPS dose (close to LPS concentration in colonic digesta) in terms of trans-cellular permeability to macromolecules and secretory responses. This might have immune and metabolic implications.

**Key Words:** lipopolysaccharide, gut, permeability, absorption, secretion.

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## 27/71. Gut: An open door to Nutrition

### Association between serum gamma-glutamyltransferase and pulmonary function

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**Introduction:** Gamma-glutamyltransferase (GGT) regulates homeostasis of glutathione, a major antioxidant.

**Objectives:** We investigated whether serum GGT levels are associated with lung function independently of cardiometabolic risk factors and inflammatory markers

**Method/Design:** A cross-sectional analysis was conducted among 15,514 healthy nondiabetic subjects. Biochemical study was performed and pulmonary function was determined by forced vital capacity (FVC) or forced expiratory volume in 1 second (FEV1).

**Results:** According to GGT quartiles, obesity, blood pressure, fasting glucose, total cholesterol, triglyceride, uric acid, C-reactive protein (CRP) levels increased, but high density lipoprotein cholesterol levels decreased. In the highest GGT quartile, the odds ratio (95% confidence interval) for having low FVC was 1.62 (1.37-1.81;  $P < 0.001$ ) for men and 1.53 (1.28-1.84;  $P < 0.001$ ) for women, compared with those in the lowest quartile after adjustment for established risk factors. Further adjustment for metabolic syndrome and CRP did not change the significance. Similarly, subjects in the lowest GGT quartile had the highest risk for low FEV1 (OR 1.47, 95% CI 1.22-1.77;  $P = 0.001$  in men; OR 1.58, 95% CI 1.33-1.88,  $P < 0.001$  in women). GGT levels, as continuous measures, were also linearly associated with both FVC and FEV1 in all subjects and remained significant in subjects divided by gender or metabolic syndrome ( $P < 0.001$  for all).

**Conclusions:** GGT was associated with impaired lung function independently of confounding factors, including metabolic syndrome and CRP. Further studies are needed to confirm a predictive role of GGT elevation in the development of lung disease

**Key Words:** Gamma-glutamyltransferase; Pulmonary function; Metabolic syndrome; Inflammatory markers.

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## 27/74. Gut: An open door to Nutrition

### Does gluten-free diet resolve vitamin and mineral deficiencies associated to onset-celiac disease? Do patients need supplementation?

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**Introduction:** Celiac disease (CD) represents a main cause of malabsorption which no longer constitutes a children-related disorder, because it appears at any stage of life. CD causes gut anomalies leading to absorption of vitamins and dietary minerals' related disorders. Ongoing to a gluten-free diet (GFD) resolves symptoms after two weeks in 70-95% patients, but intestinal histopathological lesions only reverts after months or years

**Objectives:** To analyze the evolution of anthropometric and analytical parameters in a series of adult CD patients after following a GFD

**Method/Design:** Analytical and anthropometric data from 23 adult-onset CD patients were collected before and after six month of GFD. Daily calcium (1200 mg) and vitamin D3 (800 UI) supplementation were prescribed if demonstrated deficiency and/or low mineral bone density in DEXA. Other nutritional or vitamin supplements weren't allowed

**Results:** 96% of patients were women, average age of 41.2 years, mean body mass index (BMI) of 25.15 kg/m<sup>2</sup>. Under normal levels of haemoglobin (22%), serum iron (26%), calcium (39%), vitamin D (87%) and prealbumin (65%) were present at baseline moment, being the remaining parameters (albumin, phosphor, magnesium, copper, cholesterol, folic acid, vitamins A and B12) into normality or low in <5% of cases. After six months of following GFD, a minimum increase in bodyweight was observed (200 g), together with normalization of serum calcium in 96% of patients. However, the remaining parameters didn't significantly change, including 25HO-vitamin D (from 19,4 to 22,5ng/mL)

**Conclusions:** This study document the lack of resolution of many nutritional deficiencies linked to CD after 6 month following a GFD. A supplementation in these initially altered parameters can be then recommended. Daily supplements of calcium (1200 mg) and vitamin D3 (800 UI) seems to be able to correct calcium but not vitamin D serum levels, for which higher dosages could be recommended

**Key Words:** Celiac disease, nutritional deficiencies, supplementation.

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## 27/95. Gut: An open door to Nutrition

### Biological properties of sulphated polysaccharides from sugar kombu in healthy rats

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**Introduction:** The edible seaweed sugar Kombu (*Saccharina latissima*) is a good source of dietary fibre (30.2 g/100 g dm), protein (25.7 g/100 g dm) and minerals (34.8 g/100 g dm) with interesting associated physicochemical properties [Gómez-Ordóñez et al. (2010). Food Res Int 43: 2289-2294]. It also presents antioxidant activity in vitro attributed to the sulphated polysaccharides of its dietary fibre, mainly fucans and alginate. We have evidenced previously the potential antioxidant activity of the sulphated polysaccharides in brown seaweeds [Rupérez et al. (2002). J Agric Food Chem 50: 840-845].

**Objectives:** The aim of this study was to evaluate the effect of a sugar Kombu dietary fibre-rich diet on the biochemical parameters (total protein, albumin, uric acid, glucose, total cholesterol, LDL- and HDL-cholesterol and triglycerides), prebiotic effect, and antioxidant activities in healthy rats.

**Method/Design:** Female Wistar rats were fed either a basal diet or a diet supplemented with 10% sugar Kombu for four weeks. Then, prebiotic effect was assessed in the caecum, and antioxidant activity was measured in the serum and caecal compartment. Also the total bacterial count of faeces was performed.

**Results:** Several health-promoting effects in rats fed sugar Kombu (treated group) are expected to be found, such as a decrease in total cholesterol and an increase in antioxidant status. Regarding prebiotic effect, an increase of the intestinal length is expected along with a higher caecum weight and caecal fermentation in the treated group as compared to the control group.

**Conclusions:** Sugar Kombu and the sulphated polysaccharides from this seaweed may be used as a functional ingredient with potential health-promoting effects.

**Key Words:** Seaweeds; dietary fibre; sulphated polysaccharides; antioxidant activity; prebiotic effect.

diets i.e. in C+FeZn-group was lower ( $31,1 \pm 1,94 \mu\text{mol TE/g}$ ) than in D+FeZn-group ( $36,4 \pm 5,66 \mu\text{mol TE/g}$ ). **Conclusions:** It seems that in case of iron deficiency, simultaneous supplementation with iron and zinc has a positive impact on the intestine TAC during this intervention and following cessation of it.

The study was funded by grant from Ministry of Science and Higher Education (MNiSzW), Poland (No N N312 329735).

**Key Words:** total antioxidant capacity, iron, zinc, intestine

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## 27/100. Gut: An open door to Nutrition

### The influence of iron and zinc supplementation on intestine total antioxidant capacity in rats

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**Introduction:** There is limited data on protective role of zinc on total antioxidant capacity (TAC) during diet supplementation with iron and after discontinuation of it.

**Objectives:** The aim of this study was to determine the effect of high doses of iron or iron and zinc supplementation on initial segment of the small intestine TAC in rats fed a control (C) and iron deficient (D) diet

**Method/Design:** The study was conducted on 132 male Wistar rats, initial weight  $294 \pm 20$  g, in 3 stages: 4-week adaptation to the diets: C (AIN-93) or D (iron levels  $7.4 \pm 3.1 \mu\text{g/g}$ ); 4-week intervention i.e. C and D subgroups received 10-times more, compared to C, iron (C+Fe, D+Fe) or iron and zinc (C+FeZn, D+FeZn); 2-week post-intervention period (the same diets as during the adaptation stage). TAC was measured using TEAC method based on the capacity of a sample to inhibit the ABTS+•.

**Results:** The intestine TAC was significantly lower among rats fed C+Fe-diet ( $30,6 \pm 2,07 \mu\text{mol TE/g}$ ) than among rats fed C diet ( $37,4 \pm 2,14 \mu\text{mol TE/g}$ ). Moreover, the difference between C+Fe and D+Fe group ( $30,6 \pm 2,07 \mu\text{mol TE/g}$  vs.  $37,0 \pm 3,31 \mu\text{mol TE/g}$ ) was significant. After the third stage the significant relationship in intestine TAC was found only among rats fed iron and zinc supplementation

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## 27/101. Gut: An open door to Nutrition

### The influence of iron and zinc supplementation on apparent absorption in rats fed deficient diet

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**Introduction:** There is limited data on minerals apparent absorption during and after diet supplementation with selected minerals in the situation of vitamin and mineral deficiency.

**Objectives:** The purpose of this study was to determine the effect of high doses of iron or iron and zinc supplementation on apparent absorption of iron, zinc and copper in rats fed a diet deficient in vitamins and minerals.

**Method/Design:** The study was conducted on 88 male Wistar rats, initial weight  $296 \pm 23$  g, in 3 stages: 4-week adaptation to the diets: C-control (AIN-93) and D-deficient (50% of all vitamins and minerals compare to C); 4-week intervention i.e. D subgroups received 10-times more compared to C, iron (D+Fe) or iron and zinc (D+FeZn); 2-week post-intervention period (the same diets as during the adaptation stage). Feces were collected through 3 days in the middle of each stage. Mineral levels in the samples were measured using ASA method after microwave mineralization in HNO<sub>3</sub>.

**Results:** Compared to D-diet, apparent absorption of iron from D+Fe diet was higher (23.0 vs. 40.1%) and that of zinc (30.3 vs. 15.9%) and copper (5.6 vs. -12.2%) were lower. The absorption from D+FeZn diet compared to D-diet was increased: iron from 23.0 to 39.2%, zinc from 30.3 to 39.0% and copper from 5.6 to 17.6%. Discontinuation of iron supplementation decreased the apparent absorption of iron (to 5.8%) and increased that of zinc (to 30.7%) and copper (to 12.5%), while discontinuation of iron and zinc supplementation decreased the absorption of iron, zinc and copper to 28.5%, 26.7% and 14.3%, respectively.

**Conclusions:** In case of vitamin and mineral deficiencies in the diet, simultaneous supplementation with iron and zinc decreased the adverse effect of iron on the apparent absorption of zinc and copper. Discontinuation of such treatment resulted in lower changes of absorption than in case of iron supplementation termination.

**Key Words:** Apparent Absorption, Iron, Zinc, Cooper, Rats



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**27/142. Gut: An open door to Nutrition**  
**Probiotic strains specifically stimulate**  
**NFKb, miRNA in endothelial cells**

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**Introduction:** Probiotic strains have been shown to activate cell responses involving toll like receptors (TLRs) and NF-kb pathways. Different expression profiles have been found for different probiotic strains within similar groups as well dead cells and cells of different growth phases. LPS is known to activate TLR4, NF-kbs but also mi RNAs.

**Objectives:** We investigated effects of Lactobacillus, Bifido- and Streptococcus strains on expression of inflammatory mediators, NF-kb and miRNAs in the endothelial CACO II cell line and in dendritic cells.

**Method/Design:** Expression of immune- and inflammatory mediators, kbs and miRNAs were analysed by qRT-PCR.

**Results:** In CACO-2 cells the expression of IL6 and TNFa, as well as NF- $\kappa$ B p65 and Ikb was increased differently after treatment with heat inactivated probiotic cells. kBs showed an increased expression in the first 60 min and decreased thereafter. LPS and probiotic strains to different degrees decreased mi RNA levels.

**Conclusions:** Our results from CACO II cells and dendritic cells support the hypothesis that heat inactivated cells from often closely related probiotic strains or bacteria from the gut differentially induce signaling pathways, gene expression and mi RNAs which epigenetically controll gene expression.

**Key Words:** probiotic, miRNA, NFkb

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**27/147. Gut: An open door to Nutrition**  
**Changes in human fecal microbiota due**  
**to ageing, chemotherapy or antibiotic**  
**treatment with or without probiotic inter-**  
**vention**

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**Introduction:** Ageing and medical intervention (chemotherapy or antibiotics treatment) changes the composition of the gastrointestinal microbiota. These shifts in the structure of the microbiota may contribute to invasions of pathogens or disturbed gastro intestinal- or immune functions.

**Objectives:** The improved analysis of groups of gastrointestinal microbiota due to ageing, chemotherapy or antibiotic treatment with or without probiotic intervention.

**Method/Design:** We analyzed feces of groups with different age or patients undergoing antibiotic- or chemotherapy treatment. 16S rRNA genes of bacteria were analyzed with TaqMan PCR,

denaturing gradient gel electrophoresis (DGGE) fingerprinting and high-throughput sequencing.

**Results:** Ageing resulted in a significant reduction of the abundance and diversity of bacteria, especially clostridia subgroups. Chemotherapy induced a significant drop in the abundance of microbiota ( $p = 0.037$ ) following a single treatment the microbiota which recovered within a few days sometimes even displaying a "rebound-effect". The chemotherapeutical treatment marginally affected the Bacteroides while the Clostridium cluster IV and XIVa were significantly more sensitive to chemotherapy and antibiotic treatment. DGGE fingerprinting showed decreased diversity of Clostridium cluster IV and XIVa in response to chemotherapy with cluster IV diversity being particularly affected by antibiotics. The occurrence of *C. difficile* in three out of seventeen subjects was accompanied by a decrease in the genera Bifidobacterium, Lactobacillus, Veillonella and Faecalibacterium prausnitzii. Enterococcus faecium increased following chemotherapy. As these changes in the human gut microbiota may favor colonization with *C. difficile* and Enterococcus faecium, feces of groups of patients receiving antibiotic treatment in combination with a probiotic therapy with Lactobacillus casei were compared.

**Conclusions:** Ageing and medical intervention (chemotherapy or antibiotics treatment) decreases the microbial diversity and abundance of total bacteria. Probiotic intervention tends to influence subgroups as Enterobacteriaceae and Lactobacillus.

**Key Words:** microbiota; antibiotica associated diarrhea; probiotica.

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**27/149. Gut: An open door to Nutrition**  
**IgE and IgG antibodies concentration**  
**against food allergens in IBS patients and**  
**healthy individuals**

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**Introduction:** In recent years, the hypothesis that irritable bowel syndrome (IBS) symptoms result from allergies, which have not been identified has been gaining more and more supporters. Attempts are being made to find a connection between the IBS symptoms and food allergy, particularly IgG but also IgE dependent.

**Objectives:** The main objective of this study was evaluation the usefulness of tests for IgG and IgE antibodies in patients with IBS against food allergens and the possible use of the obtained results for the introduction of an elimination diet.

**Method/Design:** The study included 100 patients with IBS diagnosed on the basis of Rome criteria II. The control group consisted of 50 healthy individuals. Total IgG and specific IgE antibodies against eight sources of food allergens were tested. The concentration of antibodies was examined by enzyme immunoassay test. Calculations were performed in Stata v.10.

**Results:** Positive tests for IgG antibodies were found in more than 90% IBS patients. For the three tested mixtures of allergens all the

results were positive. In the control group results were similar. Tests of specific IgE antibodies have shown that increased concentrations of sIgE occurred more frequently at the control group compared to the IBS patients (93.5% vs. 70, 2%), but serum sIgE levels did not exceeded the value of 3.49 IU/ml (class II). Obtained average sIgE concentrations were also higher among healthy individuals.

### Conclusions:

1. Determination of IgG and IgE concentration are not useful in IBS patients.

2. Elevated level of IgG in serum is probably the organism's response to the products consumed rather than an expression of hyperresponsiveness to allergens contained therein.

3. In the serum of none IBS patients the concentration of sIgE to any tested food allergen was no higher than in the control group.

**Key Words:** IBS, healthy individuals, IgE, IgG.

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## 27/151. Gut: An open door to Nutrition

### Gluten intolerance occurrence among patients with irritable bowel syndrome (IBS)

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**Introduction:** The irritable bowel syndrome (IBS) is one of the most common functional gastrointestinal disorders. Its pathogenesis is very complex and still largely unknown. It is considered that in a part of the IBS patients their symptoms are connected with gluten intolerance.

**Objectives:** The aim of the present work was to determine the incidence of gluten intolerance among the persons diagnosed with IBS, as well as to evaluate the effectiveness of a gluten free (gluten reduced) diet in persons with the IBS and gluten intolerance.

**Method/Design:** The surveys were carried out among patients with diagnosed IBS. The serologic tests for celiac disease [determining with ELISA method of the concentration of the anti tissue transglutaminase IgA antibodies (anti tTG) and of the anti gliadin IgA antibodies (AGA)] were conducted in 150 persons with IBS and in 50 healthy individuals (without the IBS symptoms).

**Results:** Positive results of serological tests were significantly more frequent in the studied than in the control group (21.3% vs. 0%,  $p < 0.0001$ ).

Duodenoscopy with duodenal biopsy was performed in 20 persons from the 32 persons with the positive serological tests results. In the all cases the duodenal mucosa in histopathologic assessment was correct, what suggests a presence of coeliac disease latent form. The gluten-reduced diet was introduced in these patients and in the most of them regression/relief of symptoms attributed to IBS as well as normalization of serological tests were observed.

**Conclusions:** IBS patients are more often affected by gluten intolerance than the population without the syndrome.

It seems that the most frequent form of the coeliac disease in the

IBS diagnosed persons is the latent form.

A diet involving the reduction of the main sources of gluten introduced in patients with IBS and positive serological test for celiac disease is an effective treatment.

**Key Words:** IBS - gluten intolerance – gluten-reduced diet

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## 27/159. Gut: An open door to Nutrition

### Prevalence and etiology of osteoporosis in adult-onset celiac disease

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**Introduction:** Celiac disease (CD) is a prevalent disorder. More than a half of new diagnosed cases are adult patients, who characterize by non-digestive manifestations, such as osteoporosis, whose prevalence is described to fold that for the same age group in general population. However, available studies are heterogeneous and frequently refer to paediatric population

**Objectives:** Studying the prevalence of osteoporosis and osteopenia in adult-onset CD and determining factors

**Method/Design:** Observational study to evaluate bone mineral density (BMD) using densitometry and serum levels of vitamins, minerals and hormones associated with bone metabolism, to identify possible risk factor. Kruskal-Wallis test was used

**Results:** 35 patients (33 women) aged around 42y and body mass index (BMI): 25.5kg/m<sup>2</sup> were studied. Duodenal lesion distribution was: Marsh I: 57%, Marsh II: 9% and Marsh III: 34%. Other osteoporosis determinants were excluded.

Osteoporosis in hip and lumbar axis was respectively present in 6% and 9% patients. 14% and 34% of patients respectively presented osteopenia in hip and lumbar axis. 58% of patients showed low BMD at any localization (being 14% osteoporosis and 43% osteopenia

A association between BMD and stage of duodenal lesion existed, at lumbar axis ( $p=0.03$ ) and hip levels ( $p=0.06$ ). However, it was not related with age or BMI. Association between calcium ( $p=0.02$ ) and folic acid ( $p=0.03$ ) levels and lower BMD was observed, but not with vitamin D ( $p=0.6$ ), PTH ( $p=0.09$ ), vitamin A ( $p=0.18$ ), vitamin B12 ( $p=0.9$ ), TSH ( $p=0.7$ ), DHEA ( $p=0.3$ ), CRP ( $p=0.8$ ), ferritin ( $p=0.6$ ), cholesterol ( $p=0.469$ ), triglycerids ( $p=0.2$ ), albumin ( $p=0.6$ ), prealbumin ( $p=0.3$ ), phosphor ( $p=0.162$ ), magnesium ( $p=0.19$ ), bone alcalin phosphatase ( $p=0.2$ ) nor telopeptide ( $p=0.2$ )

**Conclusions:** More than a half of adult-onset CD patients exhibit some degree of low BMD, being its prevalence higher in more advanced duodenal lesion stages. Additionally to a impaired absorption of calcium and vitamin D, other etiological factors should be considered

**Key Words:** Celiac disease, osteoporosis, bone mineral density

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**27/167. Gut: An open door to Nutrition**  
**Bioavailability of supraphysiological doses of Folic Acid in an animal model**

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**Introduction:** The compulsory fortification of grains with folic acid (FA), the synthetic form of the vitamin, has led to the chronic appearance of unmetabolized FA in systemic circulation. This effect could induce potential adverse consequences for health.

**Objectives:** To produce an animal model in which supraphysiological levels of FA supplementation are achieved, leading to unmetabolized FA in systemic circulation.

**Method/Design:** We developed an animal model with rats (n=86) split as follows: group 0: 6 µg FA/100 g body weight (requirements); group 1: 60 µg (10 times the requirements); group 2: 120 µg (20 times the requirements); group 3: 180 µg (30 times the requirements). Animals were given an intragastric dose. Serum, hepatic and intestinal folate levels were determined at 1, 2, 4, 8, 24h. Total serum and intestinal folate concentrations were quantified through the microbiological method based on the *Lactobacillus casei* growth.

**Results:** The highest concentrations of both serum and intestinal folate were reached by all groups one hour after the dose administration (p<0,001), excepting for group 2, which reached its maximum concentration 2h following the administration (p<0,001). Highest hepatic folate concentrations were observed 2h after administration, for groups 0 and 1 (p<0,05). The area under curve (AUC) was increased in groups 1, 2 and 3 regarding to group 0 (p<0,05). We observed a positive correlation between serum and intestinal folate levels in all groups (p<0,001). Only group 1 presented a positive correlation between serum and hepatic folate concentrations (p<0,001).

**Conclusions:** We suggest using doses equivalent to 20 fold the folate requirements of the rat for a physiological supplementation, and doses equivalent to 30 fold the requirements to assay a supraphysiological supplementation, in order to evaluate the effects derived from the chronic exposure to unmetabolized FA.

**Key Words:** Fortification, Unmetabolized Folic Acid, Animal Model, Supraphysiological Dose, Bioavailability.

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**27/193. Gut: An open door to Nutrition**  
**Preweaning nutritional modulation of intestinal microbiota is associated with modification of adult rat's body composition**

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**Introduction:** Neonatal nutrition impacts the establishment and composition of infant gut microbiota. As increasing evidences suggests that gut microbiota regulate energy metabolism of the host, a nutritional modulation of gut microbiota in early life could have sustained effects on metabolism and body composition in adulthood.

**Objectives:** Our aim was to determine whether a nutritional modulation of microbiota composition in early postnatal life of rat pups would affect energy metabolism and body composition in adulthood.

**Method/Design:** Suckling rat pups were supplemented by oral gavage with 3,2 g.kgBW<sup>-1</sup> short-chain fructo-oligosaccharides (scFOS) or control solution (CTRL) from their 5th to 15th postnatal days (PND), and subsequently weaned to standard chow until PND130. We characterized caecocolonic microbiota at PND15 (n=8 males/group). Metabolic parameters and body composition were analysed at PND130 (n=8 males/group).

**Results:** At PND15, microbiota composition was significantly different in pups which received scFOS compared to CTRL: *Bifidobacterium* sp. was increased whereas *Lactobacillus* sp. was decreased. In addition, caecocolonic propionate concentration was significantly increased. Body weight was higher from PND78 to PND130 in scFOS rats compared to CTRL rats (at PND130: 564±17g vs 486±29g, p=0.03) although food intake did not differ between the groups. At PND130, scFOS rats had heavier total fat pads weight (7.3±0.7% vs 4.7±0.4% of body weight, p=0.03), a slightly altered glycemic response to glucose challenge, but no change in plasma lipids compared to CTRL rats.

**Conclusions:** scFOS supplementation before weaning modulated gut microbiota and impacted on adult body composition. This suggests that microbiota composition in early life could indeed have lasting effects on adult disease risk. On-going analyses of molecular targets supposedly involved in microbiota/adipose tissue cross-talk (eg. Fiaf, LPS, GLP-1...) will provide more insights on the possible causative relation between the microbiota and adipose changes we observed. If proven, this could identify bacterial factors contributing to metabolic health later in life.

**Key Words:** Neonatal Nutrition, Nutritional Programming, Intestinal Microbiota, Body Composition and Prebiotic.

27/204. Gut: An open door to Nutrition

### **Immunomodulatory effects of a probiotic drink containing *Lactobacillus Casei* Shirota in healthy older volunteers**

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**Introduction:** There is growing evidence that probiotics confer a health benefit to the host by modulating immune function, particularly in older people. However, data from human studies are inconsistent.

**Objectives:** The aim of this study was to investigate the effect of a probiotic drink containing *Lactobacillus casei* Shirota (LcS) on immune function in an older population.

**Method/Design:** Thirty healthy volunteers (55-74 y) were supplemented with a probiotic fermented milk drink ( $1.3 \times 10^{10}$  CFU live LcS/d) or skimmed milk for 4 weeks, followed by 4 weeks of wash-out, and were then crossed over to the other treatment for 4 weeks. Peripheral blood mononuclear cells were separated and natural killer (NK) cell activity, the proportion of lymphocyte subsets (Th, Tc, NK, NKT, CD8+NK and CD8-NK) and their ConA-stimulated expression of activation markers (CD69 and CD25), and LPS-stimulated cytokine production (13 cytokines and chemokines) were measured by flow cytometry.

**Results:** LcS significantly increased NK cell activity relative to baseline. There was an increase in the proportion of T helper cells during the probiotic period compared with the placebo period, but a relative decrease in CD8+ NK cells (vs. placebo) and cytotoxic T cells (vs. baseline). LcS significantly increased the responsiveness of helper T cells to ConA compared with placebo. An increase in the ratio of IL-10 to IL-12 after LcS consumption relative to baseline was also observed.

**Conclusions:** The LcS probiotic modulates some aspects of both innate and acquired immunity in an older population. In particular, it enhanced NK activity and resulted in a more anti-inflammatory cytokine profile.

**Key Words:** Cytokine, probiotics, *L. casei* Shirota, NK cell activity, T-lymphocyte

27/206. Gut: An open door to Nutrition

### **Endocannabinoid-system tone controls adipose tissue metabolism, Glucose homeostasis and metabolic Endotoxemia in obese mice**

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**Introduction:** Obesity is characterized by a massive expansion of the adipose tissue associated with metabolic disorders (i.e., insulin-resistance, type-2 diabetes). Obesity is also associated with an increased endocannabinoid-system (eCB) tone. However, the origin and the mechanisms involved in this phenomenon remain elusive. Among the potential targets, the bioactive lipids belonging to the endocannabinoids may play a key role in the development of the metabolic disorders associated with obesity.

**Objectives:** Our project aims to highlight the involvement of the eCB-system in the alteration of adipogenesis, low-grade inflammation and glucose homeostasis disorders associated with obesity.

**Method/Design:** Animal models: 1) nutritional obesity (high-fat diet: HFD), 2) genetic obesity (ob/ob or db/db versus lean littermates), 3) models mimicking the higher eCB-system tone following the chronic administration of cannabinoid receptor agonist (HU210) via mini-pumps for four-weeks with (HU-HFD) or without high-fat diet treatment (HU). Adipogenesis and eCB markers were measured by quantitative-PCR. Portal plasma lipopolysaccharides (LPS) level (metabolic endotoxemia) was measured by endosafe multiple-cartridge system.

**Results:** Both nutritional and genetic obese mice exhibited overactive eCB-system tone (i.e., increased anandamide, expression of cannabinoid receptor-1 and synthesizing enzymes, and decreased expression of degrading enzymes) and increased markers of adipogenesis (lipogenesis and adipocyte differentiation markers). Cannabinoid receptor agonist promoted adipogenesis and glucose intolerance, the latter being exacerbated following the association between the eCB-system activation and high-fat diet feeding. We found that eCB-system activation in normal-chow fed animals significantly increased plasma LPS levels to a similar extent as the one observed upon HFD-treatment.

**Conclusions:** We found that the eCB-system triggers metabolic disorders such as metabolic endotoxemia, altered adipose tissue metabolism and glucose homeostasis. In addition, we propose that the eCB-system is directly involved in the control of the gut barrier function (metabolic endotoxemia) and adipose tissue metabolism, both are crucial in the control of whole-body glucose homeostasis.

**Key Words:** adipose tissue, endocannabinoids, endotoxemia, glucose homeostasis, obesity

27/207. Gut: An open door to Nutrition

### Prebiotic treatment in obese mice identifies gut microbes that shape metabolism

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**Introduction:** Growing evidence demonstrates that the gut microbiota plays a critical role in the development of obesity, type-2 diabetes and insulin resistance. Prebiotics have been shown to improve these disorders by increasing gut peptides secretion (i.e., glucagon-like peptide-1 and 2 (GLP-1 and GLP-2)). However, the exact composition of bacterial communities and the specific mechanisms involved in the increased intestinal GLP-1 and GLP-2 content remain unknown.

**Objectives:** To investigate deep and comprehensive analysis of gut microbial communities and biological parameters (glucose homeostasis, metabolic stresses, and gut permeability) following prebiotics administration in obese and diabetic mice.

**Method/Design:** Obese and diabetic ob/ob mice were chronically fed with prebiotic-enriched diet (Ob-Pre) or with a standard diet (Ob-CT). Extensive gut microbiota analyses coupled with metabolic parameters were performed. We combined multiple molecular methods, including quantitative-PCR, bar-coded pyrosequencing of the 16S-ribosomal-RNA (rRNA), and phylogenetic-microarrays. Mice were subjected to glucose tolerance and gut permeability tests. Tight-junctions localization and distribution as well as intestinal enteroendocrine L-cells were quantified by immunohistological analyses.

**Results:** We found that prebiotics reduced fat-mass development, improved glucose tolerance, alleviated oxidative-stress and low-grade inflammation and reduced gut permeability. We found that the gut microbiota regulate stem-cell differentiation and increase L-cells number. Analyses revealed two clusters corresponding to the dietary conditions. Prebiotics treatment significantly reduced Firmicutes/Bacteroidetes ratio. 102 distinct 16S-rRNA sequences were affected by the prebiotic treatment, 16 of which displayed a >10-fold change in abundance after the treatment. Importantly, multivariate-analyses revealed strong correlations between specific bacteria and the observed biological footprints.

**Conclusions:** We conclude that specific gut microbiota modulation target enteroendocrine cells, improve gut barrier integrity, and

glucose intolerance. By profiling the gut microbiota, we demonstrated that specific bacteria can modulate the phenotype of obese mice, and identified novel bacterial targets that may affect host-metabolism and enteroendocrine cells numbers in obesity and diabetes.

**Key Words:** Gut microbiota, gut permeability, inflammation, microbiota profiling, Type 2 diabetes

27/213. Gut: An open door to Nutrition

### Contribution of prebiotics-induced changes in gut microbiota to fatty acid composition in adipose tissue

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**Introduction:** In vitro experiments show that some gut bacteria, in particular roseburia and bifidobacteria species, express enzymes which can metabolize dietary lipids into conjugated polyunsaturated fatty acids (CPUFA). Several non-digestible/fermentable carbohydrates (NDC) selectively modulate the composition of the gut microbiota and thereby impact on obesity and associated metabolic disorders.

**Objectives:** The aim of the present study was to investigate the ability of supplementation with inulin-type fructans (ITF), fungal chitin-glucan (CG) and wheat bran arabinoxylans (Ax) to modulate fatty acid composition in the subcutaneous adipose tissue (SAT) of mice upon high fat (HF) diet feeding.

**Method/Design:** Male C57Bl6/J mice were separated into 5 groups treated for 4 weeks as such: CT group fed a standard diet, HF group fed a high-fat diet, HF – ITF group fed a HF diet supplemented with ITF (0.2g/day), HF – Ax group fed a HF diet supplemented with Ax (0.2g/day), HF – CG group fed a HF diet supplemented with CG (0.2g/day).

**Results:** All NDC selectively modulated the gut microbiota and counteracted the HF-induced fat mass development, but differently modified the fatty acid profile in SAT: CG supplementation increased the EPA + DHA content, Ax and CG supplementation increased the C18:2 C9-T11 content. The analysis of the stearoyl-Coenzyme A desaturase 1 gene expression and activity in the liver and in the SAT allowed to exclude the involvement of changes in host metabolism to explain the changes in fatty acid profile, suggesting that the higher CPUFA content in the SAT result from the bacterial metabolism of linoleic acid.

**Conclusions:** We conclude that the administration of NDC with prebiotic effect changes the fatty acid profile in host SAT. We postulate that the CPUFA-producing bacteria could be an important actor to consider in the metabolic effects of prebiotics.

**Key Words:** conjugated fatty acids, gut microbiota, non-digestible carbohydrate, obesity.

**27/221.** Gut: An open door to Nutrition

**Development and evolution of the gut microbiota of preterm neonates as assessed by culture-based techniques**

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**Introduction:** The microbiota of the human gastrointestinal tract may vary on an individual basis depending on several factors, including the gestational age and the food choice. In the last years, breast milk has been acknowledged as a source of commensal bacteria to the infant gut. Therefore, it represents one of the key factors in the initiation and development of the infant gut microbiota. Nowadays, hospitals are trying to foment breastfeeding and the use of human donor milk to provide the best feeding option to the preterm infant.

**Objectives:** The objective of this work was to analyse the bacterial diversity in meconium and feces of preterm neonates and to evaluate the impact of the feeding option in its evolution.

**Method/Design:** A total of 26 women and their respective preterm infants participated in the study. They provided a sample of colostrum/breast milk and meconium/feces, respectively, at days 0, 7, 14, 21, and then every 15 days until they left the hospital. Infant anthropometric and clinically relevant data were also recorded. The samples were plated onto different culture media. At least one representative of each colony morphology obtained in each culture medium was isolated. The isolates were submitted to genetic profiling and identified by species-specific PCR or 16S rRNA PCR sequencing.

**Results:** Approximately 6,000 isolates were identified at the species level. The dominant groups in feces of the preterm neonates were *Staphylococcus epidermidis*, *Staphylococcus aureus*, *Enterococcus faecalis*, *Enterococcus faecium*, and some Gram-negative species belonging to the genera *Serratia*, *Klebsiella* and *Escherichia*. Lactic acid bacteria and bifidobacteria were not frequent microorganisms in the analyzed samples.

**Conclusions:** Fecal microbiota of preterm neonates seems to be dominated by *Staphylococcus epidermidis*, a bacterial species that is a differential trait of the fecal microbiota of breast-fed infants but also by species that use to be highly prevalent in hospitalary settings.

**Key Words:** microbiota, gut, colonization, preterm, human milk

**27/223.** Gut: An open door to Nutrition

**Effects of scFOS on faecal Bifidobacteria and digestive tolerance of follow-on formula-fed infants**

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**Introduction:** The composition of the faecal microbiota of infants is influenced by delivery mode and feeding type. The objectives of the study were to assess the potential of short-chain fructo-oligosaccharides (scFOS) to increase the concentrations of faecal Bifidobacteria in infants receiving follow-on formula and the safety of use of this ingredient during a 6-month supplementation.

**Objectives:**

**Method/Design:** We recruited 75 formula-fed infants at the age of 4 months from 17 paediatricians' consultations in Barcelona (Spain). In a controlled, double blind design, they were randomly assigned to either receive at least 500mL per day of a placebo (5g/L maltodextrin) or a scFOS from sucrose (5g/L) supplemented follow-on formula from 4 to 10 months of age. Faecal samples were collected at inclusion at 4 months of age and at the age of 5 and 6 months for determination of the concentration of Bifidobacteria. Growth parameters and digestive tolerance were followed until the age of 10 months. Analysis was performed in intention to treat.

**Results:** For the ITT population, increase in faecal concentration of Bifidobacteria from 4 to 5 months of age was significantly greater in the sc-FOS supplemented group than in the control

but was not significant at 6 months of age. Complementary analysis showed that effect on Bifidobacteria is observed specifically on non breastfed infant and last even at 6 months of age. There was no difference between the 2 formulas in term of digestive tolerance and growth parameters.

**Conclusions:** This study showed for the first time that scFOS alone at 5g/L in follow-on formula enhance the growth of Bifidobacteria (especially in non breastfed infants) and are safe and well tolerated.

**Key Words:** follow-on formula, Bifidobacteria, prebiotic, fructo-oligosaccharides

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27/229. Gut: An open door to Nutrition

**ScFOS modulate intestinal microbiota and metabolic parameters of human flora-associated dio mice**

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**Introduction:** Prebiotic fibres like short-chain fructo-oligosaccharides (scFOS) are known to selectively modulate the composition of the intestinal microbiota and the involvement of this microbiota in host metabolic regulations has been recently highlighted.

**Objectives:** The objective of the study was to evaluate in an animal model of obesity the effect of scFOS on the composition of the intestinal microbiota and on metabolic parameters of diet-induced obesity (DIO)

**Method/Design:** 48 axenic C57BL/6J mice were inoculated with a sample of faecal human microbiota from one healthy, lean adult and randomly assigned to one of the 3 diets for 7 weeks: a control diet, a high fat diet (60% of energy from fat) or an isocaloric high-fat diet containing 10% of scFOS. At the start and at the end of the study, the taxonomic composition of the faecal microbiota of mice was evaluated by the FISH technique using 16S rRNA primers specific for 9 major groups of the human faecal microbiota. Blood and urine were also collected for analysis of the metabolome. After 7 weeks, animals were slaughtered. Their organs were collected, weighed and stored for further analysis.

**Results:** Mice fed with the two high fat diets were significantly heavier than mice from the control group even if they tended to be less heavy with the addition of scFOS in the high fat diet. Mice receiving the scFOS showed bigger caecum content than the others. They also tended to have less epididymal fat than the HF group. Furthermore the addition of scFOS in the HF diet induced a significant increase of faecal Bifidobacteria and Clostridium coccoides whereas it decreases Erysipelotrichi.

**Conclusions:** Preliminary results showed that the modulation of the microbiota induced by the addition of scFOS in a high fat diet may be linked to metabolic changes and possibly with the storage of fat.

**Key Words:** short-chain fructo-oligosaccharides, microbiota, obesity

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27/230. Gut: An open door to Nutrition

**Gliadin peptidase activity of gut microbiota**

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**Introduction:** The peptides generated from gluten proteins (gliadins) during gastrointestinal digestion are the main responsible for the signs and symptoms of celiac disease (CD).

**Objectives:** To evaluate gene expression and enzyme activity of gliadin-hydrolysing enzymes in bifidobacteria and other intestinal bacteria isolated from the microbiota of CD patients to progress in the knowledge of their possible role in this disorder.

**Method/Design:** Different bifidobacterial (*B. longum* CECT 7347 and *B. bifidum* 7365), *Bacteroides fragilis* (CAQ2 and CBS1) and *Escherichia coli* (CBL2 and CBL8) strains were incubated (37 °C/1h) with the main immunogenic gliadin peptides: PQQQLPYPQQLP, LQPPFPQQLPY, LGQQQFPFPQPY, and LQLPFPQQLPYPQQLPYPQQLPYPQQLP (33-mer). The peptides generated were analyzed by HPLC-ESI-MS/MS. Gene expression (mRNA) was analysed in bacteria grown in a medium containing gliadin (peptides) as a source of proline by RT-qPCR.

**Results:** *Bacteroides fragilis* strains had the highest peptidase activity, cleaving preferentially the peptide PQQQLPYPQQLP and generating a peptide sequence -QPQLP- highly specific for tissue transglutaminase, which increases its affinity for HLA-DQ2/8 molecules of dendritic cells and the activation of T-cells. *B. longum* CECT 7347 and *B. fragilis* CBS1 were the only strains that hydrolysed the 33-mer generating different peptide products that still retain sequences potentially immunogenic. The expression of genes coding for a prolyl-oligopeptidase and the endopeptidase PepO was significantly induced by gliadin peptides in the two bifidobacterial strains. The expression of genes coding for an endopeptidase and a dipeptidyl peptidase were in not induced in *B. fragilis* CAQ2 and that of the endopeptidase was down regulated in *B. fragilis* CBS1.

**Conclusions:** The specificity and gene expression of gliadin-hydrolyzing enzymes differ in different intestinal bacteria leading to the generation of peptides with potentially different immunological properties. Investigations are in progress to determine the clinical meaning of these findings for CD.

**Key Words:** Celiac disease, gliadin, peptidase, microbiota, bifidobacteria.

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27/255. Gut: An open door to Nutrition

**Insulinemia and inflammatory markers might predict different responses of obese subjects under the same hypocaloric diet intervention**

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**Introduction:** The ability to identify obese subjects' responses to energy-restriction is an important strategy in obesity clinical care.

**Objectives:** We investigated potential predictors of weight loss responses under a dietary program.

**Method/Design:** Fifty obese/overweight subjects were submitted to hypocaloric diet for 6 weeks followed by a 6-weeks weight-maintenance diet.

**Results:** Based on their trajectories of weight loss during the study, three subjects clusters were identified. Cluster A (n=17) and Cluster B (n=15) lost more weight during the diet period, however during the stabilization phase cluster A continued to lose weight, whereas cluster B remained stable. Cluster C (n=17) lost less and rapidly regained weight during the stabilization. At baseline, subjects in cluster C had the highest plasma insulin, IL-6 and adipose tissue inflammatory marker (HAM56), and the lowest plasma FFA excursions after an OGTT test. Seven groups of fecal bacteria were studied by qPCR in all subjects. Intriguingly, subjects in cluster C had the highest level of Lactobacillus/Leuconostoc/Pediococcus group at baseline. During the dietary program subjects in cluster C consumed more starchy foods, less protein and raw vegetables. Spearman correlations revealed positive relationship between weight-regain after diet and insulinresistance markers (e.g. HOMA-IR: P=0.0002, rs=0.5), inflammatory markers (e.g. IL-6: P=0.002, rs=0.43) as well as the number of Lactobacillus/Leuconostoc/Pediococcus group (p=0.005, rs=0.4) at baseline. Bayesian network (BN) was performed for prediction of these 3 clusters by using the data prior to this dietary program. According to the learned structure of BN, the levels of 4 biomarkers (plasma insulin, IL-6, leucocytes numbers and adipose tissue HAM56) at baseline were sufficient to characterize the distribution of the 3 clusters. The prediction of clusters was 75.5% (37 among 49 subjects).

**Conclusions:** Individual responses to hypocaloric high protein dietary program could be predicted by plasma insulin, IL-6, leucocytes numbers and adipose tissue HAM56 levels prior to diet.

**Key Words:** Obesity, hypocaloric diet, fecal bacteria, prediction of weight loss.

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## 27/284. Gut: An open door to Nutrition

### The satiating effect of egg is higher than fresh cheese in humans

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**Introduction:** Proteins are usually considered to have a specific satiating effect but the differences between different protein sources are unclear. In contrast to dairy proteins, the satiating effect of eggs has been poorly investigated.

**Objectives:** The aim was to compare the satiating effect of two isocaloric "solid" preloads containing egg or milk protein (omelette or fresh cheese), and to relate this effect to plasma metabolites and hormones variations.

**Method/Design:** 30 subjects participated to 2 randomised test days, one per preload. On each test day, after consumption of the whole preload (322kcal; 26g proteins, 21g lipids, 7.5g lactose), their appetite sensations were recorded until they asked for the next meal. The delay between the preload and the next meal and the spontaneous energy intake at the meal were measured. In 10 volunteers, blood samples were taken during the same time in order to measure plasma concentrations of glucose, triglycerides cholesterol and urea as well as hormones involved in satiety.

**Results:** The two preloads displayed no difference for the delay between the preload and the meal, but the omelette reduced significantly the energy intake at the meal by 300 kcal in comparison to the cheese product. Subjects reported to feel less hunger with the omelette. GIP and insulin secretions and uremia increased significantly after the dairy but not the omelette preload, while glucagon and GLP-1 secretions displayed delayed profiles with the omelette.

**Conclusions:** We conclude that eggs present a more satiating effect than a fresh dairy product on the basis of a decreased energy intake. Uremia and hormone profiles suggest that this effect is mainly due to a slower digestion rate, caused by a different structure of the food.

**Key Words:** Satiety, Egg Proteins, Dairy Proteins, Satiety Hormones, Metabolism

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## 27/287. Gut: An open door to Nutrition

### Prebiotic approach improves hepatic steatosis associated with n-3 polyunsaturated fatty acid depletion in mice

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**Introduction:** Patients with nonalcoholic fatty liver disease are characterised by a decreased n-3/n-6 polyunsaturated fatty acid (PUFA) ratio in hepatic phospholipids. Gut microbiota contributes to the regulation of fatty acid metabolism namely through the fermentation of non digestible carbohydrates provided in the diet. Dietary fructans (FOS) supplementation has been shown to lessen hepatic steatosis in animal models of obesity.



**Objectives:** Mice depleted in n-3 PUFA were supplemented with FOS in order to analyse the mechanism of interaction between the gut microbiobes and hepatic lipid metabolism.

**Method/Design:** C57Bl/6J mice were fed during 3 months with an n-3 PUFA depleted diet versus a control diet. Ten days before the end of treatment, a group of n-3 PUFA depleted mice was supplemented with FOS (0.25g/day/mice).

**Results:** n-3 PUFA depleted mice exhibited an increased hepatic triglyceride and cholesterol content. Microarray analysis showed a stimulation of the lipogenic pathway. n-3 PUFA depleted mice supplemented with FOS exhibited a modulation of caecal gut microbiota characterized by higher *Bifidobacterium* spp. and lesser *Roseburia* spp. content. FOS supplementation reduced hepatic lipid accumulation in n-3 PUFA depleted mice, and increased the expression of several enzymes involved in fatty acid oxidation, which are regulated by the transcription factor peroxisome proliferator-activated receptor alpha. Moreover, the analysis of labelled CO<sub>2</sub> produced by precision-cut liver slices incubated with <sup>14</sup>C-palmitate confirmed a boost in fatty acid oxidation in n-3 PUFA depleted mice supplemented with FOS.

**Conclusions:** n-3 PUFA depletion is associated with hepatic triglycerides accumulation resulting mainly from an increased lipogenesis. FOS supplementation reverses the hepatic lipid accumulation by promoting fatty acid oxidation in the liver of n-3 PUFA depleted mice. The exact metabolic pathway connecting the changes in gut microbiota and fatty acid oxidation remains to be explored and could involve the production of conjugated linoleic acid as metabolites prone to interact with PPAR's in host tissues.

**Key Words:** n-3 polyunsaturated fatty acid, hepatic steatosis.

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**27/292.** Gut: An open door to Nutrition

**Displacement of enteric bacteria adhered to Caco-2 cells by gangliosides and sialic acid**

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**Introduction:** Enteropathogenic bacteria cause diarrheal episodes specially important in newborns which their immunological system is not completely developed. Gangliosides and sialic acid (present in human milk and infant formula) have positive effects on neuronal development, immune system and prebiotic. It is frequently the use of Caco-2 cells as a validated model of intestinal epithelium for adhesion studies.

**Objectives:** To evaluate the displacement of adhered enterotoxigenic *E. coli* (ETEC), Enteropathogenic *E. coli* (EPEC), *Campylobacter jejuni* and *Salmonella enterica* to Caco-2 cells cultures by sialic acid (Neu5Ac) and gangliosides (GM3, GD3, GM1) at the concentra-

tion found in bioaccessible fraction of infant formulas.

**Method/Design:** Bacteria (20-hour-old-culture) were labelled with 75 mM carboxyfluorescein diacetate (37°C/30 min), washed and resuspended in PBS.

For each well (Caco-2 cells), 400 µL of bacterial labelled suspensions were incubated at 37°C/1 hour. After to wash with PBS, 400 µL of each ganglioside standard solution were added and incubated at 37°C/1 hour. Cells were washed again with PBS, 1 ml/well of 1%(w/v) SDS in 0.1M NaOH was added and it was incubated at 37°C/1h. Fluorescence were measured at  $\lambda_{exc} = 485$  nm,  $\lambda_{em} = 538$  nm. For each bacteria and treatment, assay was performed in twelve replicates divided in 2 independent experiments.

To evaluate differences in the adhesion an ANOVA ( $p < 0.05$ ) was applied.

**Results:** The percentage of adhesion respect to the control group (expressed as mean  $\sigma$  standard deviation) ranged between 27.06  $\sigma$  2.90 for *Salmonella enterica* with GM3 and -9.16  $\sigma$  3.29 for EPEC with GD3. Only with GM1 and GM3 were not statistical differences with the control adhesion for *C. jejuni* and GD3 with EPEC.

**Conclusions:** The inhibition-rate depends on the pathogen and ganglioside assayed. GM3, GD3, GM1 and Neu5Ac at the concentration assayed are able to diminish the adhesion of the pathogens evaluated, except *C. jejuni* and EPEC for GM1 and GD3, respectively.

**Key Words:** gangliosides, sialic acid, enteric bacteria, adhesion, inhibition.

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**27/300.** Gut: An open door to Nutrition

**Caseinphosphopeptides as bio modulators of intestinal cell functions related to normal/tumor phenotypes**

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**Introduction:** It is well known that dietary calcium exerts a chemoprotective role on normal differentiated intestinal cells, while it behaves as a carcinogenesis promoter on aberrant colonocytes and adenomatous crypts. These different functions can be achieved through the modulation of proliferation and/or differentiation processes. Milk represents the major source of calcium in the diet, due to the high availability of the mineral bound to casein and caseinphosphopeptides (CPPs). CPPs, derived by in vitro or in vivo casein hydrolysis, are able to induce calcium uptake in human intestinal tumor cells differentiated in vitro toward an enterocytic phenotype.

**Objectives:** The CPP properties and abilities could be correlated with a possible activation of pathways of calcium signalling in intestinal cells either in standard growth condition, or in calcium overload as it might occurs following a meal.

**Method/Design:** Undifferentiated and differentiated human in-

testinal cell lines HT-29 and Caco2, as in vitro cellular models of intestinal epithelium, were assayed for: cell proliferation (bromodeoxyuridine incorporation); apoptosis (caspase 3.7 activation, DAPI staining); intracellular calcium increases (Video-imaging experiments using Fura2).

**Results:** In HT-29 cells, CPPs differently affected proliferation rate and apoptosis in undifferentiated toward differentiated cells, acting through the modulation of the voltage operated L-type calcium channels, known to activate calcium entry into the cells under depolarization and to exert a mitogenic effect. In Caco2 cells, CPPs did not significantly affect proliferation and apoptosis, moreover they induced calcium uptakes mainly through the TRPV6 channel, known as the epithelial channel responsible for the calcium absorption at duodenum level.

**Conclusions:** Taken together these results demonstrate the ability for CPPs, through the binding with calcium ions and the stimulated ingress of these ions in differentiated cells, to modulate biological activity strictly related to normal or cancer phenotype, thus opening the way for a use of CPPs as nutraceutical.functional food.

**Key Words:** intestinal cells, caseinphosphopeptides, calcium, tumor

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**27/304.** Gut: An open door to Nutrition

**Can human resistance to ETEC infection be predicted by specific biomarkers of gut health?**

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**Introduction:** Food ingredients such as pre- and probiotics may enhance resistance to gastrointestinal infections. Resistance to infection can be evaluated by challenging subjects with an attenuated pathogen. A live but attenuated Enterotoxigenic Escherichia coli (ETEC) oral vaccine has been used for such evaluation. We were interested to identify biomarkers that might predict the response to this infection challenge. Therefore, we measured potential biomarkers of gut health in subjects taking a probiotic that has been shown to be effective in preventing travelers' diarrhea and a control group, and related those markers to the response to ETEC challenge.

**Objectives:** Explore biomarkers of gut health that are predictive of the response to acute ETEC infection.

**Method/Design:** 32 Men (age: 24 ± 5 yrs; BMI: 23.5 ± 2.6 kg.m<sup>-2</sup>) participated in a randomized, double-blind, parallel, placebo-controlled trial. Subjects took two sachets of 450 billion live freeze-dried lactic acid bacteria per sachet (VSL #3), or two sachets of placebo, twice daily, for four weeks. After three weeks the ETEC infection was administered. Blood, urine and faecal samples were collected at baseline, at three weeks (before ETEC infection), and after oral ETEC infection.

**Results:** Compliance of study substance intake was high (97%). All subjects were physically affected by the ETEC infection. 21 Subjects had mild complaints; 9 subjects moderate; and 2 subjects reported acute fever and vomiting. A fast recovery was seen (within two days). Data on faecal output, intestinal permeability and inflammation markers in relation to symptoms will be available and reported at the time of the conference.

**Conclusions:** All subjects showed a response due to ETEC infection. Whether probiotics were effective in reducing severity of complaints and to what extent specific biomarkers are predictive of the response to this infection challenge will be presented at the conference.

**Key Words:** Intestinal permeability, human, inflammation, ETEC infection, probiotics.

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**27/317.** Gut: An open door to Nutrition

**Prebiotic salmosan® and probiotic Saccharomyces cerevisiae var. Boulardii prevent intestinal adhesion of Salmonella Typhimurium in pig epithelial cells in culture**

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**Introduction:** Mannan oligosaccharides are mannose rich substrates derived from yeast *Saccharomyces cerevisiae* cell walls which are described to agglutinate Gram negative bacteria thus exerting beneficial effects in the prevention of intestinal infections. Recently, we have observed that Salmosan®, a β-galactomannan patented by IRTA and ITPSA obtained from the carob bean gum of the *Ceratonia siliqua* tree, is able to reduce the expression of proinflammatory cytokines and chemokines induced by *Salmonella enterica* ser. Typhimurium (*Salmonella*) infection in ileal pig cells in vitro.

**Objectives:** The aim of this study was to investigate the potential role of Salmosan® and *Saccharomyces cerevisiae* var. *boulardii* (Scb) to prevent *Salmonella* infection as determined by confocal and scanning electron microscopy, and bacterial adherence assays.

**Method/Design:** Swine intestinal cell line IPI-2I was infected in vitro by *Salmonella* (MOI=4). Cells were treated with or without Salmosan® and Scb (MOI=3). For bacterial adherence assays, the homogenate of infected cells was plated on LB-Agar Petri dishes to count the number of colony former units (CFU). For scanning electron microscopy, the cultures were prepared as previously described (Mitjans et al., 2004, *Microsc Res Tech* 63:206-214) and examined in a Zeiss DSM 940A (Jena, Germany) electronic microscope. Finally, for

confocal microscopy, Salmonella was labelled with BacLightGreen (Invitrogen) and fluorescence examined in confocal microscope Leica TCS-SP5 (Leica Microsystems, Heidelberg GmbH).

**Results:** The images reveal the presence of Salmosan®, mainly as spherical structures, with Salmonella attached to the surface. Moreover, in cultures treated with Salmosan® and Scb, there is a dose dependent reduction in the number of bacteria adhered to the epithelium.

**Conclusions:** Prebiotic Salmosan® and probiotic *Saccharomyces cerevisiae* var. *boulardii* may be suitable additives to prevent intestinal infections in pigs and to reduce Salmonella contamination of meat products for human consumption.

**Key Words:**  $\beta$ -galactomannan, mannan oligosaccharides, man-nose, scanning electron microscopy

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**27/341.** Gut: An open door to Nutrition

### **Interaction of 7keto-stigmasterol & 7keto-cholesterol to intestinal (Caco-2) cells**

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**Introduction:** Phytosterol oxidation products (POPs) appear to exert qualitatively similar toxic effects to cholesterol oxides; however, evidence in this area is limited and deserves further attention. After oral intake, the intestinal epithelium constitutes the first physiological barrier to absorption of POPs. Therefore, it's interesting to study its effects in a validated intestinal epithelium cell model (Caco-2) since data in this field remain scarce.

**Objectives:** The aim of this study is to evaluate the possible interaction between 7keto-stigmasterol and 7keto-cholesterol in intestinal epithelial human cells (Caco-2).

**Method/Design:** Cell cultures (initial density of 50.000 cells/cm<sup>2</sup>) were challenged (5 d post-seeding) to solutions (120  $\mu$ M) of stigmasterol, 7keto-stigmasterol and 7keto-cholesterol alone, or mixtures of 7keto-cholesterol with stigmasterol or 7keto-stigmasterol (120  $\mu$ M each) for 24h. Alterations in the energetic cell metabolism (Test MTT) and perturbations on mitochondrial potential ( $\Delta\psi$ m) were determined. Cell cycle analyses and quantification of the relative distribution of nucleic acids in cycle phases were performed.

**Results:** Cultures exposed to 7keto-cholesterol exhibited an impaired MTT conversion and  $\Delta\psi$ m, compared to controls; however, these parameters are not altered in cells exposed to stigmasterol or 7keto-stigmasterol alone or together with 7keto-cholesterol. Cell cycle analyses revealed 7keto-stigmasterol and/or 7keto-cholesterol alterations in cell G1 phase, which could not be abolished by the stigmasterol. In contrast, only 7keto-cholesterol caused a significant decrease in the ARN content of G1 phase.

**Conclusions:** 7keto-stigmasterol appears to alter cell cycle distribution similarly to 7-keto-cholesterol, but without cytotoxic effects on mitochondrial function. In presence of 7keto-stigmasterol or stigmasterol decreases the cytotoxic effect of 7keto-cholesterol.

**Key Words:** Phytosterol oxidation products, cytotoxicity, Caco-2.

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**27/387.** Gut: An open door to Nutrition

### **Adding phytosterol esters into a meal lowers chylomicron cholesterol occurrence without altering lipid digestion**

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**Introduction:** Phytosterols were shown to lower intestinal cholesterol absorption, but the complex dynamics of the lipid digestion process in the presence of these plant microconstituents are not fully understood.

**Objectives:** The present study was aimed to get a full comprehensive description of the effects of phytosterols on the lipid digestion process and postprandial secretion of cholesterol in humans.

**Method/Design:** We performed in vitro experiments under simulated gastro-intestinal conditions and a clinical study in intubated healthy subjects to compare the distribution of all lipid moieties present in duodenal phases during 4 h of digestion of meals containing or not phytosterols.

**Results:** Our experiments showed that adding phytosterol does not alter triglyceride hydrolysis in the duodenum or subsequent chylomicron triglyceride occurrence in the circulation (chylomicrons and plasma). In contrast, our results clearly showed that cholesterol available for mucosal uptake from the aqueous/micellar phase is markedly reduced (~30%,  $p < 0.05$ ) when phytosterols are added. Moreover, the addition of phytosterols, as solid (emulsified with fat) or liquid (microdispersed) forms, into a meal resulted in a markedly reduced presence of meal-derived hepta-deuterated cholesterol in chylomicrons (~ -40% for solid form,  $p < 0.001$  and ~ -60% for liquid form,  $p < 0.001$ ). The greater reduction of cholesterol suggests that additional mechanisms could occur, such as the modulation of key transporters controlling cholesterol absorption and of the enzyme for intracellular sterol esterification.

**Conclusions:** We showed in healthy subjects that addition of phytosterol esters into meals did not alter triglyceride hydrolysis, increased phytosterol levels in the duodenum phases and reduced cholesterol availability in the aqueous phase. Such a reduction of cholesterol availability in duodenum resulted in a markedly reduced occurrence of meal-derived cholesterol in the circulation.

**Key Words:** micelles, sitosterol, campesterol, sitostanol, isotope enrichment

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27/402. Gut: An open door to Nutrition

### **Role of Angiotensin II in the regulation of Glucagon-like Peptide- 1 Secretion.**

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**Introduction:** Obesity is a state of chronic low grade inflammation with concomitantly increased production and release of pro-inflammatory factors from the adipose tissue. Angiotensin II is an octapeptide and an important regulator of blood pressure and salt and water balance. Levels of Angiotensin II and its precursor Angiotensinogen significantly increase during obesity. GLP-1 is an insulinotropic and hypoglycemic hormone secreted from intestinal enteroendocrine L cells in response to nutrients. Its secretion is reduced in patients with type 2 diabetes and also in obesity.

**Objectives:** The aim of our study was to examine the involvement of Angiotensin II on GLP-1 secretion and to look for the presence of Angiotensin II receptors on intestinal enteroendocrine cells.

**Method/Design:** The effects of Angiotensin II on glucose and peptide driven GLP-1 secretion was studied in the NCI-H7 16 cell line and ex vivo in dissected mouse intestine. In parallel studies, we also looked for the expression of Angiotensin II receptors, type 1 & 2 specifically on the enteroendocrine cells by RT-PCR, western blotting and immunofluorescence techniques. Further we used antagonists of both the receptors and studied GLP-1 secretion.

**Results:** Our data reveals the presence of both , type 1 & 2 receptors on the NCI-H7 16 cells and in mouse tissue co-stained with GLP-1 (marker for enteroendocrine cell). Treatment with Angiotensin II reduces the nutrient response of the cells and GLP-1 secretion is lowered. Further, this effect was alleviated when cells were incubated along with Candesartan and PD4 which are antagonists of the type 1 & 2 receptor respectively.

**Conclusions:** Hence, we can conclude that Angiotensin II regulates GLP-1 secretion and therefore specific inhibition of its receptors could be a potential target for diabetes therapy.

**Key Words:** Angiotensin II, GLP-1, Candesartan, PD 4

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27/451. Gut: An open door to Nutrition

### **Identification of membrane proteins involved in Vitamin K intestinal transport**

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**Introduction:** The concept of “vitamin K” gathers various co-factors playing a crucial role in blood coagulation and bone calcification. In order to prevent cardiovascular diseases and osteoporosis, an optimal statute in vitamin K appears as essential.

**Objectives:** Unfortunately, the mechanisms underlying its absorption remain poorly understood. Vitamin K1 (phylloquinone) is theoretically absorbed via an unknown active transporter in the small intestine. As vitamin E interferes with vitamin K activity, we hypothesized that these two vitamins may share some common intestinal absorption pathways.

**Method/Design:** Phylloquinone absorption was examined in human Caco-2 and transfected HEK cells. We first evaluated the effect of a competition for absorption with vitamin E. We then assessed the effect of specific inhibitor and/or antibodies of proteins involved in vitamin E and/or cholesterol transport (SR-BI, NPC1-L1, and CD36) on phylloquinone apical uptake and/or efflux.

**Results:** Our results showed that micellar tocopherol and phylloquinone competed for their respective uptake by Caco-2 cells (-29% and -28%, respectively). Both a SR-BI blocking-antibody and BLT1 (a chemical inhibitor of SR-BI) significantly diminished vitamin K absorption in Caco-2 cells (up to -93% and -84%, respectively). Ezetimibe (a chemical inhibitor of NPC1L1) also diminished its absorption by Caco-2 cells (-18%). At last, the overexpression of SR-BI, CD36 and NPLCL1 in HEK cells led to a significant increase of vitamin K uptake (210%, 264% and 265%, respectively). These increases were annihilated when specific inhibitors of the different proteins were added.

**Conclusions:** The present data show for the first time that vitamin K1 intestinal absorption involves, at least partly, some cholesterol transporters. These results will allow a better comprehension of vitamin K absorption mechanisms, in order to optimize its status in subgroups of the population at risk of developing osteoporosis or cardiovascular diseases.

**Key Words:** Vitamin K, absorption, transporters, membrane proteins

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27/452. Gut: An open door to Nutrition

### **Safety trial of an infant formula enriched with the human milk probiotic strain L.Fermentum Cect5716.**

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**Introduction:** Breast milk of healthy mother contains lactic acid bacteria with probiotic potential which could be responsible of the some of the beneficial effect of the breast milk. *Lactobacillus fermentum* CECT5716, a probiotic strain originally isolated from breast milk, has shown beneficial effect on health of adults and infants in previous studies.

**Objectives:** To evaluate the safety and tolerance of the consumption of an initial infant formula supplemented with *L.fermentum* CECT5716 in neonates from 1 to 6 months of life.

**Method/Design:** A randomized double blinded controlled study including 126 infants at the age of 1 month was conducted. Infants were assigned randomly to either infant formula supplemented with *L.fermentum* (Probiotic group), or the same formula without the probiotic strain (Control group). The primary outcome of the study was the average daily weight gain between baseline (1 month of life) and 6 months. Secondary outcomes for safety were other anthropometric data (length and head circumference) and formula consumption and tolerance. Incidence of infections was also recorded by pediatricians.

**Results:** No differences in weight gain were observed between groups (25.3±6.0 vs 24.8±5.1 g/day). The growth of the infants of both groups was similar. There were no statistically significant differences in the consumption of formula by infants of both groups. Regarding to symptoms related with the tolerance of the formula there were no significant differences between control and probiotic group in the incidence of infantile colic, spitting up or constipation. Finally the incidence rate of diarrhoea in infants of control group was 3 times higher than in the probiotic group (p=0.02). No significant differences were observed in the rate of incidence of respiratory infections.

**Conclusions:** The consumption from 1 to 6 months of life of an infant formula enriched with the human milk probiotic strain *L.fermentum* CECT5716 is well tolerated and safe.

**Key Words:** Probiotics, infant formula, neonates, safety, infections.

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**27/454.** Gut: An open door to Nutrition

### **Effect of the olive oil on the intestinal microbiota of hypertensive rats**

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**Introduction:** There are a number of bibliographic references indicating that the type of intestinal microbiota is implicated in the development of obesity and insuline resistance and can be related to the metabolic syndrome, including high pressure. On the other hand, some authors have studied the effect of high fat/high calorie diets and have detected changes on the microbiota. However, there is no study on the specific effect of the olive oil, even though olive oil has been shown to be beneficial on all the above mentioned.

**Objectives:** We set up a study on hypertensive rats to check out the effect of olive oil on the intestinal microbiota and different physiological variables.

**Method/Design:** We have fed hypertensive rats with a high content in virgin olive oil diet, and with a control diet. After treatment, symbiont population in faeces has been studied by using culture independent methods (Denaturing Gradient Gel Electrophoresis) and correlations have been drawn.

**Results:** Olive oil fed group shows 15% more 16S DNA bands than control group, possibly indicating a higher biodiversity. A Pearson correlation (Opt. 0.50%) of the microbiota profiles in all the individuals of both diets indicate that, although not all the olive oil fed rats cluster together, 75% of them do have another individual of the same group as the nearest neighbor.

**Conclusions:** An olive oil based diet seems to have an influence on the microbiota of hypertensive rats. More consequences will be discussed.

**Key Words:** Gut Microbiota, Olive Oil, Microbial Diversity, Hypertensive Rats

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**27/455.** Gut: An open door to Nutrition

### **Infant gut colonization is influenced by milk-feeding practices and genetic risk of developing celiac disease**

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**Introduction:** Celiac disease (CD) is an immune-mediated enteropathy involving genetic and environmental factors, whose interaction might influence disease risk

**Objectives:** To determine the effects of milk-feeding practices and HLA-DQ genotype on intestinal colonization of *Bacteroides* species in infants at risk of CD development.

**Method/Design:** This study included 75 full-term newborns with at least one first-degree relative suffering CD. Infants were classified according to their milk-feeding practices (breastfed or formula-fed); and to their HLA-DQ genotype (high and low genetic risk). *Bacteroides* species were analyzed in stools at seven days, one month and four months by PCR and DGGE.

**Results:** *Bacteroides* diversity index was higher in formula-fed than in breastfed infants. Breastfed infants showed higher prevalence

of *B. uniformis* at one and four months old, while those formula-fed had higher prevalence of *B. intestinalis* at all sampling times, of *B. caccae* at one and four months, and of *B. plebeius* at four months old. Irrespective of milk-feeding, high genetic risk infants showed higher prevalence of *B. vulgatus*, while low genetic risk infants showed higher prevalence of *B. ovatus*, *B. plebeius* and *B. uniformis*. In breastfed infants, prevalence of *B. uniformis* was higher in low genetic risk than in high genetic risk infants. In formula-fed infants, *B. ovatus* and *B. plebeius* prevalence was increased in low genetic risk infants, while *B. vulgatus* prevalence was higher in high genetic risk infants.

**Conclusions:** The results indicate that both the type of milk feeding and the HLA-DQ genotype influence the gut colonization process of *Bacteroides* species and possible the disease risk.

**Key Words:** Gut microbiota, celiac disease, breast-feeding, HLA-DQ

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27/472. Gut: An open door to Nutrition

**Protective effect of various polyphenols against mitochondrial dysfunction induced by indomethacin in caco-2 cells**

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**Introduction:** Non-steroidal anti-inflammatory drugs (NSAIDs) are amongst the most prescribed drugs. Its side effect involve mainly the gastrointestinal (GI) tract. Indomethacin (INDO) causes the most damage to the GI mucosa; and is frequently used as the paradigm for the adverse effects associated with NSAIDs and to evaluate the potential protective effects of bioactive compounds, like polyphenols. Amongst the mechanisms probably involved in the development of such GI lesions, the inhibition of cyclooxygenase 1 has been considered. However, mechanisms other than cyclooxygenase inhibition, such as the ability of INDO to induce mitochondrial dysfunction and subsequently oxidative stress, are also probably involved.

**Objectives:** The aim of this study was to evaluate the protective effect of the polyphenols quercetin, rutin, resveratrol and epigallocatechingallate against the mitochondrial dysfunction induced by INDO in Caco-2 cells.

**Method/Design:** Caco-2 cells were exposed to INDO for 20 min and the resulting alterations of mitochondrial function like ATP levels, mitochondrial membrane potential (MMP) and mitochondrial complex I activity were assessed. The protective effect of each polyphenol against the mitochondrial dysfunction induced by INDO was assessed at a concentration from 0 to 1 mg/mL.

**Results:** The exposure of Caco-2 cells to INDO inhibits mitochondrial complex I activity, decreases intracellular ATP levels, and lowers the MMP. The polyphenols tested were able to protect Caco-2 cells against the mitochondrial damaging effect induced by INDO, except for epigallocatechingallate. Quercetin (0.01 mg/mL,

30 uM), resveratrol (0.1 mg/mL, 440 uM) and rutin (1 mg/mL, 1500 uM) totally protected against all of these mitochondrial dysfunctions, preventing the inhibition of complex I (excepting for resveratrol, for which it has not been proven yet) and the decrease in ATP and MMP.

**Conclusions:** In addition to their known antioxidant activity, these polyphenols may exert their protective effect against oxidative stress induced by INDO by preventing mitochondrial dysfunction.

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**Key Words:** Polyphenols, quercetin, rutin, resveratrol, epigallocatechingallate, indomethacin, mitochondrial dysfunction

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27/497. Gut: An open door to Nutrition

**Effects of high-fat diet on magnesium status and insulin sensitivity in rats**

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**Introduction:** It is suggested that high-fat diets, especially with a high content of saturated fat, can induce changes in magnesium status, caused by an abnormal accumulation of saturated fatty acids in cell membrane that can lead to metabolic alterations that can induce non-communicable diseases as type 2 diabetes.

**Objectives:** To investigate, in rats, the effects of a short time consumption of a high-fat diet on Mg status and insulin sensitivity.

**Method/Design:** Twelve male weaning Wistar rats (body weight 48.3±7.6g) were distributed in two groups, and were fed, respectively, high-fat (60% energy of lipids from soy bean and lard) or control (10% energy of lipids from soy bean and lard) diet during 24 days. Mg status (concentration in plasma, erythrocytes, urine, feces, gastrocnemius, and tibia), 12-h fasting glucose, insulin tolerance test, liver fatty acids, body and organs weight, and body composition (total carcass lipids and protein) were assessed. Data were evaluated using Student-t and Pearson correlation test.

**Results:** When compared to control the high-fat group had higher apparent magnesium absorption (11.3±5.4 vs 4.2±2.0 mg/d; p=0.013), and tibia Mg (5.4±0.5 vs 4.9±0.3mg/g; p=0.035), and lower urine Mg concentration (1.1±0.1 vs 2.4±0.8; p=0.002). No statistically differences were observed in: Mg concentrations in muscle, plasma, and erythrocytes, fasting glucose and insulin sensitivity between groups. Carcass lipids were related with fasting glucose (r=0.58, p=0.049) and fasting glucose with saturated (r=0.620, p=0.032) and monounsaturated (r=0.58, p=0.047) fatty acids in the liver.

**Conclusions:** These findings suggest that even a short-time consumption of high-fat diet alters some parameters of magnesium status, that can be even more impaired with time. Financial support by FA-PESP (Process # 2009/05624-7) and CNPq (Process # 480487/2009-0).

**Key Words:** glucose, high-fat diet, insulin sensitivity, magnesium, rats.

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27/567. Gut: An open door to Nutrition

**Causative relation between augmented nutritional strategies and improvement in neurorehabilitation, a structural equation analysis**

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**Introduction:** Former work (Dávalos, Finestone, Volkert) documented poorer rehabilitation potential for patients with neurogenic dysphagia and/or undernutrition interfering with our clinical observation that these patients exhibit a remarkable improvement during neurorehabilitation

(NR).

**Objectives:** Augmented nutritional strategies promote better outcome in neurorehabilitation

**Method/Design:** The impact of 4 variables of augmented nutritional strategies, (mealtime supervision, food consistency adaptation, tube feeding nasal, tube feeding via PEG) on an integrated function of improvement in neurorehabilitation as measured by Rivermead motor assessment(RMA), Barthel Index(BI), Extended activities of daily living(EADL), Basic activities of daily living(BADL) was tested.

64/127 consecutive patients routinely admitted for inpatient neurorehabilitation needed nutritional support.

Swallowing, nutritional or cognitive profile showed the same distribution in the diagnostic subgroups stroke vs. TBI and CID.

Statistical Analysis: as appropriate chi-square test, t-test, Mann-Whitney-U-test, Spearman-rank-correlation. Confirmatory factor analysis and structural equation modelling.

**Results:** A model including a path from the latent variable “augmented nutritional strategies” (mealtime supervision, food consistency adaptation, tube feeding (nasal or PEG) to “improvement in neurorehabilitation” showed a good fit to the data (chi-square(19)=36.47, p=.009; RMR=.946; GFI=.643; NFI Delta I=.911). This structural equation model presented a significantly better fit (r=0,39) than a control model in which the path from “augmented nutritional strategies” to “improvement in NR” was fixed to be 0 (chi-square(1)=15.42, p<.001).

All indicators of „improvement in NR-variable“ loaded significantly on this latent variable ( $\Delta$ RMA: r=.55,  $\Delta$ BI-WS: r=.74,  $\Delta$ EADL: r= .67,  $\Delta$ BADL: r= .87).

**Conclusions:** All swallowing compromised patients under augmented nutritional strategies showed a significantly stronger functional improvement.

The predictive potential of augmented nutritional strategy for improvement in neurorehabilitation was clearly demonstrated by means of structural equation modelling (r=0,39). Not only dysphagia related problems showed significant improvement, also mobility, ambulation, basic cognitive deficits.

This confirms that the rehabilitation potential of these patients is strongly underestimated

**Key Words:** augmented nutritional strategies, neurorehabilitation.

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27/597. Gut: An open door to Nutrition

**Effect of an exopolysaccharide produced by Halomonas maura on the digestive utilization of minerals**

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**Introduction:** Halomonas maura is a moderately halophilic bacterium that produces an exopolysaccharide denominated mauran, an anionic heteropolysaccharide with a complex structure, which has high ability to bind cations, difficult in vitro digestibility and retains stable structure after undergoing freeze-drying process

**Objectives:** Evaluate the potential utilization of mauran as a source of hydrocarbon compounds that may affect mineral bioavailability

**Method/Design:** Extraction and purification of mauran was done according to Quesada et al. (1993); 22 male Wistar rats were randomly assigned into 2 experimental groups fed either a control casein-methionine diet or a casein-methionine diet supplemented with 5% mauran. The animals were housed in metabolic cages designed for the separate collection of faeces and urine. Phosphorus was determined using a colorimetric technique, whereas calcium and magnesium were determined by atomic absorption spectrophotometry. Digestive utilization of P, Ca and Mg was measured as Apparent Digestibility Coefficient (ADC).

**Results:** Animals fed the mauran-supplemented diet showed a significantly higher faecal weight. Higher daily food intake and faecal weight were observed in the experimental group that consumed the mauran diet. Furthermore, when fecal weight was linearly correlated to daily food intake, a higher slope was found for the mauran-fed when compared to the control animals ( $y=0.0771x - 0.2071$ ;  $y=0.0817x - 0.0491$  in control and mauran diet, respectively). The Apparent Digestibility Coefficient (ADC) of P, Ca and Mg was significantly lower in the experimental group of rats fed mauran when compared to control diet

**Conclusions:** Mauran could have an effect of non fermentable

dietary fiber, showed by increased faecal excretion and dragged minerals and water that resulted in a decrease in digestive utilization of the minerals P, Ca and Mg

**Key Words:** exopolysaccharide, functional foods, Halomonas, mauran, mineral bioavailability.

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**27/642.** Gut: An open door to Nutrition

**Effect of antimethanogenic treatment on Iga levels in plasma of lactating goats and their offspring.**

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**Introduction:** The microbial colonization of the host's gut causes extensive immune adaptation, although the factors involved in such processes are still poorly understood. Recent data suggest that an early nutritional intervention in the young animal might play a role in the modulation of the microbial ecosystem that will be residing in the rumen in the adult life. However, the effects on the immune response at early life and the potential influence of the mother have not been investigated yet.

**Objectives:** To study the effect of treating goats and their offspring early in life with an antimethanogenic compound (bromochloromethane, BCM) on changes of total IgA levels in plasma.

**Method/Design:** Eighteen goats giving birth to two kids were used. Nine goats were treated with BCM (G+) after kids were born and over 8 weeks. The other 9 goats were not treated (G-). One kid per mother in both groups was treated with BCM (k+) while the other was untreated (k-), resulting in four experimental groups: G+/k+, G+/k-, G-/k+ and G-/k-. Blood samples were taken from mothers at 8 weeks and from kids, a month after (when the BCM k+ treatment ceased, P1) and 3 months later (P2). Total IgA levels were determined by ELISA.

**Results:** The addition of BCM had no effect on mothers' IgA levels. In kids, IgA concentrations ( $\mu\text{g/ml}$ ) were higher ( $P=0.014$ ) at P1 (35.1) than at P2 (23.2). Kids from G+ mothers showed higher values of IgA levels than those from G- ( $P=0.030$ ), corresponding the highest ( $P<0.001$ ) levels to G+k- kids compared to the other 3 groups.

**Conclusions:** Our results suggest that a modulation of the rumen microbial colonization early in life, including the influence of the mother, exerts a modulated systemic immune response. The specific mechanisms involved in such modulation deserve further investigation.

**Key Words:** bromochloromethane, IgA, rumen.

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**27/655.** Gut: An open door to Nutrition

**Associations between leptin and lymphocyte subsets in adolescents. The afinos study**

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**Introduction:** Leptin is an adipose hormone that regulates appetite and energy balance, and has an important immunoregulatory activity

**Objectives:** To examine the association between leptin and lymphocyte subsets in adolescents

**Method/Design:** This study comprised a sample of 198 adolescents (98 females), aged 13.0 to 17.9 years, from the Madrid region and enrolled in the AFINOS study. Waist circumference and serum leptin concentrations were measured. Lymphocyte subsets (CD3+, CD4+, CD8+, CD16+56+, CD19+, CD3+CD45RO+, CD3+CD45RA+, CD4+CD45RO+, CD4+CD45RA+, CD8+CD45RO+, CD8+CD45RA+) were determined by flow cytometry. The data were analysed by one-way ANOVA and partial correlations controlled for age and waist circumference.

**Results:** Females showed higher levels of leptin than males ( $11.1\pm 6.9$  vs.  $4.6\pm 5.0$  ng/ml;  $p<0.001$ ). No gender differences were found in lymphocyte subsets, except for CD19+ and CD16+CD56+ levels which were higher in males than in females ( $314.0\pm 132.5$  vs.  $250.8\pm 89.0$  cells/ml and  $450.0\pm 191.2$  vs.  $381.6\pm 196.4$  cells/ml, respectively; both  $p<0.05$ ). Positive correlations were found between leptin and CD3+ ( $r=0.24$ ), CD8+ ( $r=0.22$ ), CD3+CD45RO+ ( $r=0.31$ ), CD8+CD45RO+ ( $r=0.23$ ) and CD4+CD45RO+ ( $r=0.21$ ) in females (all  $p<0.05$ ). However, only CD4+CD45RO+ was associated with leptin in males ( $r=0.25$ ,  $p=0.017$ ).

**Conclusions:** These results suggest that the potential association between leptin and memory T cells (CD3+CD45RO+, CD4+CD45RO+, CD8+CD45RO+) may be mediated by sex. Therefore, this outcome could mean an immunoprotective role of leptin in females, more than in males.

**Key Words:** Leptin, Memory T Cells, Adolescents.

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**27/657.** Gut: An open door to Nutrition

**Investigation of the bioactivation of glucoraphanin in human microbiota-associated mice**

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**Introduction:** Broccoli has been associated with chemopreventive effects, mainly due to its main glucosinolate glucoraphanin. Glucoraphanin is converted to the active metabolite sulforaphane by myrosinase when plant tissue is injured. Although myrosinase is inactivated by thermal treatment, biological effects and characteristic degradational metabolites have been observed when cooked Brassica vegetables are consumed. Therefore, glucosinolates may be activated by intestinal bacteria.

**Objectives:** Aim of the study was to investigate the role of human intestinal bacteria in the bioactivation of glucoraphanin in vivo.

**Method/Design:** The bacterial activation of glucoraphanin was studied by comparing human microbiota-associated (HMA) mice with germfree mice. Either glucoraphanin (172 mg/kg b.w.) or glucoraphanin in combination with myrosinase (17 U/kg b.w.) was orally applied to HMA and germfree mice. Water served as a control. Feces were collected for 48 hours after application. Thereafter, the animals were killed and intestinal contents were collected. Glucoraphanin and sulforaphane were analysed using HPLC/DAD.

**Results:** Fecal excretion of glucoraphanin was low independent of the colonisation status or the application of myrosinase. Total recovery of glucoraphanin in the form of glucoraphanin and sulforaphane in feces within 48 hours after application of glucoraphanin was higher in germfree mice that received glucoraphanin (0.78%) or glucoraphanin with myrosinase (0.52%) than in HMA mice that received glucoraphanin (0.06%) or glucoraphanin with myrosinase (0.03%). Germfree mice did not produce any sulforaphane from glucoraphanin, whereas germfree mice that received myrosinase and HMA mice did. Bacterial colonisation accelerated fecal excretion of glucoraphanin. After 48 hours, glucoraphanin was still present in the small intestine, cecum and colon of germfree mice (0.002, 0.26 and 0.04%, respectively), but not of HMA mice.

**Conclusions:** Transformation of glucoraphanin was observed only in germfree animals that received myrosinase or in HMA animals. It can be concluded, that human intestinal bacteria possess myrosinase activity and contribute to the bioactivation of glucoraphanin in the gut.

**Key Words:** Glucoraphanin, Sulforaphane, Myrosinase, Germfree, Human microbiota.

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27/664. Gut: An open door to Nutrition

**Nutritional study in high-performance athlete supplemented with Cu and Fe.**

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**Introduction:** Athletes who restrict energy intake or use severe weight-loss practices, monotonous or low micronutrient density diets,

are at greatest risk of micronutrient deficiencies. Copper deficiency can generate cellular Iron deficiency and produce many alterations in oxygen transport and energy production. As a result, oxidative stress disturbances may ensue and lead to cell damage, impairment of muscle function.

**Objectives:** To evaluate the status of iron and copper before and after supplementation with Cu and Fe, and its association with other parameters involved in sports performance in a population of high performance athletes

**Method/Design:** 14 professional handball players in 2-months intermittent intensive training and nutritional education were treated with 5 mg Fe/d and 600 mg Cu/d supplements. Food intake and blood samples were collected before supplementation, after two consecutive months of mineral supplementation and after two months post mineral supplementation. Fe and Cu plasma levels were measured by atomic absorption spectrometry.

**Results:** Carbohydrates intake was below recommendations for athletes (6-10 g/kg/day) at the three points studied. Protein and fat intakes were in accordance with the athlete's recommendations. Throughout the experimental period, we found Cu and Fe intakes to be over the recommended intake for a healthy population (there are currently no specific recommendations for these minerals in athletes). Before supplementation, 14.2% and 49.7% of athletes were below the reference values for plasma Fe and Cu, respectively. After two months supplementation, 14.2% and 21.3% of subjects were still below. However, Fe and Cu plasma levels were restored two months post supplementation. There was a significant correlation ( $p < 0.05$ ) between meat consumption frequency and fat percentage with Cu and Fe in plasma.

**Conclusions:** High-performance athletes need to be nutritionally-controlled during intensive training in order to keep a correct nutritional balance. Individualized nutritional assessment may be necessary to establish whether supplementation might be required to optimize performance athlete

**Key Words:** Athletes, Cooper, Iron, plasma, supplements

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27/667. Gut: An open door to Nutrition

**Relationship of mineral status in women with postmenopausal hormonal factors**

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**Introduction:** Menopause is a stage in the life of the woman reaches when the cessation of ovarian function, with the disappearance of follicular activity or caused by surgical absence of ovaries. In this situation, the metabolism of calcium, phosphorus and magnesium are altered due to hormonal changes, can lead to osteoporosis

**Objectives:** To study the status of calcium, phosphorus and magnesium in a population of postmenopausal women and to determine

the relationship with the hormonal factors such as parathyroid hormone (PTH) and osteocalcin.

**Method/Design:** The study was performed in 24 postmenopausal women from the Granada, Spain with age 42-71 years. Inclusion criteria were based on acceptance to participate in the study and did not show any pathology that could affect their nutritional status. Calcium and magnesium were analyzed by Atomic Absorption Spectrometry in plasma samples mineralized by wet and phosphorus was determined by the colorimetric Fiske-Subbarow method. Hormonal parameters were determined by colorimetric enzyme immunoassay technique. A questionnaire of 72 hours and a frequency of food consumption, and using Nutriber® (Mataix, and Garcia Diz, 2006) software we obtained the % of RDA's.

**Results:** Regarding mineral intake, our results show a Ca intake very close to the RDA's (97%), somewhat lower in magnesium (82%) and phosphorus values above the RDA (128%). Regarding plasma values, we observed a deficiency of Ca and P by 18% and 10% respectively of the women studied. On the other hand, found a 19% higher than normal values of PTH, and 82% that showed lower osteocalcin values than the reference.

**Conclusions:** It is important to control and monitoring of nutritional status, especially in regard to metabolism of calcium, phosphorus and magnesium in postmenopausal women still need to control both the intake and plasma levels of these minerals, and hormonal levels involved in metabolism, for prevent consequent disorders caused by deficiencies in these minerals

**Key Words:** Postmenopausal, Calcium, Phosphorus, Magnesium, Osteocalcin.

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#### 27/672. Gut: An open door to Nutrition

### Impact of gut microbiota on gut elongation in the PRM/Alf mouse model

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**Introduction:** Between birth and weaning the PRM/Alf mouse develops an elongated intestine, which is one third longer compared to other mouse strains. Cross-fostering experiments have shown that the gut extension can be attributed to genetics as well as environmental factors. The latter are due to a strong maternal effect resulting from either the milk of PRM/Alf mothers and/or gut microbiota.

**Objectives:** Aim was to examine the impact of the gut microbiota on gut elongation in the PRM/Alf mouse. Since short chain fatty acids (SCFA) and polyamines are known to be trophic factors, the possible contribution of these bacterial metabolites to gut elongation was to be tested.

**Method/Design:** Germfree PRM/Alf and C3H control mice were colonized with a microbial consortium composed of nine bacterial species representing a simplified model of the human gut microbiota (SIHUMI). The gut length of eight weeks old PRM/Alf and C3H mice were determined and caecal SCFA and polyamines were analysed. The effect of gut microbiota on gut length was investigated by comparing germfree, conventional and SIHUMI PRM/Alf mice.

**Results:** The gut of the PRM/Alf mice showed an increased length of 27 % compared to C3H mice. Caecal concentrations of acetate, propionate and butyrate were decreased 1.4, 1.3 and 1.5-fold, respectively, in PRM/Alf mice compared to C3H mice. The concentrations of putrescine, spermidine and spermine and the acetylated polyamines N-acetylcadaverine, N-acetylspermidine and N-acetylspermine were decreased by a factor of 1.4, 3.4, 1.6 and 2.1, 1.2, 1.3, respectively. The gut length of germfree and colonized PRM/Alf mice showed no major differences.

**Conclusions:** Comparison between germfree and colonized PRM/Alf mice shows that the gut microbiota alone is not responsible for gut elongation. The reduced caecal concentrations of bacterial metabolites in PRM/Alf mice compared to C3H mice might be explained by an increased nutrient absorption due to a higher gut surface.

**Key Words:** PRM/Alf mouse, gut lengthening, gut microbiota, short chain fatty acids, polyamines.

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#### 27/750. Gut: An open door to Nutrition

### Coffee polyphenols and colonic fermentation: an in vivo study.

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**Introduction:** We recently demonstrated a significant increase of faecal mass in healthy volunteers after a two-week diet containing the same amount of dietary fibre but with a higher amount of polyphenols compared to a polyphenols-poor diet. This effect might be attributed to the intake of scarcely bioavailable phenolics, which have been previously described as able to inhibit microbial fermentation of indigestible carbohydrates in feeds.

**Objectives:** The aim of the present work was to evaluate in vivo the effect of chronic consumption of a polyphenol-rich beverage (coffee) on colonic hydrogen production stimulated by the intake of a fermentable fibre.

**Method/Design:** In a crossover randomised experiment, six healthy subjects underwent a breath hydrogen test for 10 hours after consumption of 10 g of inulin in two separate occasions. In one case, volunteers consumed a standard diet and 4 cups of espresso coffee per day for the 3 days before the experiment, while in the other experimental period, subjects followed the standard diet but avoided coffee for the 3 days preceding inulin intake.

**Results:** After the same amount of inulin and a standardised diet, coffee intake significantly reduced colonic hydrogen production as measured by breath test ( $p = 0.016$ ). The colonic fermentation was almost completely inhibited after the coffee diet and, consequently,

flatulence was reduced starting from the seventh hour after inulin intake.

**Conclusions:** In conclusion, we observed that the intake of coffee was able, in physiological doses, to reasonably reduce intestinal fermentation of soluble fibre. The consequences of polyphenols-rich diets on the prebiotic effect of fibres such as inulin warrant further studies.

**Key Words:** Coffee, colonic fermentation, polyphenols, in vivo study, breath hydrogen test.

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## 27/765. Gut: An open door to Nutrition Effect of protein diet on weight loss

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**Introduction:** High-protein, low carbohydrate diets have been widely promoted in recent years as an effective approach to losing weight.

**Objectives:** Analyze the effect of protein diet on weight loss.

**Method/Design:** Descriptive study, in which the sample population included 50 individuals of both sexes (24% male and 76% female), aged between 18 and 68 years old. The study was performed in Murcia (south-east Spain) and all patients were overweight (BMI  $\geq 25$ ) or obese (BMI  $\geq 30$ ). The patients were subjected to a protein diet for 4 months with examinations performed every 15 days during the active phase, in which their physical state (current weight, changes in their eating habits, entry or expansion of physical exercise) and dietary reeducation were recorded. The protein diet is structured in a full range of preparations based on proteins of high biological value, in accordance with current legislation (EC Directive 96/8 of 1996) and low glycemic load vegetables. The average caloric intake of this type of diet is 750 Kcal/day and aims to achieve weight loss, which is maintained by food re-education and physical exercise.

**Results:** The mean initial weight of the sample population was 90.9 $\pm$ 19.3 Kg (men 110.5 $\pm$ 20.2 Kg and women 83.4 $\pm$ 13.9 Kg) ( $p \leq 0.05$ ). After the diet the average weight in the sample population decreased 17.6  $\pm$  7.9 Kg. A greater weight reduction was observed in males than in females (23.7 $\pm$ 8.8 Kg and 15.9 $\pm$ 6.7 Kg respectively ( $p \leq 0.05$ )). There was an average final weight of 73.4 $\pm$ 7.4 Kg (89.7 $\pm$ 7.4 Kg in men and 68.6 $\pm$ 9.2 Kg in women ( $p \leq 0.05$ )). Mean BMI decreased 6.4 $\pm$ 2.8 kg/m<sup>2</sup> (7.5 $\pm$ 2.9 Kg/m<sup>2</sup> for men and 6.1 $\pm$ 2.9 Kg/m<sup>2</sup> for women ( $p \geq 0.05$ )).

**Conclusions:** The protein diet is more effective than hipocaloric diet on weight loss in a short lapse of time.

**Key Words:** protein diet, weight loss, low carbohydrates.

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## 27/776. Gut: An open door to Nutrition Dietary counselling and probiotic intervention during pregnancy modify postpartum adiposity

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**Introduction:** Pregnancy predisposes women to a heightened risk of obesity and consequently obesity-related diseases in future years. In addition to current attempts to prevent or manage obesity, based on the control of traditional life-style-related risk factors, probiotics may offer novel tools. The concept arises from reports demonstrating that gut microbiota deviations associate with obesity.

**Objectives:** To establish whether dietary counselling and supplementation with a probiotic combination of *Lactobacillus rhamnosus* GG (ATCC53103) and *Bifidobacterium lactis* initiated in early pregnancy are effective in controlling the weight and body composition of the mother during and after pregnancy.

**Method/Design:** At the first trimester of pregnancy 256 women were randomly assigned to receive nutrition counselling to modify dietary intake according to current recommendations or as controls; dietary intervention groups were further randomized to receive probiotics *Lactobacillus rhamnosus* GG (ATCC 53103) and *Bifidobacterium lactis* (diet/probiotics) or placebo (diet/placebo) capsules in a double-blind manner, whilst the controls received placebo (control/placebo). The intervention lasted until the end of exclusive breastfeeding for up to six months.

**Results:** The risk of central adiposity defined as waist circumference 80 cm or more was lowered in women in the diet/probiotics group compared with the control/placebo group (OR 0.30, 95%CI 0.11 to 0.85,  $p=0.023$  adjusted for baseline BMI), whilst the diet/placebo group did not differ from the controls (OR 1.00, 95% CI 0.38 to 2.68,  $p=0.994$ ) at 6 months postpartum. The number needed to treat (NNT) with diet/probiotics to prevent one woman from developing a waist circumference of 80 cm or more was 4. However, intervention had no impact on weight gain over pregnancy or postpartum weight loss.

**Conclusions:** Nutrition counselling with probiotics potentially restrains central adiposity after delivery and may offer a novel means for the prevention and management of obesity.

**Key Words:** probiotics, diet, pregnancy, postpartum, anthropometric measurements

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27/778. Gut: An open door to Nutrition

### **Increasing doses of zinc on the absorption of iron in milk fortified with iron**

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**Introduction:** There is evidence that Purita Fortified Milk has not had a similar effect on the nutritional status of zinc as observed for iron, suggesting the possibility of increasing the concentration of zinc in fortified milk, however, it is first necessary to ensure that this amendment does not affect iron absorption.

**Objectives:** To determine the effect of increasing doses of zinc additions on the bioavailability of iron in full fat milk powder fortified with iron in humans.

**Method/Design:** Experimental study, involving 15 adult women. We measured the bioavailability of iron through the double-radioisotope technique with <sup>55</sup>Fe and <sup>59</sup>Fe incorporation into red blood cells after 14 days of the administration of 4 different formulations of cow's milk fortified on days 1, 2, 14 and 15 of the study, with 10 mg/L of iron, as ferrous sulfate, with increasing doses of zinc added, as zinc sulfate, achieving final molar ratios (native more added) of Zn:Fe of 0.3:1, 0.8:1, 1.2:1 and 2.1:1.

**Results:** Zinc fortification in increasing doses did not significantly modified the absorption of iron (repeated measures ANOVA, F = 1.31, p = 0.28).

**Conclusions:** In full fat milk powder fortified with 10 mg/L of iron, the addition of 20 mg/L of zinc does not inhibit iron absorption, which equals final product molar ratios of Zn:Fe less than or equal to 2.1:1.

**Key Words:** Milk, Fortification, Absorption, Zinc, Iron.

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27/801. Gut: An open door to Nutrition

### **Dietary iron and quality of life in inflammatory bowel disease**

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**Introduction:** There is mounting evidence to suggest that free (unchelated), oral iron exacerbates colonic inflammation in IBD patients due to a surplus of unabsorbed iron in the colon. Iron, in its free, soluble form, is extremely redox reactive, generating harmful reactive oxygen species, and providing essential nutrition for the colonisation of detrimental bacteria in the colon, potentially leading to an imbalance

in the gut microflora.

**Objectives:** To measure the effect of high dietary iron intakes on the quality of life of patients with inflammatory bowel disease, with particular interest in dietary fortificant iron (i.e. from fortified foods such as breakfast cereals). Additionally, associate increased faecal iron concentrations with increased inflammation potential in the gut.

**Method/Design:** Dietary iron intake and quality of life will be measured in IBD patients during a multicentre, observational trial in East Anglia, UK (n=100). Additionally, the inflammatory effects of iron in the gut will be measured in healthy individuals during a placebo controlled, randomised controlled trial. Stool sample concentrations of redox reactive iron and detrimental gut bacteria will be correlated with total faecal iron concentrations and total dietary iron intake after both iron fortification and iron supplementation treatments (crossover study design).

**Results:** Results are pending.

**Conclusions:** It is accepted that increased inflammation (i.e. increased disease activity) in IBD patients impacts negatively on their quality of life, and therefore high dietary intakes of free iron (in particular, fortificant iron intakes) may play a role in driving forward this inflammation and, subsequently, may contribute to the lower quality of life reported by most IBD patients. The identification of free fortificant iron as a stimulant of gut inflammation and disease activity in IBD patients will stimulate research on alternative approaches to introducing iron safely in this patient group.

**Key Words:** Iron, inflammatory bowel disease, quality of life, gut bacteria, redox markers

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27/805. Gut: An open door to Nutrition

### **Lactobacillus rhamnosus CNCM I-4036 as an Inhibitor Of Enteropathogenic Escherichia coli AND Salmonella typhimurium GROWTH**

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**Introduction:** Enteropathogenic Escherichia coli (EPEC) and Salmonella enterica serovar typhimurium are a major cause of acute diarrhea in humans, affecting mainly infants in developing countries and travelers from industrialized countries visiting tropical or subtropical areas. Lactobacillus rhamnosus is a Gram positive bacillus known for its effect as a probiotic agent.

**Objectives:** The aim of the present study was to determine the in vitro antimicrobial activity of culture supernatants of Lactobacillus rhamnosus CNCM I-4036 against the pathogens Escherichia coli and Salmonella typhimurium.

**Method/Design:** Neutralized supernatant of Lactobacillus

rhamnosus CNCM I-4036 (24 h, 37°C, anaerobically), lyophilized and concentrated 10x was subjected to antimicrobial activity assay. Inhibition of pathogenic bacteria growth and proliferation was evaluated inoculating the pathogens in tryptone soy broth with 4% of the probiotic supernatant and incubating aerobically at 37°C for 17h. Optical densities were measured at 620 nm each hour.

**Results:** In a dose and pH dependent manner, *Lactobacillus rhamnosus* CNCM I-4036 culture supernatant inhibited the growth of *Escherichia coli* CECT 742 ( $P < 0,000$ ) and *Salmonella typhimurium* CECT 4594 ( $P < 0,000$ ).

**Conclusions:** *Lactobacillus rhamnosus* CNCM I-4036 inhibits *Escherichia coli* CECT 742 and *Salmonella typhimurium* CECT 4594 growth. This effect might be due to antimicrobial substances (bacteriocins) produced by the probiotic bacteria and indeed present in neutralized culture supernatants.

**Key Words:** Probiotics, *Lactobacillus Rhamnosus*, Bacteria and Enterophogens

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### 27/831. Gut: An open door to Nutrition

#### Assessment of basal metabolic rate and VO<sub>2</sub>max in rats fed normo or high-whey protein diets

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**Introduction:** VO<sub>2</sub> estimation is a useful way to analyze training effectiveness and energy-related metabolic changes in response to dietary treatments

**Objectives:** The aim of the present study was to estimate the basal metabolic rate, maximal oxygen consumption (VO<sub>2</sub>max), and the influence of anaerobic exercise on the above mentioned parameters of rats that consumed diets based on different protein levels.

**Method/Design:** Twenty male Wistar rats were randomly distributed into two groups: normo or high-whey protein diet. Both groups followed a resistance training protocol described by Aparicio et al. (2011). An open-circuit indirect calorimetry system was used to determine energy expenditure, O<sub>2</sub> consumption, CO<sub>2</sub> production and respiratory quotient. The basal metabolic rate was estimated using metabolic cages in which animals were placed during 24 hours. For the VO<sub>2</sub> max test, animals followed a protocol previously described by Wisloff et al. (2001) with small modifications (Martin S et al. 2010). All the different parameters were measured at the beginning and at the end of an experimental period of 12 weeks.

**Results:** Energy expenditure expressed as (kcal/day/kg<sup>0,75</sup>) was higher during the dark when compared to the light cycle (152.4±2.18 vs 125.8±2.27,  $P < 0.001$ ). It was also higher at the beginning than at the end of the experimental period (139.1±2.63 vs 118.1±2.03,  $P < 0.001$ ). In contrast, VO<sub>2</sub> max was lower at the end of the experimental period when compared to the starting values (21.8±1.20 vs

30.3±2.49,  $P < 0.001$ ). We have not observed differences in any of the studied variables between the two dietary treatments assayed.

**Conclusions:** Consumption of a high-protein diet did not affect either aerobic capacity or energy expenditure. The lower values observed in VO<sub>2</sub>max at the end of the experimental period might be due to the anaerobic training followed by the animals. With regard to energy expenditure, Wistar rats are nocturnal and thus, their metabolism is higher during the dark cycle.

**Key Words:** VO<sub>2</sub> max, basal metabolic rate, high-whey protein, rats and indirect calorimetry

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### 27/852. Gut: An open door to Nutrition

#### Farmed salmon supplementation enhances the enzymatic defence system

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**Introduction:** A high consumption of n-3 long chain-polyunsaturated fatty acids (n-3 LC-PUFA) can lead to an increased oxidative state because of n-3 LC-PUFA high susceptibility to oxidation.

**Objectives:** Investigate whether the increased salmon consumption could affect the enzymatic antioxidant defense system in pregnant women.

**Method/Design:** 123 pregnant women were randomly assigned to one of two groups. Women in the control group (n=61) were asked to continue their habitual diet and women in the salmon group (n=62) were asked to incorporate two portions of farmed-salmon (150 g/portion) into their diet per week from study entry (week 20) until they gave birth.

Fasting blood was collected at weeks 20, 34 and 38 of gestation. Catalase (CAT), superoxide dismutase (SOD), glutathione reductase (GR) and glutathione peroxidase (GPx) activities were determined by spectrophotometric methods. Concentration of selenium was determi-

ned by inductively-coupled plasma mass spectrometry and glutathione by high pressure liquid chromatography (HPLC) with fluorescence detection at 420 nm.

Differences between treatment groups over time were evaluated using a general linear model of variance for repeated measures. A posteriori Bonferroni tests were also performed ( $P < 0.05$ ).

**Results:** Erythrocyte GPx activity and selenium concentration significantly increased during pregnancy ( $P < 0.001$ ) and were significantly lower in the control group compared to the salmon group ( $P = 0.042$  and  $< 0.001$ , respectively). GR and glutathione increased significantly during pregnancy ( $P = 0.008, 0.029, 0.005, 0.007$ , respectively) without differences between groups. SOD and CAT activities did not change over pregnancy and were similar between groups.

**Conclusions:** Increased consumption of salmon enhances the activity of GPx parallel to that of selenium in pregnant women. This enhanced antioxidant defense might be helpful to prevent and/or eliminate additional oxidative stress during pregnancy.

This study was supported by the European Union Commission under Framework 6: Sustainable Aquafeeds to Maximize the Health Benefits of Farmed Fish for Consumers (AQUAMAX; FOOD-CT-2006-16249).

**Key Words:** Antioxidant Defense System, Oxidative Stress, Pregnancy and Diet.

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## 27/886. Gut: An open door to Nutrition

### **Influence of protective characteristics of packaging material and packing conditions on packed dried apricot**

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**Introduction:** By reducing the water content fruit and vegetables products become very hygroscopic - sensitive to moisture, oxidation and light. Physical-chemical processes that cause changes in the packaged products quality take place in this sensitive substrate, depending on the packaging and storage conditions.

Oxidative changes during storage affect the composition and sensory characteristics and lower the nutritive value and overall product quality.

Dried apricot (*Prunus armeniaca* L.) is rich in vitamins C and A, iron and carbohydrates, and contains up to 5 times more potassium than the fresh fruit.

Materials for dried apricot packaging are necessary to have appropriate barrier characteristics for water, oxygen nitrogen and carbon dioxide molecules, as well as for electromagnetic rays, especially those with low wavelengths in UV region.

Changes in quality of dried apricot packed into selected packaging materials at normal atmospheric pressure at a modified atmos-

phere (30% CO<sub>2</sub>, 60% N<sub>2</sub>) were examined during the research.

The work shows both the results of the packing material barrier properties testing and the results of modified atmosphere stability analyses.

Over the storage period of 12 months, changes in the water content and polyphenol content in packaged product were monitored.

The results indicate the influence of the packaging materials type, combination and barrier properties on packed dried apricots quality.

The goal of this research was to determine a quality packaging material that would optimally protect the product, by means of monitoring the packed dried apricots quality changes.

#### **Objectives:**

**Method/Design:** Four characteristic combinations of packaging materials with different barrier properties were selected into which dried apricot was packed:

- Polyester-polyethylene, (PET/PE),
- Paper-polyethylene, (PAP/PE),
- Paper-aluminium-polyethylene, (PAP/AL/PE),
- Polyester-aluminium-polyethylene, (PET/AL/PE)

Dried apricot was packed under normal atmospheric pressure and in the modified atmosphere (30% CO<sub>2</sub>, 60% N<sub>2</sub>).

100g dried apricot was packed into formed packaging material units.

Packed samples were kept at room temperatures 17-22°C, exposed to influence of light for 12 months.

The packed dried apricot was tested following the next periods of time:

0,1,6,9, and 12 months.

-Gas molecules permeability was determined by the isostatic gas chromatographic method (DIN53380), using "LYSSY SPM-200" a gas chromatograph included (GS-320), and an integrator (Hewlett-Packard 3396A

-Water vapor permeability was determined by the ASTM E 96 method

-Modified atmosphere sustainability was monitored by OXY-BABY device

Following chemical analyses were performed:

- Moisture content - drying at  $103 \pm 2^\circ\text{C}$  to constant mass
- Polyphenol content - Folin-Ciocalteu method

**Results:** Dried product had 31.2% moisture at the beginning. The biggest changes in moisture content occurred in samples packed into PAP-PE. The best moisture protection showed PET-AL-PE due to protective role of aluminum foil. Packaging in nitrogen conditions showed the same tendencies as the corresponding packaging in atmospheric conditions.

Polyphenol changes point out to occurrence of cyclic changes, depending on packing material and storage time. During the first month, polyphenol content decrease occurred, followed by an increase - with smallest amount of these changes observed in samples packed into the PET-AL-PE. The smallest changes were measured in samples packed under nitrogen.

**Conclusions:** According to the tests, it can be concluded that adequately applied modified atmosphere combination, choice of packaging materials, their combinations and barrier characteristics all bare great significance and influence sustainability of packed dried

apricot. The best protection to packed dried apricot provide the PET-AL-PE combination.

**Key Words:** packaging, modified atmosphere, dried apricot.

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**27/889.** Gut: An open door to Nutrition

**Endothelial progenitor cell numbers are associated with body composition, but not fat intake or blood lipids**

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**Introduction:** The endothelium plays an essential role in vascular homeostasis and regulation of vascular tone. Endothelial dysfunction occurs in the early stages of atherosclerosis, and contributes to the formation of atherosclerotic plaques. Circulating markers of endothelial function include endothelial progenitor cells (EPC), which play a role in repair and maintenance of damaged endothelium, and endothelial microparticles (EMP) and platelet microparticles (PMP), which are produced directly as a result of endothelial activation. There is little data on the effects of dietary fat or body composition on these novel markers of endothelial function.

**Objectives:** The aim of this study was to examine the influence of habitual dietary fat intake, body composition and blood lipids on circulating EPC, EMP, and PMP numbers in a cohort of subjects with moderate cardiovascular risk.

**Method/Design:** Intakes of total fat, saturated fatty acids (SFA), monounsaturated fatty acids (MUFA), n-3 polyunsaturated fatty acids (PUFA) and n-6 PUFA fatty acids in the habitual diet of 55 volunteers were correlated with absolute numbers of blood EPC, EMP, and PMP, which were analysed using flow cytometry. EPC were stained with a combination of anti-CD34 and anti-CD309 (VEGFR2), and EMP and PMP were stained with anti-CD31 and anti-CD42b.

**Results:** EPC numbers were positively correlated with BMI and waist circumference ( $P = 0.019, 0.039$  respectively). There were no other significant associations, and no relationship between dietary intake of fatty acids and EPC, EMP or PMP. There were no associations between EPC, EMP, PMP and blood lipids (cholesterol, high density lipoprotein, and triglyceride).

**Conclusions:** Data from this study is not consistent with previous literature; most studies report an inverse association between adiposity and EPC numbers. EPC numbers are also negatively associated with CVD risk. Thus, this observation requires further investigation.

This work was funded by the Foods Standards Agency (grant number N02R0007002)

**Key Words:** endothelial progenitor cells, endothelial microparticles, platelet microparticles, BMI.

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**27/893.** Gut: An open door to Nutrition

**Effect of fibre-rich breads on physico-chemical properties of intestinal content and ileal digestibility in pigs**

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**Introduction:** Content and structure of non-starch polysaccharides plays an important role in regulating the digestion process.  $\beta$ -glucan and arabinoxylans are two soluble cereal soluble non-starch polysaccharides that may influence the physicochemical properties of digesta and thereby influence the digestion of nutrients in the small intestine.

**Objectives:** The aim was to study the impact of food structure and added soluble non-starch polysaccharides on the physico-chemical properties of digesta and the digestion processes in the small intestine.

**Method/Design:** A control diet low in dietary fibre (DF; white wheat bread - WF) and four complex diets high in DF and reasonably iso-DF (dark ground rye bread - MR, rye bread with kernels - RK, bread with inclusion of isolated arabinoxylans - AX, breads with inclusion of isolated  $\beta$ -glucan - BG) were studied in a 5 x 5 Latin square design using pigs with an average weight of 55kg. Prior to feeding, breads were mixed with whey protein (Lacprodan 87), vitamins, minerals and indigestible marker (chromic oxide).

**Results:** The ileal digestibility of starch was significantly lower for RK, BG, and MR diets compared to AX and WF (0.96-0.98 vs. 0.99). However, the digestibility of organic matter was lower for all high-fibre diets compared to the WF diet (0.78-0.82 vs. 0.92) with MR and RK having the lowest digestibility. AX gave the highest viscosity of ileal content (15.4 mPa.s) and surprisingly, BG lower than of all other diets in spite of the highest viscosity of the diets, which may be due to differences in extent of degradation of the fibres in the gut.

**Conclusions:** The diets had different impact on starch and organic matter digestibility. The isolated fibres did not reduce organic matter digestibility to the same extent as the two breads with whole grain fibre, and the effect on starch digestibility not directly related to in vivo viscosity.

**Key Words:** digestibility, starch,  $\beta$ -glucan, arabinoxylan and pigs.

27/910. Gut: An open door to Nutrition

### The level of phosphorus in instant soups and processed cheeses

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**Introduction:** The addition of food additives containing phosphates to many food products may lead to excessive consumption of this mineral. That is the main reason why the level of phosphorus in food should be monitored. The aim of this study was to determine the phosphorus in food with high phosphorus content such as instant soups (17 samples) and cream processed cheeses (18 samples).

#### Objectives:

**Method/Design:** Phosphorus determination was conducted using dry ashing followed by UV-Vis spectrophotometry with ammonium vanadomolybdate method (VM). Obtained results were compared to the maximum level of phosphate added set by Polish legislation (0.3 % expressed as P<sub>2</sub>O<sub>5</sub> in the final product). The data were also compared with the Recommended Dietary Allowance (RDA) (700 mg per day according to Polish legislation) for each product.

**Results:** The level of phosphorus determined in the samples of cream processed cheeses was between 465 and 855 mg/100 g with the mean of 689 mg/100 g. The mean of the results is higher than the value given in the Polish "Food Composition Tables" (578 mg/100 g) from 2005. The phosphorus content in the samples of instant soups ranged from 142 to 714 mg/100 g; the highest was observed in tomato soups (515 mg/100 g), the lowest in mushroom soups (342 mg/100 g). Results showed that the mean portion of soup (5 g) covers with 12% of the RDA, while the portion of the cheese (100 g) as much as 98% of the RDA. None of the results did not exceed the legislation maximum limit of phosphates added.

**Conclusions:** The results indicate that regular consumption of processed cheeses in combination with other phosphate-containing products may lead to excess of phosphorus level. It should be taken into consideration especially in countries where such products are willingly consumed.

**Key Words:** phosphorus, UV-VIS spectrophotometry, food additives.

27/939. Gut: An open door to Nutrition

### Metabolic effects of raw and fermented vigna unguiculata consumption studied in vivo and in vitro

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**Introduction:** The potential health benefits of legume consumption can be further improved by different biotechnological treatments like fermentation.

**Objectives:** I) To determine the effects of raw and fermented *Vigna unguiculata* extracts in a human colon cell line (HT-29) viability and mitochondrial enzyme activity, II) To study the antioxidant capacity of raw and fermented *Vigna unguiculata* acetone extracts, and III) To study the influence of raw and fermented *Vigna unguiculata* consumption by growing rats on organ weight, plasmatic lipid parameters and antioxidant capacity.

**Method/Design:** In vitro experiments were carried out using a human colonic cell line (HT-29) treated with raw and fermented *Vigna unguiculata* acetone extracts. Cell viability was measured using Cristal violet test and mitochondrial enzyme activity by MTT test. Antioxidant capacity of raw and fermented acetone extracts was assayed in brain homogenate or LDL electrophoretic mobility models. In vivo experiments were conducted in recently weaned Wistar rats that consumed legume-based experimental diets for a period of 21 days. Plasma lipid parameters and antioxidant capacity were measured using commercial kits.

**Results:** Fermented *Vigna unguiculata* extracts were more protective against peroxynitrite radical-induced oxidative stress when compared to raw and negative control treatments. A finding that was reflected in improved viability and mitochondrial activity tests. Acetone extracts of fermented *Vigna unguiculata* exhibited higher antioxidant capacity when compared to raw bean extracts or negative controls in the two in vitro models tested. Legume-based diets caused a reduction in the levels of total cholesterol and triglycerides in plasma that run parallel to a lower liver weight in case of total cholesterol. The reduction was highest for raw and naturally fermented *Vigna unguiculata* diets. In addition, fermented *Vigna unguiculata* diets exhibited a higher plasma antioxidant capacity when compared to raw *Vigna* or casein-metionine diets. Caecum weight was differentially affected by the dietary treatments assayed, whereas no significant effect was found for colon weight.

**Conclusions:** Fermentation is an effective treatment to improve the functional value of *Vigna unguiculata* given that it improves the antioxidant capacity of this foodstuff and enhances its metabolic effects in vivo.



**Key Words:** *Vigna unguiculata*, fermentation, antioxidant capacity, HT-29, lipid parameters

**27/943.** Gut: An open door to Nutrition

**Effect of two whey protein concentrates used as enrichment of infants formulas on intestinal microbiota**

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**Introduction:** Breast milk is the reference for the designing of infant formulas, which try to mimic its composition to produce the same physiological effects on newborns. The cow's milk is used as the protein source in infant formula.  $\alpha$ -lactalbumin is the main protein of whey in breast milk; however, in cow's milk its concentration is very low, for this reason infant formulas are enriched with it. Furthermore, bovine whey contains a high concentration of  $\beta$ -lactoglobulin, which is absent in human milk.

**Objectives:** The aim of this study was to evaluate the microbiota gut evolution by batch culture inoculated with infant faecal samples exposed to two commercial whey protein concentrates used to enrich infant formulas.

**Method/Design:** Whey enriched with  $\alpha$ -lactalbumin or  $\beta$ -lactoglobulin (digested and non digested) were evaluated in fecal slurry batch cultures and compared with lactose (as control) for the gut microbiota evolution. The experiment was carried out in duplicate in two independent fecal batch, from two different donors. Microbiota changes were monitored by quantitative real time PCR and the Short-chain fatty acids content (SCFA) were measured by gas chromatography.

**Results:** Both nondigested whey enriched with  $\alpha$ -lactalbumin or  $\beta$ -lactoglobulin stimulated the growth of *Bifidobacterium* at the beginning of the experiment. At 36 and 48 hours the counts of *Lactobacillus* were higher in all groups except for control group. Regarding to SCFA, the levels of acetic acid were the greatest in the batch with protein non digested compared with the other groups.

**Conclusions:** The results suggest that the whey protein concentrates studied in this work affect the growth of intestinal bacteria and the short chain fatty acids produced by them.

**Key Words:** whey,  $\alpha$ -lactalbumin,  $\beta$ -lactoglobulin, intestinal microbiota, SCFA

**27/944.** Gut: An open door to Nutrition

**Effect of nucleotides used as enrichment of infants formulas on intestinal cell ultrastructure and microbiota**

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**Introduction:** Nucleotides are present in breast milk (2-5% non-protein nitrogenous) however, the infant formula without supplementation show very low levels. Based on this it has been recommended the addition of this compound to infant formulas. Dietary nucleotides are important for growth, repair and differentiation of cells of the gastrointestinal tract, and immune system. There are studies indicating that the enrichment of infant formula with nucleotides could have a beneficial effect on gut microbiota.

**Objectives:** The aim of this study was to evaluate the microbiota gut evolution by batch culture inoculated with infant faecal samples exposed to two nucleotides concentration.

**Method/Design:** Nucleotides (digested and non digested) were evaluated in fecal slurry batch cultures and compared with lactose (as control) for the gut microbiota evolution. The experiment was carried out in duplicate in two independent fecal batch, from two different donors. Microbiota changes were monitored by quantitative real time PCR and the Short-chain fatty acids content were measured by gas chromatography. We also evaluated possible changes in intestinal cells ultrastructure by exposition with two levels of nucleotides to Caco-2 cells (scanning microscopy electron).

**Results:** The results obtained showed an increase in the levels of *Lactobacillus* in batch supplemented with non digested nucleotides. In the last sampling point we also detected a slight increase in *Bifidobacterium* counts for the groups with nucleotides. However similar counts were observed in the other microbial groups tested. The addition of nucleotides did not exert great changes in the short chain fatty acid composition.

The intestinal cells that were exposed to nucleotides showed a slight increase on microvilli density than cells incubated with control media.

**Conclusions:** Results obtained in this study indicate that the nucleotides may exert beneficial effects in infant nutrition due to its capacity to modify the intestinal microbiota. There is a need of further studies on the effect of nucleotides on intestinal microbiota of infants.

**Key Words:** Nucleotides, intestinal microbiota, SCFA, intestinal ultrastructure.

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**27/979. Gut: An open door to Nutrition**  
**Effect of nutritional status on the immune system in patients living with HIV**

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**Introduction:** HIV infection destroys CD4+ lymphocytes, whose blood count is a predicting factor of survival in patients living with HIV. Deficient dietary supply of nutrients is a known cause for impaired immune response. Adequate nutritional status improves overall health and has a well established effect on the immune system as well.

**Objectives:**

**Method/Design:** 89 HIV files of patients attending the nutrition service of the CAPASITS (HIV and Sexually Transmitted Diseases Ambulatory Care and Prevention Clinics) in Chihuahua, Mexico were revised, to obtain data on nutritional status and immune system.

**Results:** 78.65% (70) were male and 21.35% (19) were women. The average age is 40.87 years is a +9.91 DS, with an average initial weight of 66.37 +14.57 kg, while the average height was 1.66 meters with a DS plus or minus 0,091. According to BMI, we found that 52.81% had a normal weight, in a range for BMI of 24.88 +4.18. The average CD4 levels were 381.84 +272.46 DS, We found 19 (21.35 %) subjects whose CD4+ count was under 200/ml3, 45 subjects (55.56%) from 200-499/ml3 and 25 subjects 28.09% had CD4+ counts over 500/ml3. Lymphocytes ranged from 0.1 to 5.5, with an average of 2.11 +1.11 DS. The multiple linear regression model, with  $r^2 = 0.3571$ , resulted in statistically significant for lymphocytes, albumin, glucose and sex.

**Conclusions:** The relationship is positive in the first variables and involves a possibility of increased risk in women. Thus we can observe the importance of nutrition intervention as a part of treatment for people living with HIV to promote an improvement in their immune system.

**Key Words:** Immune System, Nutritional Intervention and HIV

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**27/998. Gut: An open door to Nutrition**  
**Immuno-nutrition in the elderly**

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**Introduction:** We have investigate the thematic in the last years because to the progressive aging of the world's population. The immuno-senescence is characterized by a series of changes of immune pathways, diminished immune functions, chronic diseases, increase susceptibility to the infection and tumors, autoimmunity diseases and cancer which represent the greatest danger to an individual, so to identify nutritional approaches is important in clinical practice and the investigation.

**Objectives:** we would like to development some projects of in-

vestigation to establish a useful therapeutic conduct which allow the old man to take the appropriate diet and prevent lots disorders in the immunological system.

**Method/Design:** Inicially we performed a wide bibliographic revision about nutrition and immunity, on the second place we compiled and prosecuted the information.

**Results:** From the nutritional point of view, the studies show that the elderly have low levels of oligoelements intake as vitamins E, A, C, Zn, Se, Fe, fermented oligosacharydes and triacylglycerol among others. From the immunological point of view, the chronic malnutrition proteic caloric lead to the reduction of both, the quality and subset lymphocitaries. It also reduces survival of B cell with humorals changes.

**Conclusions:** Finally we analyzed the information of all studies, so we can conclude by saying that in the elderly, there are many disorders like tumor process, autoimmunity diseases, allergic diseases, too much stress, severe sepsis, thus could be possible immunodeficiencies and increase of hospitalary time. It is important to underline that the majority of the studies were carried out in different institutions to old man; therefore, the physchosocial factor has a great influence in these process.

**Key Words:** nutrition, immunity, immune senescence

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**27/1003. Gut: An open door to Nutrition**  
**Evaluation of the Mini Nutritional Assessment in the elderly, Tehran, Iran**

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**Introduction:** Malnutrition is a frequent and serious problem in geriatric patients. In ill elderly subjects it is one of the most common and least-headed problems in hospitals and nursing homes the Mini-Nutritional Assessment (MNA) has been increasingly employed, worldwide, for the brief evaluation of older persons' nutritional status which has been recommended by ESPEN MNA has not been validated in the Iranian elderly, and whether MNA and its established cutoff points for the diagnosis of malnutrition and at-risk status are applicable to the Iranian elderly remains unknown. In the present study we examined whether MNA can screen and diagnose for malnutrition and the risk for malnutrition, in the elderly population in kahrizak charity foundation (Tehran, Iran)

**Objectives:** To determine whether the Mini Nutritional Assessment (MNA) can screen and diagnose for malnutrition in the Iranian elderly.

**Method/Design:** Two hundred and twenty-one consecutive elderly patients entered into the cross-sectional study from Kahrizak Charity Foundation (Tehran, Iran). Amputees and patients with liver or renal disorders, oedema or any end-stage diseases were excluded. The MNA was administered to all volunteers. Each patient underwent

anthropometric and serum albumin measurements. Reliability, validity, sensitivity, specificity, positive- and negative-predictive values were estimated. To identify optimal threshold values for predicting malnutrition, receiver-operating characteristic curve analysis was performed for MNA scores.

**Results:** According to MNA score, 3.2 % were malnourished, 43.4 % were at risk of malnutrition and 53.4 % were well nourished. The proportions in these categories according to ideal body weight and serum albumin were 2.3 %, 17.1 % and 80.6 %, respectively. Cronbach's alpha coefficient (reliability) was 0.61. The correlations between total MNA score, anthropometric values and serum albumin (criterion-related validity) were all significant. There were significant differences in total MNA score between two BMI groups but not between two categories according to serum albumin and skin ulcers (construct validity). The sensitivity and specificity of the MNA according to its established cut-off points were 82 % and 63 %, respectively. Positive-predictive value was 35 % and negative-predictive value was 93 %. By using the best cut-off point (MNA score of 22 according to Youden index), the sensitivity, specificity, positive-predictive value and negative-predictive value were 88 %, 62 %, 57 % and 89 %, respectively.

**Conclusions:** The MNA with its established cut-off points may not be a good fit for Asian populations, including Iranian elderly.

**Key Words:** MNA, elderly, Tehran.

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**27/1005.** Gut: An open door to Nutrition

**Effect of cooking process in vitamin c and folates content in wild Spanish vegetables.**

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**Introduction:** The intake of traditionally consumed wild edible species is nowadays receiving renewed attention, due to the recognition of their potential benefits for human health. Many vegetables are usually consumed after a cooking process to improve texture or digestibility. In this process, vitamin losses may occur, especially for labile and water-soluble vitamins as vitamin C and folates.

**Objectives:** The objective of the present study is to evaluate the influence of thermal treatment in vitamin C and folates content in wild vegetables.

**Method/Design:** Six species traditionally consumed as cooked vegetables in Spain have been selected. Their edible parts are leaves (*Rumex pulcher* L.), leafy stems (*Silene vulgaris* (Moench) Garcke) and tender shoots (*Asparagus acutifolius* L., *Bryonia dioica* Jacq., *Tamus communis* L. and *Humulus lupulus* L.). They were analyzed before and after cooking in boiling water during 10 minutes. Ascorbic acid (AA) and total vitamin C were determined by HPLC-UV after extraction in a metaphosphoric acid solution. Foliates were extracted

in phosphate buffer, deconjugated, derivatized and analysed by HPLC-FL as 5-methyltetrahydrofolic acid.

**Results:** Degradation of vitamins in vegetables can be due to a variety of agents, as diffusion to cooking liquid and thermal treatment. *Asparagus acutifolius* and *Tamus communis* showed the highest retention percent for vitamin C (69.8-84.56% respectively), reaching a final amount of 40.9-47.9 mg/100 g after cooking process, which means up to 50% of the daily requirements for adults. Although folates were quite stable in *Rumex pulcher*, *Bryonia dioica* and *Tamus communis* (retention percent 68.5-69.8%), the final amount in the cooked plant was only high in the case of *Rumex pulcher* (0.277 mg/100g), which is higher than the daily requirements for adults.

**Conclusions:** Wild greens are good sources of water-soluble vitamins; however, losses arising from boiling should be considered. *Asparagus acutifolius* and *Rumex pulcher* provided the best vitamin C and folates content respectively even after traditional cooking process. Other cooking process such as stir-frying should be also studied in such species.

**Key Words:** Vitamin C, Foliates, Wild Vegetables, Cooking Process

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**27/1006.** Gut: An open door to Nutrition

**Nutritional characterization of xoconostle fruits**

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**Introduction:** The genus *Opuntia* includes about 1500 species of cactus, many of them producing sweet fruits (prickly pear) or acid fruits (xoconostle). Xoconostle fruits are produced in cactus growing in arid and semi-arid climates and represent a valuable food in Latin America. This fruit contains numerous seeds that may be considered as a by-product of these fruits, however there is a lack of information about its detailed chemical composition

**Objectives:** The aim of this study was to determine the proximate composition of edible fraction (pulp and seed) of two species of xoconostle.

**Method/Design:** Xoconostle fruits (*O. matudae* Scheinvar, cultivar Rosa and *O. joconostle* F.A.C. Weber ex Diguët, cultivar Cuaresmeño) were provided by a Mexican association (CoMeNTuna) in autumn 2009. Moisture, pH, protein, fat, ash and total dietary fiber (soluble and insoluble) were analyzed according to AOAC methods. Soluble sugars were determined by HPLC-differential refractive index detection. Comparison of mean values was performed by one-way analysis of variance (ANOVA) followed by Tukey test ( $P \leq 0.05$ ).

**Results:** The pulp of these cultivars was characterized by soluble sugars (27-30% dry basis) with a higher proportion of fructose followed by glucose and sucrose. Dietary fiber was 30 to 34% dry basis, and had similar proportion of soluble and insoluble fiber. Protein and ash were in low proportion in the pulp. The seeds of the fruits had

a high fiber content (about 80% dry basis) with a high proportion of insoluble fraction, in addition to protein (9% dry basis) and fat (8-10% dry basis).

**Conclusions:** The pulp of this fruit was characterized by soluble sugars and soluble fiber while the seeds were characterized by a high content of insoluble fiber and fat. For that, both fractions could be considered a good alternative for increase the consumption of fiber in the population, or be considered as ingredients in other food products.

**Key Words:** Opuntia, Xoconostle, Chemical Composition

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**27/1007.** Gut: An open door to Nutrition

**Waist circumference is a better predictor than BMI and WHR for clearance ceratinin in normal and obese healthy Iranian women.**

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**Introduction:**

**Objectives:** For assessment that which anthropometric indices is a better predictor for CC in healthy normal and obese women.

**Method/Design:** In this clinical cross-sectional study, a total of 62 normal and obese healthy women from 18 to 30 years of age were studied. The subjects were classified to case group (31 subjects) = healthy obese women ( $30 \leq \text{BMI} \leq 39.9 \text{ kg/m}^2$ ) and control group (31 subjects) = healthy normal women ( $18.5 \leq \text{BMI} \leq 24.9 \text{ kg/m}^2$ ). The assessment of BMI was considered as general obesity index and assessment of WC and WHR were considered as central obesity indices. After getting urine creatinine, urine volume in 24 hours and plasma creatinine, 24-hour creatinine clearance (CC) was calculated by formula.

**Results:** WC and WHR were significantly higher in obese group comparable to normal ones ( $95.7 \pm 10.07 \text{ cm}$  vs  $71.03 \pm 8.85 \text{ cm}$   $P < 0.005$ ;  $0.83 \pm 0.11$  vs  $0.7 \pm 0.03$   $P < 0.005$  for WC and WHR respectively). The means of CC in subjects with increased BMI, WC, and WHR were significantly higher than those in subjects with normal BMI, WC, and WHR ( $P < 0.005$ ,  $P < 0.005$ ,  $P < 0.005$ , respectively). CC was significantly correlated with WC, WHR, and BMI ( $P < 0.005$  for all variables). Although there was significant correlation between CC with these variables but there was only strong correlation between CC with WC in case and control groups ( $r = 0.4$ ,  $P = 0.009$ ;  $r = 0.4$ ,  $P = 0.01$  respectively).

**Conclusions:** According to obtained results, WC can be used as

a better predictor of CC, than WHR and BMI in both normal and obese healthy women.

**Key Words:** Predictor, Anthropometric Indices, CC and Iranian Women.

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**27/1008.** Gut: An open door to Nutrition

**HSP72-induced release of inflammatory cytokines is deregulated in macrophages from obese Zucker rats: effect of exercise.**

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**Introduction:** Metabolic syndrome (MS) is associated with obesity and involves risk factors for type-II diabetes mellitus and arteriosclerosis. Obesity is also associated with a state of "chronic low-grade inflammation", and exercise has been proposed as a good non-pharmacological treatment.

**Objectives:** The aim of the present investigation was to evaluate the effect of exogenous heat shock protein of 72 kDa (eHsp72) on the release of IL-1 $\beta$ , IL-6, and TNF $\alpha$  by macrophages from obese Zucker (ObZ) rats (fa/fa), as well as the effect of habitual exercise; using lean Zucker (LZ) rats (Fa/fa) as reference values.

**Method/Design:** The habitual exercise program consisted in running, 5 days/week for 35 min at 35 cm/s, for 14 weeks. Circulating concentration of eHsp72 was determined in plasma by ELISA. Cytokines were determined by ELISA in the supernatants of macrophages cultured for 24 h (37°C, 5% CO<sub>2</sub> and 100% RH) in presence or absence of 10  $\mu\text{g/ml}$  eHsp72.

**Results:** ObZ presented higher circulating levels of eHsp72 than LZ, and exercise increased eHsp72 concentration in ObZ. In response to eHsp72 macrophages from ObZ released less IL-1 $\beta$  and TNF $\alpha$ , but more IL-6, than macrophages from LZ. In addition, eHsp72 stimulated the release of IL-1 $\beta$  and IL-6 in macrophages from healthy LZ (with respect to the constitutive release), but inhibited the release of these cytokines in macrophages from ObZ. The habitual exercise improved the release of inflammatory cytokines by macrophages from ObZ in response to eHsp72 (it increases IL-1 $\beta$  and TNF $\alpha$ , and decreases IL-6), with values closer to those determined in healthy LZ.

**Conclusions:** A deregulated macrophage's inflammatory response induced by eHsp2 appears in animals with MS. This regulation is improved by habitual exercise.

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**Key Words:** metabolic syndrome, inflammation, macrophages, exercise

27/1009. Gut: An open door to Nutrition

### The survey of lipid profile in overweight and obese adult women at different ages.

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**Introduction:** In these days one of health concerns in developed and developing countries is increasing of some life threatening disease include TC, TG, LDL-C and decreasing HDL-C that are correlated with coronary heart disease.

**Objectives:** The objective of current study was to determine some of cardiovascular disease parameters in overweight and obese adult women at different ages.

**Method/Design:** In this clinical cross-sectional study, 714 overweight and obese women aged 20 to 70 years who were referred to two nutrition clinics in Sistan and Baluchestan province, Islamic Republic of Iran, were studied. The subjects were classified into three groups, 20 to < 35 (group 1), 35 to < 50 (group 2), and >or=50 (group 3) years of age. Total cholesterol (TC), triglyceride (TG) and HDL-C were determined by enzymatically methods. LDL-C was calculated according to the Friedewald equation.

**Results:** The Mean  $\pm$  SD of TC was  $189.58 \pm 43.25$ ,  $199.68 \pm 42.36$  and  $216.49 \pm 40.67$  in groups of 1, 2 and 3 respectively. Older subjects (>or=50 years old) had significantly higher values of TC than those in the two younger age classes. The same order of magnitude was also observed for TG and LDL-C variables. For HDL-C parameter there was not seen any significant differences between three groups.

**Conclusions:** The rate of TC, TG and LDL-C were increased with age in overweight and obese Iranian women. Related to correlation of increasing of these blood parameters with cardiovascular disease, overweight and obese Iranian women must be encouraged to go to weight loss by diet and activity.

**Key Words:** Lipid Profile, Age, Women and Iran.

27/1022. Gut: An open door to Nutrition

### Coexistence of overweight and iron deficiency in urban Moroccan women

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**Introduction:** In Morocco as in many emerging countries, especially in urban areas, the nutrition transition is characterized by an increasing level of overweight while some micronutrient deficiencies remain highly prevalent.

**Objectives:** To describe the magnitude of this double burden of malnutrition (DB) both at population and individual level among women from an urban environment and to assess relationships with current socio-demographic factors.

**Method/Design:** Cross-sectional survey (2010) in Rabat, the capital city. Two-stage random cluster sample: 895 women (20-49 y). Body Mass Index  $\geq 25$  kg/m<sup>2</sup> defined overweight and BMI  $\geq 30$  kg/m<sup>2</sup> obesity; serum ferritin defined iron deficiency (ID) when  $< 15 \mu\text{g/L}$  (after ferritin level corrected by  $\times 0.65$  for inflammation when CRP  $> 5 \text{mg/L}$ ). DBOW was the coexistence of ID with overweight, and DBOB with obesity. Adjusted relationships (OR) were estimated by logistic regression.

**Results:** Prevalence of overweight was 66.2% [62.3-70.0], obesity 32.4% [28.4-36.4] and ID 42.1% [38.1-46.1]. There was no relationship, adjusted or not, between ID and overweight or obesity. Prevalence of DBOW was 27.2% [23.6-30.8] and of DBOB 13.7% [11.0-16.4]. Overall, only 18.1% women had neither overweight nor ID. After adjustment, OR of DBOW and DBOB increased with women's parity but only OR of DBOB increased with women's age. No other relationship was observed.

**Conclusions:** In urban Morocco, more than 8 women of reproductive age out of 10 were affected either by overweight (including obesity), or by iron deficiency. At individual level, despite no relationship between overweight and ID, 1 woman out of 4 was struck at the same time by overweight and ID, whatever her educational or economic level. This poses a new and serious public health challenge, especially because up to now these two nutritional problems remain tackled separately.

**Key Words:** Urban Morocco, double burden of malnutrition, overweight, iron deficiency, women.

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27/1040. Gut: An open door to Nutrition

### **Celiac disease in the XXI century it's not more a kids' stuff**

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**Introduction:** Celiac disease (CD) is a chronic primarily-gastrointestinal systemic disease caused by the exposition to gluten, affecting to intolerant genetically predisposed individuals. A marked increase in the incidence-rates of adult onset of CD over the time has been described. Despite this, CD remains to be considered as a main predominant pediatric associated disorder.

**Objectives:** To compare the incidence rates of CD diagnosis of children and adults, during one-year time.

**Method/Design:** An observational, descriptive and retrospective study, was developed at two Spanish general hospitals located in different geographical regions, collecting and analysing data from all pediatric and adults patients with a new diagnosed of CD during the whole year 2010. CD diagnosed was based in a combination of data consisting of concordant clinical history, serology and HLA-DQ compatible and presence of mucosal lesions in duodenal biopsies.

**Results:** A total of 79 patients of CD were diagnosed along the year 2010, of which 68 (86.1%) were of adult onset (>16 year-old). No differences were detected between patients from the two hospitals regarding to demographic, biochemical, immunological and genetic characteristics. Distribution of HLA-DQ2 and DQ8 alleles, showed no differences between children and adults, being the most significant difference between them related to symptoms, duodenal lesions and positive anti-tissue transglutaminase antibodies (tTGA). Classical symptoms (diarrhea and iron-deficiency anemia) were present in 90.9% of children, while it were in only 54.4% of adults ( $p=0.02$ ). Villous atrophy was present in 63.7% in children and 19.1% in adults ( $p=0.004$ ). tTGA was (+) in 81.8% of children, compared to only 19.1% of adults ( $p=0.004$ ). Average hemoglobin levels were lower in children ( $p=0.025$ ).

**Conclusions:** CD onset is the predominantly form in adults (6.2/1). CD cannot be considered any more, a children-associated disorder. New diagnostic algorithms are needed, in order to improve correct recognition of CD in adult cases.

**Key Words:** Celiac disease, Adult Patient, Children, Anti-tissue Transglutaminase Antibodies and Gluten Enteropathy.

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27/1059. Gut: An open door to Nutrition

### **Cocoa anti-allergic effects in a rat experimental model**

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**Introduction:** During the last decade, the influence of cocoa intake on health has been explored due to its high content in flavonoids. In this sense, previous studies performed in our laboratory have demonstrated the ability of different cocoa diets to modulate immune system in young rats which showed lower serum concentrations of immunoglobulins, among others.

**Objectives:** This cocoa potential has prompted us to study the possible role of the cocoa diet in the prevention of some immune mediated diseases. The specific objective of the present design consisted in ascertaining the effect of a cocoa-enriched diet in a model of allergy in rats.

**Method/Design:** 28-day-old Brown Norway rats were immunized with ovoalbumin (OVA) emulsioned with alum adjuvant together with Bordetella pertussis toxin to promote the IgE synthesis, by i.p. injection. During the next 21 days rats received either a cocoa diet (with 0.2% polyphenols, w/w) or a standard diet. At the end of the study serum samples were obtained and specific anti-OVA antibodies IgG1, IgG2a, IgG2b and IgE were quantified by ELISA.

**Results:** Animals fed standard diet showed high levels of specific anti-OVA IgG isotypes (IgG1, IgG2a and IgG2b) and IgE, which is involved in the allergic response. Rats after the 21 days of cocoa intake had significantly lower concentrations of anti-OVA IgG1, IgG2a, IgG2b. In addition, cocoa-fed rats showed 4-5 times serum anti-OVA IgE concentration than that in reference animals ( $p<0.05$ ). In summary, cocoa diet by decreasing IgE formation may have a potential anti-allergic action.

**Conclusions:**

**Key Words:** cocoa, polyphenols, flavonoids, allergy.

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27/56. Innovation in Food for Optimal Nutrition

### **Acceptance of "salt of herbs" in a hospital in Santo Antônio de Jesus, Bahia, Brasil**

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**Introduction:** The hospital diet is important to ensure the supply of nutrients for the hospitalized patient, allowing you to preserve or restore their nutritional status through its role as co-therapy in chronic and acute diseases, and because it is a practice that develops important

role in the experience of admission. Often the diet associated with the disease, leads to dietary restrictions, such as salt reduction or exclusion of food the patient likes and which part of your eating habits. A hospital should take into consideration the quality of preparations produced, as well as the sensory characteristics. Improve the appearance of the preparation, or use herbs when the diet is sodium restriction are some examples of care that influence the quality of food.

**Objectives:** It was based on the acceptance of the chicken coccionado herbs containing added salt in the diet of patients of a maternity hospital in Santo Antonio de Jesus - Bahia.

**Method. Design:** This was a cross-sectional study, quantitative, performed in a hospital in Santo Antonio de Jesus - Bahia, Brazil. All hospital inpatients participated in the analysis. We used hedonic scale with seven levels and is explained to patients the goal of research. All patients received chicken coccionado containing salt plus rosemary, basil, oregano, parsley and thyme.

**Results:** In terms of acceptance of chicken, two people (5.7%) were indifferent to the flavor, 12 people (34.29%) liked moderately, 17 (48.58%) liked it a lot and 4 (11.43 %) liked it greatly.

**Conclusions:** The chicken with the "salt of herbs" has positive connotations, and can be deployed on the menu of the patients successfully.

**Key Words:** Nutrition, salt, herbs, acceptance, hospital.

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### 27/86. Innovation in Food for Optimal Nutrition **Chemopreventive effects of traditional herb tea, *Tabebuia Avellanadae* on *in vitro* and *in vivo* carcinogenesis system**

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**Introduction:** As part of an ongoing project to investigate the anti-tumor

and anti-tumor promoting properties of *Tabebuia avellanadae*, dry powder essence and its active compound, 5-hydroxy-2-((1-hydroxymethyl)-naphtho 2,3-b) furan-4,9-dione (NQ801)

was carried out. *Tabebuia avellanadae*(Bignoniaceae)(TA), which is native in South America from Brazil to northern Argentina, is well known in traditional folk medicine used for the treatment of various disease during five hundred years.

**Objectives:** The inner bark of this plant produced in Brazil is distributed in Asia as a herb tea and healthy purpose. The application of a new screening procedure which utilizes the synergistic effect of short-chain fatty acids and phorbol esters in enabled rapid and easy detection of naturally occurring substances(anti-tumor promoters, chemopreventive agents) with inhibition of Epstein-Barr virus(EBV) activation, using human lymphoblastoid cells.

**Method. Design:** These useful compounds were tested for their inhibition of tumor promoting activity by using a short term *in vitro* assay for TPA induced EBV-EA activation in Raji cells. Herb tea type samples exhibited potent activity against TPA induction and effects was two-fold greater than typical chemopreventive agents, carotenoids. NQ801 produced remarkable inhibition(65-80%) of EBV-EA activation at a concentration of 500 nmol ratio per TPA. In addition, we have now extended these investigations to a new tumorigenesis model in which we initiated the tumors with 390 nmol of DMBA initiation and promoted with 1.7 nmol of TPA in two-stage mouse skin test.

**Results:** The compounds were subjected to an *in vivo* two-stage mouse skin carcinogenesis assay using DMBA and TPA. The control animals exhibited a 100 % papilloma incidence at 20 weeks after promotion. However, treatment with the tested compounds(85 nmol) along with tumor promoter, reduced the percentage of tumor bearing mice by between 13.3-33.3 at 20 weeks

**Conclusions:** These results provide a basis for further development of these botanical supplements for human cancer chemoprevention.

**Key Words:** *Tabebuia avellanadae*, Herbal tea, Chemoprevention

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### 27/93. Innovation in Food for Optimal Nutrition **Effect of mandatory flour fortification with folic acid on neural tube defects reduction in Iran**

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**Introduction:** Considering the evidences on the role of folic acid on reducing Neural Tube Defects (NTDs), Mandatory flour fortification with folic acid has been considered a priority to reduce NTDs in Iran.

**Objectives:** To study the effects of mandatory flour fortification with folic acid on reduction of NTDs

**Method. Design:** A longitudinal hospital-based study was performed in Dezyani teaching hospital in Gorgan, capital city of Golestan province in northern Iran, between September 2006 and December 2008 (before and after flour fortification). All live and stillbirths (a gestational age of  $\geq 20$  weeks and  $\geq 500$  g who were admitted in neonatal intensive care unit were included. The design was based on a sample of 13361 postpartum women after admission for childbirth. Types of NTDs registered were anencephaly, encephalocele, and spina bifida associated or not with other malformations. This referral hospital covers for 25% of annual birth in Golestan province and the largest portion of deliveries (80%) in Gorgan district.

**Results:** The overall prevalence of NTDs decreased from 3.16 per 1000 births including live births and stillbirths, before flour fortification to 2.19 per 1000 births during the full-fortification period (RR 0.09, 95% CI 0.042 - 0.21) that was statistically significant (P-value < 0.01).

The total annual rate of NTDs significantly declined by 31% (95% CI 26%-35%) after the implementation of folic acid fortification (P < 0.01). There was not a significant difference between mother's age (p = 0.579), level of education (p = 0.346), taking of folic acid supplement (p = 0.481), smoking (p = 0.721) and the incidence of NTDs, before and after flour fortification periods.

**Conclusions:** Findings, support the view expressed by many that mandatory fortification with folic acid is the only means of ensuring that all women of reproductive age can benefit in terms of reduced risk of NTDs.

**Key Words:** flour fortification; folic acid; neural tube defects.

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### 27/97. Innovation in Food for Optimal Nutrition Beneficial effect of dietary supplement Diosgenin on ageing

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**Introduction:** Dehydroepiandrosterone (DHEA) is the major secretory product of the adrenal gland, it is also produced in the central nervous system and works in humans as neurosteroid – having memory enhancing and depression alleviating qualities ensued from ageing. Concentration of DHEA decreases dramatically with age in humans.

**Objectives:** The current study is designed to test whether precursor of DHEA diosgenin in Wild Yam could improve the level of DHEA-s in serum of ageing women.

**Method. Design:** The study included of 20 non-smoking women of age group of 50...80 years with diagnosis of age-related depression. Concentration sulfated DHEA-s was tested in serum (immunological test) before investigation and after two months supplementation Wild Yam (contents precursor of DHEA diosgenin).

**Results:** Before Wild Yam supplementation by all patients DHEA-s level in serum was low (0.94...1.72 mmol. l). After two months supplementation with Wild Yam has increased serum concentration of DHEA-s (4.42...27.3%). We also detected beneficial effect of mood and well-being and the decrease of age-related depression.

In our earlier work we have tested beneficial effect of diosgenin in treatment of postmenopausal osteoporosis (S.Teesalu et al 2007).

The present study is the first report to our knowledge demonstrating precursor of DHEA diosgenin having a beneficial effect on the serum concentration of DHEA-s.

**Conclusions:** We have tested beneficial effect of precursor DHEA

diosgenin on serum concentration of DHEA-s of ageing women and the decrease of age-related depression. It is important for anti-ageing medicine that diosgenin works as physiological hormone – replacement therapy.

**Key Words:** Ageing, Physiological Hormone – Replacement Therapy

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### 27/102. Innovation in Food for Optimal Nutrition Nutrition information on French food labels

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**Introduction:** Since 2008, the French Observatory of Food Quality (OQALI) has monitored nutritional information provided on labels.

**Objectives:** To assess the nutrition information provided on product labels.

**Method. Design:** Packagings were provided by manufacturers and retailers or photographed in stores. All nutrition data on labels were collected: nutrition labelling stating the Big 4 or Big 8 (4 or 8 nutrient values), nutrition labelling scheme (e.g. the GDA or Traffic Light systems), nutrition and health claims, serving sizes and consumption advice. Nutrition parameter frequencies were calculated by food category. Market shares were also collected, to assess the representativeness of the category markets.

**Results:** More than 20,000 food items from 18 categories were collected covering between 30% (chilled ready meals) and 78% (soft drinks) of each category market. On average, nutrition labelling was provided on 86% of products (minimum of 52% for jams and maximum of 99% for breakfast cereals and frozen pizzas), and the Big 8 was stated for 58% of products (between 35% for canned fruit and 90% for breakfast cereals). Nutrition labelling schemes were displayed on 37% of products (from 5% for jams to 75% for frozen pizzas). 20% of products provided a nutrition claim, with the proportion rising from 1% for sauces to 70% for compote. 48% of products indicated a serving size (between 8% for jams and 72% for chilled ready meals), and 20% offered consumption advice (from 1% for jams to 88% for breakfast cereals).

**Conclusions:** The quantity and quality of nutrition information provided on French product labels differ among food categories but are quite similar to those of other European countries.

Further OQALI studies are needed to follow these parameter frequencies over time. A better knowledge of the impact of these different parameters on consumer choice is also required to determine which is the most effective.

**Key Words:** Nutrition labelling, nutrition claim, serving size, nutrition labelling scheme, product labels.



**Epigenetics and SNPs in thermogenesis, obesity, a public health genomics point of view**

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**Introduction:** Common complex disorders are characterized by the interaction of multiple genes and environmental factors. Obesity phenotypes are common traits associated in GWAs to identify susceptibility loci. Data on nutrition, lifestyle etc. are being correlated as well. Investigations on interactions of genomic (genetic and gene expression) variation with the environmental component are also relevant but requires large study samples (most studies have not yet focused on the analysis of interactions).

**Objectives:** Focusing either on genetic or environmental factors results in severe limitations. This systematic review introduces epigenetic markers as problem solvers in environmental-sensitive pathways.

**Method. Design:** A PubMed search revealed evidence on genetic and epigenetic variation of genes in adaptive thermogenesis (BAT) and their association with obesity. Information on epigenetic regulation was limited to DNA methylation and histone modifications. Analyzed genes included beta-3 adrenergic receptor (ADRB3), uncoupling protein 1 (UCP1), the transcription factors peroxisome proliferated activator receptor gamma (PPAR $\gamma$ ), peroxisome proliferated activator receptor gamma coactivator 1 alpha (PGC1 $\alpha$ ), retinoid acid X receptor alpha (RXR $\alpha$ ), CCAAT. enhancer-binding protein alpha (C. EBP $\alpha$ ), fatty acid binding protein 4 (FABP4) and lipoprotein lipase (LPL).

**Results:** SNPs as well as epigenetic mechanisms seem to regulate adaptive thermogenesis. Genetic association studies are characterized by inconsistencies in results. As for epigenetic studies, although they are mainly discovery orientated rather than hypothesis testing, they demonstrate the presence of epigenetic regulation in obesity and adaptive thermogenesis.

**Conclusions:** There is an advanced need for joint analyses of genetic, epigenetic, environmental factors in different life phases on environmental-sensing pathways to disentangle the complexity of common conditions and diseases. We demonstrate the benefits of incorporating epigenomics in human genome epidemiology as an integrative way to account for an individual's environment impact in future research and once translated into policy and practice, for Public Health.

**Key Words:** Epigenetic, UCP1, obesity, genetic, epidemiology.

**Preservation, antioxidant activity and sensory evaluation in Purple Prickly Pear Juice**

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**Introduction:** Prickly pear (*Opuntia ficus indica*) grows in the semiarid countries throughout the world, especially cultivated in Central America. The fruit is juicy and sweet, México is mainly consumed fresh. Harvest season is short and usually low revenues are common due to post-harvest losses of up to 60%.

**Objectives:** Analyze antioxidant activity and sensory evaluation in purple prickly pear juice heat treated and storage at 12 days.

**Method. Design:** Juices were treated at 70°C. 30min, 80°C. 30min. Un-heated juice was used as control; samples were stored at 4°C and evaluated the 1, 6 and 12 days. Phenolic compounds (gallic acid mg. L), ABTS (ascorbic acid mg. L) were determinate as antioxidant activity. Juices from 1 and 12 days were used for sensorial evaluation with fifty untrained panelists for color, smell, taste, sweetness, consistency, viscosity and acceptability.

**Results:** Juice treated at 70°C. 30min showed higher phenolic content on day 1, 80°C. 30min on day 6, control sample on day 12. During storage, juice treated at 80°C. 30min and control showed an increase from day 1 to 12 (1552.57 to 1651,923 and 98.22 to 140.44 mg gallic acid. L respectively). Only the first day of storage, juice treated at 70°C. 30min presented low levels of antioxidant activity (p>0.05), during storage, each sample were kept unchanged. Control sample obtained highest rating in acceptability only day 1. Between treatments there were significant differences except in taste; the other attributes were lowest in the juice treated at 80°C. 30min. On day 12, better acceptability was in juice treated at 70°C30 min, which showed significant differences in color and sweetness

**Conclusions:** Thermal treatment and storage increased phenolic content, did not affect the antioxidant activity. During storage, juice treated at 70°C30 min was better accepted. The results could be useful to increase availability and use of purple prickly pear as functional food.

**Key Words:** Prickly Pear, Antioxidant Activity, Phenolic, Abts, Sensorial Evaluation.

27/194. Innovation in Food for Optimal Nutrition

### Fatty acid profiles of supercritical extracts of commercial espresso coffee and spent coffee

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**Introduction:** The process of making espresso coffee generates a considerable amount of spent coffee as waste. Emerging evidence suggests that spent coffee contains many bioactive components that can modulate human health. However, no studies are addressing the possible recycling of coffee waste and its content of biologically active components.

**Objectives:** The primary objective of this study was to examine and compare the fatty acid profiles of commercial espresso and corresponding spent coffee. A long study goal is to obtain a sufficient data of a possible health-promoting effect of coffee residue with possible design of an effective supplement.

**Method/Design:** The commercial coffee (Cream caffe, Italy) and corresponding spent coffee were obtained using an Astoria espresso machine. Supercritical extraction was carried out at the Autoclaven Engineers SCE Screening System at 70° C and 30MPa. Extraction yield was calculated over the initial mass of samples in the extractor and mass of extracts. The yields of extraction were 8.51% and 10% for coffee and spent coffee, respectively. Fatty acid methyl esters (FAMES) were prepared by transmethylation using 2 M NaOH and 1M H<sub>2</sub>SO<sub>4</sub> in methanol. The FAMES were analyzed by gas chromatography (SHIMADZU 2014, Japan,) equipped with a capillary column (Rtx2330, RESTEC, USA), flame ionization detector and splitless injector.

**Results:** The preliminary results show that the fatty acid content of analyzed espresso coffee is (given in %): 14:0(0.05), 16:0(35.08), 18:0(7.70), 18:1(12.07), 18:2(40.18), 20:0(3.05), 18:3n-3(0.81), 20:1n-9(0.30), 22:0(0.75), and corresponding spent coffee is: 14:0(0.05), 16:0(34.11), 18:0(7.40), 18:1(11.91), 18:2(42.04), 20:0(2.75), 18:3n-3(0.87), 20:1n-9(0.41 and 22:0 (0.47).

**Conclusions:** In conclusion, the fatty acid composition of spent coffee is more favorable than that of espresso coffee because it has a lower amount of saturated fatty acids (16:0, 18:0, 20:0, 22:0) and a higher proportion of mono- and polyunsaturated fatty acids (18:2, 18:3 n-3, 20:1 n-9).

**Key Words:** Fatty Acid, Spent Coffee, Supercritical Extraction, Supplement

27/202. Innovation in Food for Optimal Nutrition

### Predictive value of in vitro digestion models: in vivo validation using absorption modifiers

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**Introduction:** Bioavailability is a critical feature in the assessment of the role of micronutrients in human health and the approaches to this issue include in vitro and in vivo methods. However, to ascertain the accuracy of in vitro bioaccessibility values is difficult unless it can be compared with in vivo human studies.

**Objectives:** To study the predictive value of an in vitro digestion model, we assess the in vitro bioaccessibility and in vivo response of  $\beta$ -cryptoxanthin from fortified drinks in the presence of absorption modifiers (phytosterols).

**Method/Design:** A static in vitro digestion model was applied to assess the bioaccessibility of  $\beta$ -cryptoxanthin from drinks in the presence of phytosterols (absorption modifiers) (Granado-Lorencio et al, Food Chem., 102; 641-48, 2007). In the human study, 38 volunteers (age (mean, CI 95%): 55 (54, 56); BMI (mean, CI 95%): 25.6 (24.8, 26.4)) were randomly allocated to consume each drink for 4 weeks with a 4-week washout in between.  $\beta$ -cryptoxanthin in serum was analyzed by ultra performance liquid chromatography (Granado-Lorencio et al, Anal. Bioanal. Chem., 97 (3): 1389-93, 2010).

**Results:** Free  $\beta$ -cryptoxanthin, the proportion of free form and the total content of  $\beta$ -cryptoxanthin were not different in both types of drinks. Under in vitro conditions, the extent of  $\beta$ -cryptoxanthin esters hydrolysis and the recovery of free and total  $\beta$ -cryptoxanthin in the duodenal and micellar phases were not significantly affected by the presence of phytosterols, suggesting a similar in vivo response for both drinks. In the human intervention study, intake of both drinks provoked a significant increment  $\beta$ -cryptoxanthin in serum, reaching levels close to 1  $\mu$ mol/l, regardless of the presence of phytosterols in the drink, as predicted by the in vitro model.

**Conclusions:** The present results suggest the usefulness of in vitro models to provide relevant information to predict in vivo responses.

Funding: Ministerio de Ciencia e Innovación, Spain (AGL2008-02591-C02-02).

**Key Words:**  $\beta$ -cryptoxanthin, phytosterols, in vitro digestion, human study.

27/203. Innovation in Food for Optimal Nutrition

### Effects of dietary lipids on infection resistance against *Listeria Monocytogenes* in severely immunosuppressed mice

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**Introduction:** Several studies have shown a main role of dietary lipids on the functions of the immune system and on infection resistance in both animals and humans.

**Objectives:** To analyze the influence of several dietary lipids on host immune resistance against *Listeria monocytogenes* in severely immunosuppressed mice.

**Method/Design:** BALB / C mice were fed with diets containing 20% of olive oil (OO), organic olive oil (OOO), fish oil (FO) or sunflower oil (SO) and compared with a low fat control (LF) diet for 4 weeks. At the end of the feeding period mice were treated with anti-CD4+ lymphocyte (GK 1.5) and anti-granulocyte receptor 1 (RB6 8C5) immunosuppressors, using PBS as control, prior to a sub-lethal infection with *L.monocytogenes*. Count of viable bacteria from spleens and livers were determined at 24h and 48 h post infection.

**Results:** Compared with LF diet, high fat diets increase viable bacteria recovery from spleens and livers, especially with FO in non-immunosuppressed PBS-controls. In addition, the counts of viable bacteria in spleen at 48 h and in livers in both times were significantly higher with FO than in the other high fat dietary groups. In immunosuppressed mice, FO worsens the infection than the other dietary fats. In fact, in RB6 8C5-treated mice, animals did not survive at 48 h post infection. Furthermore, RB6 8C5-treated mice showed the highest counts of viable bacteria from both organs. Finally, viable bacteria recovery in both organs at 48 h post infection from immunosuppressed mice fed OOO does not shown significant differences when compared with LF diet.

**Conclusions:** RB6 8C5-treated mice worsens infection with *L. monocytogenes* than PBS-control and GK1.5.treated mice. Regarding dietary treatment, FO aggravates the immunosuppressive state induced in GK1.5 and RB6 8C5-treated mice. Our results suggest an improvement of the immunosuppressive state with dietary OOO when compared with other dietary lipids.

**Key Words:** Olive oil, Dietary lipids; Host resistance; Immunosuppression.

27/205. Innovation in Food for Optimal Nutrition

### Beneficial cardiac effects of Proanthocyanidin-rich almond skin extract in Aldosterone-treated rats

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**Introduction:** Consumption of almonds and other nuts is inversely associated with the incidence of cardiovascular disease. Proanthocyanidins, located in their skin, have shown cardioprotective effects.

**Objectives:** To study the potential beneficial effects of a proanthocyanidin-rich almond skin extract (PASE) on the structural, functional and molecular alterations induced in rat heart by aldosterone+salt treatment, as well as the expression of the main mediator of cellular aldosterone actions, serum and glucocorticoid regulated kinase type 1 (SGK-1).

**Method/Design:** Male Wistar rats received aldosterone (1mg/Kg/day) + 1% NaCl for 3 weeks. Half of the animals in each group were simultaneously treated with PASE (100mg/Kg/day).

**Results:** Systolic and diastolic blood pressure (SBP, DBP), left ventricle systolic pressure (PSVI) and left ventricle end diastolic pressure (LVEDP) were elevated ( $p<0.05$ ) in aldosterone+salt-treated rats.  $-dP/dt$  decreased ( $p<0.05$ ) in aldosterone+salt-treated rats, but  $+dP/dt$  was similar in all groups. PASE normalized ( $p<0.05$ ) SBP, DBP, LVSP, LVEDP and  $-dP/dt$ . Relative heart weight, collagen content, mRNA expression of transforming growth factor beta (TGF- $\beta$ ), connective tissue growth factor (CTGF), matrix metalloprotease 2 (MMP2), matrix metalloprotease inhibitor 2 (TIMP2), tumor necrosis factor alpha (TNF- $\alpha$ ), interleukin 1beta (IL-1 $\beta$ ), p22phox, endothelial nitric oxide synthase (eNOS) were increased ( $p<0.05$ ) in aldosterone+salt-treated rats and reduced by PASE ( $p<0.05$ ). PASE also reduced the elevated SGK-1 expression in aldosterone+salt-treated rats.

**Conclusions:** Effects of PASE on cardiac hypertrophy, fibrosis, hypertension and diastolic dysfunction, were probably due to the reduction of inflammatory, oxidative and fibrotic mediators. The observed reduction of SGK-1 expression produced by PASE may suggest a possible mineralocorticoid antagonist effect of this proanthocyanidin-rich almond skin extract.

**Key Words:** Proanthocyanidins, almond skin extract, cardiac hypertrophy, inflammation, oxidation, fibrosis, aldosterone, SGK-1

### Impact of an Amaranth product the nutritional status and lipidemic profile of elderly individuals

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**Introduction:** The intake of amaranth grain has been reported to exert a hypocholesterolemic effect in experimental animals and, under certain circumstances, in humans. No data were found on studies with elderly humans.

**Objectives:** To assess the efficacy of an easy to eat amaranth product on the nutritional status and lipidemic profile of elderly individuals.

**Method/Design:** A case-control study was conducted with 20 elderly subjects (2 males, 18 females), aged 60 to 74 years and confirmed to have lipidemic levels moderately above normal (above 170mg/dL), who consumed an amaranth product for three months. The volunteers were selected from community half-way homes for the third age. The test product was expanded amaranth grain, having puffed rice as placebo. Each participant ingested 50g of one of the products during 45 days and, in a crossover fashion, the other product for additional 45 days. Anthropometric parameters, such as body weight, height, body mass index (BMI), waist and hip circumference, corrected arm muscle area (CAMA) and bioelectrical impedance analysis (BIA) were determined. The biochemical parameters, total cholesterol, LDL-cholesterol, HDL-cholesterol, triacylglycerols, glycaemia, creatinin, urea and RPC were also determined at three time-points.

**Results:** When the controlled case was compared to the placebo group, the amaranth product was seen to promote a increase with the significant difference for lean body mass in the BIA, but a minor decrease in HDL-cholesterol for the placebo group.

**Conclusions:** No significant positive impact was found in the nutritional status or in the lipidemic profile of these elderly subjects due to the ingestion of the whole amaranth product.

**Key Words:** amaranth grain; elderly; dislipidemias; nutritional status; bio-impedance.

### Impact of Phytosterol-enriched fruit beverages consumption on phytosterol and cholesterol-precursor serum levels in post-menopausal

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**Introduction:** Phytosterols (Ps) enriched fruit-based beverages, due to their cholesterol-lowering properties, may be a good choice as dietetics treatment in cardiovascular diseases caused by high cholesterol levels in blood, without increasing the diet fat intake.

**Objectives:** Evaluation of the impact of two Ps-enriched (2 g/100 mL) skim milk (50%) and fruit-based (48%) beverages – with mandarin, grape and banana (A) or grape and banana (B) juices – on serum levels of Ps (campesterol, stigmasterol and  $\beta$ -sitosterol) and two cholesterol precursors (desmosterol and lathosterol).

**Method/Design:** Subjects (n=34, 50-65 years of age, post-menopausal women) were randomly divided in two groups at baseline and ingested the beverages for 4 weeks with a wash-out period of 4 weeks in between.

Blood samples were drawn at week zero (W0) and at the end of each intervention period (W4). A GC-FID validated method was applied for sterols quantification.

**Results:** To determine differences in serum concentrations at the beginning and at the end of the intervention period, a paired t test was used. Initial versus final serum levels ( $\mu$ g/100 mL) for campesterol ( $2.983 \pm 0.094$ ;  $3.286 \pm 0.123$ ), stigmasterol ( $0.504 \pm 0.040$ ;  $0.496 \pm 0.037$ ),  $\beta$ -sitosterol ( $3.955 \pm 0.202$ ;  $5.916 \pm 0.487$ ), desmosterol ( $0.600 \pm 0.025$ ;  $0.647 \pm 0.025$ ) and lathosterol ( $3.061 \pm 0.121$ ;  $3.112 \pm 0.156$ ) showed a significant ( $p < 0.05$ ) increase of campesterol,  $\beta$ -sitosterol and desmosterol levels at W4.

Differences due to the type of beverage (assessed by ANOVA and post hoc Tukey test after data transforming using net increments) indicated that intake of beverage A afforded higher ( $p < 0.05$ ) levels of desmosterol.

**Conclusions:** Intake of Ps-enriched beverages results in an increase in serum levels of major Ps (campesterol and  $\beta$ -sitosterol) accompanied by a concomitant rise in the cholesterol-precursor desmosterol which reflects a compensatory homeostatic mechanism associated to reduction on cholesterol absorption. Therefore, these beverages may be useful for reducing cholesterol levels.

**Key Words:** phytosterols, cholesterol precursors, functional beverages, human intervention study.

### Melania snails showing biological activities in Korea

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**Introduction:** *Melania* snails belonging to the Family Pleuroceridae contain three genus types, *Semisulcospira*, *Koreanomelania* and *Koreoleptoxis*. Nine species of *Melania* snails inhabit in freshwater in Korea. *Melania* snails are a popular health-seeking foods in Korea, however few reports on the biological activities and chemical compositions are found.

**Objectives:** This study was conducted to compare the chemical composition and the biological activities of 7 species of *Melania* snails (*Semisulcospira coreana*, *Koreanomelania nodifila*, *Semisulcospira forticosta*, *Koreoleptoxis globus ovalis*, *Semisulcospira libertina*, *Semisulcospira tegulata*, *Semisulcospira gottschei*) in Korea.

**Method/Design:** For the detailed proximate, fatty/amino acid, mineral composition and chlorophyll contents were tested by the general methods as known. For the biological activities, cell cytotoxicity, DPPH radical scavenging activity, angiotensin I-converting enzyme (ACE) inhibition activity and Glucose 6-phosphate dehydrogenase inhibitory activity were tested. The activity-related compounds for ACE inhibition were analyzed by using the spectrophotometer (Bio-Tek, USA) and gas-chromatography (Shimadzu, Japan).

**Results:** *S. coreana*, *Korean. nodifila*, *S. forticosta* and *S. gottschei* showed higher cytotoxicities on three cancer cell lines, SNU-1, A549 and Hep 3B. In case of angiotensin I-converting enzyme (ACE) inhibition activity, only three *Melania* snails, *S. coreana*, *Korean. nodifila*, *S. forticosta* showed over 60% ACE inhibition activities, whereas other *Melania* snails showed the inhibition activities lower than 25%. DPPH radical scavenging activities were determined, and the *Melania* snails were divided into three groups based on the Duncan's multiple range test at  $p \leq 0.05$ . Glucose 6-phosphate dehydrogenase inhibitory activity was obtained in the extract of *S. coreana* (31.9%) and *Korean. nodifila* (28.1%). For ACE inhibitory activity, the extract of *Semisulcospira coreana* was fractionated with n-hexane, 85% aqueous (aq.) methanol, n-BuOH and water, and then the activity-related compounds were suggested.

**Conclusions:** Based on the above results, we conclude that the extracts of *Melania* snails can be used for health functional food development.

**Key Words:** *Melania* snails, Cytotoxicities, angiotensin I-converting enzyme, DPPH radical scavenging, Glucose 6-phosphate dehydrogenase inhibitory activity

### Cardioprotective effect of a meat with omega-3 and rosemary antioxidant in low cardiovascular risk people.

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**Introduction:** to design and research functional foods that may have a beneficial effect on the public health is a current topic of great interest in food and nutrition science.

**Objectives:** to evaluate the cardioprotective properties of consumption of a functional meat enriched with rosemary extract and omega-3 fatty acids on different cardiovascular risk parameters in dyslipidemic population without drug treatment.

**Method/Design:** In a randomized, cross-over, double-blind, placebo-controlled study, 43 dyslipidemic subjects without drug treatment, received 3 servings/week (serving=150 g) of a functional meat (FM) (turkey or ham slices) enriched with rosemary extract (0.03%) and omega-3 (0.9%) or control meat (CM). Each volunteer received the 2 product in random order (FM/CM or CM/FM) during 12-weeks intervention periods with 4-weeks washout period. A balanced diet was recommended during the study. Dietetic, anthropometric, and biochemical data, and different cardiovascular risk scores (Framingham, LDL/HDL, Col/HDL) were collected and calculated at baseline and at the end of each intervention period.

**Results:** No statistical differences were found in energy intake during FM and CM intervention. Framingham risk score ( $-0.2287 \pm 0.13$  vs.  $0.1644 \pm 0.13$ ,  $p < 0.05$ ) and the inflammatory indicator parameter PAI-1 ( $-0.22 \pm 0.13$  vs.  $0.33 \pm 0.13$  ng/mL,  $p < 0.01$ ) was significantly lower in FM. There were no changes in blood lipid profile parameters. However, FM subjects with initial risk HDL values ( $\geq 40$  mg/dL ♂,  $\geq 50$  mg/dL ♀) increased the HDL-Cholesterol ( $1.55 \pm 1.28$  mg/dL vs.  $-0.41 \pm 1.29$  mg/dL), and decreased the LDL/HDL ratio ( $-0.090 \pm 0.15$  vs.  $0.17 \pm 0.15$ ) at the end of the intervention, while in the CM group the difference no were significant. Finally, the antioxidant capacity in blood was significantly higher in FM comparing with CM ( $1.78 \pm 1.25$  vs.  $-2.68 \pm 1.27$ ,  $p < 0.05$ ).

**Conclusions:** FM consumption within the context of a balanced diet may have an anti-inflammatory, antioxidant and cardioprotective effect, especially in population with low/moderate cardiovascular risk.

**Key Words:** functional food, omega-3, rosemary antioxidant, functional meat, cardiovascular disease.

### Thermal stability of dried apricots followed by thermoanalytical techniques

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**Introduction:** The importance of the rubber to glass transition (T<sub>g</sub>) and formation of the glassy state became widely appreciated in understanding and controlling of food materials.

**Objectives:** The objective of this study was to determine optimal packaging material based on differences of dried apricot's thermal characteristics. PCA and SWOT analysis were performed, in order to obtain statistical information regarding the quality of packed apricots.

**Method/Design:** Glass transition (T<sub>g</sub>) of dried apricots (*Prunus armeniaca* L.) packed in four different packing materials, with appropriate barrier properties and modified atmosphere (30% CO<sub>2</sub>, 60% N<sub>2</sub>), has been followed by differential scanning calorimetry (DSC). DSC scans were performed in TA Q1000 calorimeter with RCS cooling unit. All samples have been scanned in temperature range from -80°C to 180°C. heating rate of 5°C/min in nitrogen. Water content, residue at 700°C and total weight loss at 700°C were determined by thermogravimetric analysis (TGA), TA Q500. Dried apricots has been packed in four packaging materials: paper-polyethylene (PAP/PE), paper-aluminium-polyethylene (PAP/PE/AL/PE), polyester-polyethylene (PET/PE) and polyester-aluminium-polyethylene (PET/AL/PE). Thermal stability was followed in 6 month intervals during a year. Statistical analysis included PCA and SWOT.

**Results:** As a consequence of aging and package conditions, structural changes of food material has been induced, what is detectable through variation of T<sub>g</sub>. Two glass transitions have been found. First glass transitions (T<sub>g1</sub>) was detected in temperature range of -60°C to -18°C and second glass transition (T<sub>g2</sub>) in temperature range of -21°C to 34°C. A wide, complex endothermic peak between 50°C and 163°C was found in all samples.

**Conclusions:** According to results obtained, smallest change of glass temperature, one year after packaging, have been found in samples of dried apricots packed in PET/AL/PE package which was also confirmed by PCA and SWOT analysis

**Key Words:** DSC, packaging, dried apricot

### The Effect Evaluation of Healthy Restaurant Program in Seoul Korea

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**Introduction:** Eating-out expenses and frequencies are growing in our country. Increased reliance on the outside meal reflects the increased influence of restaurant food on health. Compared with the Korean dietary reference intakes, restaurant meals in Seoul had excessive calories, fat and sodium (Joung, 2007), which were risk factors for many chronic diseases. For these reasons, we implemented the healthy restaurant program in the community.

**Objectives:** The goal of this study was to evaluate the outcome of the Healthy Restaurant Program implemented by Seocho-gu District (2007.7-2010.6) and make suggestions for improving the program.

**Method/Design:** Customers (case; 97, control; 149) were sampled by convenient sampling. Data was collected from interview by a structured self-administered questionnaire which covered variables concerning outcome evaluation. Descriptive statistics, t-test and ANOVA were used to identify the difference between case and control group. Research designs were case-control and cross-sectional studies.

**Results:** In terms of short result, case group had generally high marks of awareness of this program (t=3.57, p<0.001), and was highly supportive of the program being implemented by public health centers (t=4.69, p<0.001) and by local restaurants (t=4.87, p<0.001). For mid-term result, 73.2% of all respondents noted that they chose their menu knowing that it is promoted as healthy food. For long-term result, effect on residents as providing Healthy Food by Healthy Restaurant is diverting.

**Conclusions:** To summarize these analyses, the evaluation of the Healthy Restaurant Program indicates that Healthy Food is in the starting stage of expanding, and there is growing awareness that Healthy Restaurant Program can contribute to healthier food-service environment. This investigation suggests that strategies to encourage voluntary participation of both customers and restaurateurs are essential. (Acknowledgements: This work was supported by the Brain Korea 21 Project in 2011 and Health Promotion Project 2010 of Seocho City Public Health Center in Seoul, Korea.)

**Key Words:** Healthy Restaurant Program, Customer, Effect evaluation

**Characterization of lactic acid bacteria isolated from industrially fermented caper fruits**

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**Introduction:** Traditionally caper bush has been a wild plant that grows spontaneously in olive groves and arid lands due to their low water and nutrients requirement. Nowadays, trade of flower buttons or capers has expanded. However, in the province of Jaén, caper fruits are more demanded, and the culture and controlled exploitation of this plant is prevailing. The studies carried out in our laboratory, using samples from a local industry, allowed us to get to know better the dynamic of the microbial populations that take part in the fermentation of caper fruits, as well as the functional characteristics of strains isolated from the final product. Once this study was over, we decided to extend it to all the enterprises that perform the caper fruit fermentation in the province of Jaén, during two consecutive harvest seasons.

**Objectives:** To study the microbial ecology in the caper fruit fermentations in the province of Jaén as well as to evaluate food security and the nutritional quality of the lactic acid bacteria involved in the product.

**Method/Design:** In order to achieve this, for two consecutive years we screened samples of fermented caper fruits coming from the eight cooperatives that carry out their fermentation and trade in the province of Jaén. Culture independent molecular ecology studies were performed and a collection of 120 lactic acid bacteria strains was compiled and characterized.

**Results:** Our results confirm the role of lactic acid bacteria in the fermentation and the generalized absence of enterococci in the samples. The characterization of the strains showed they did not produce amines, did not hydrolyse biliar salts and their antibiotic resistance profile is limited. Three strains showed antimicrobial activity.

**Conclusions:** Fermented caper fruits in Jaén are a safe product performed by a cohort of beneficial bacteria that improves their safety as well as their digestibility.

**Key Words:** Microbial Diversity, Food Safety, Fermentation, Caper Fruits.

**Taking into account the nutritional specificities of food categories in an across-the-board nutrient profile system**

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**Introduction:** The nutrient profile system proposed by the French Food Safety Agency is based on two independent scores, the SAIN and the LIM, estimating the positive and negative aspects of foods, respectively.

**Objectives:** In this study, we explored the possibility of better taking into account the nutritional specificities of food categories in the SAIN, originally calculated as the mean adequacy for 5 basic nutrients (proteins, fibre, ascorbic acid, calcium, iron) per 100kcal.

**Method/Design:** Food products that contained at least 50g per 100 g of either fruit&vegetables, or fish, or meat&eggs, or dairy products or cereals&starchy roots were allocated to the corresponding food category. For each positive nutrient (more than twenty), we calculated the contribution of each category to the total intake of this nutrient by adults participating in the INCA2 dietary survey. Then, we identified the top-5 nutrients provided by each food category. Two alternative SAIN scores, each based on 5 nutrients only, were then tested. Within each food category, the SAIN1 used all the top-5 nutrients of the corresponding category, and the SAIN2 included the 5 basic nutrients of the original SAIN with a possibility of exchanging one basic nutrient with one category-specific nutrient. The latter was selected among the top-5 of its category based on public health considerations and common-sense of what is nutritionally expected from a given category.

**Results:** Folate, vitamin D, niacin, riboflavin, and complex carbohydrates were respectively selected as category-specific nutrient for fruit&vegetables, fish, meat&eggs, dairy products and cereals&starchy roots. The SAIN2 values were always greater than the original SAIN values whereas the SAIN1 values could be lower.

**Conclusions:** These results suggest that an across-the-board scoring system including only some category-specific nutrients (like SAIN2) would perform better than a system only based on category-specific nutrients (like SAIN1). The latter may be too dependent on the a-priori definition of the categories.

**Key Words:** nutrient profile, food category, Vitamins, minerals, nutrient density

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### Antimicrobial effect of natural food preservatives in fresh basil-based Pesto Spreads

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**Introduction:** There has been an increased interest in recent years to introduce changes in food industry towards technologies combining mild pasteurization, higher pH, intermediate water activity (aw) values (0.6 – 0.9), modified atmosphere packaging or natural preservatives, in an effort to meet consumers demand for “natural”, minimally processed, food with good nutritional and organoleptic properties and microbiological safety.

**Objectives:** The effect of biopreservatives: bacteriocine nisin, milk protein lactoferrin and sugar alcohol xylitol on micro flora and water activity (aw), during preparation and storage of fresh basil-based pesto spreads was studied. The antimicrobial activity of biopreservatives was evaluated against *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Bacillus* sp. isolated from pesto spreads as well as laboratory strains *Listeria innocua* and *Lactobacillus* sp.

**Method/Design:** A total number of microorganisms in the product were determined by the pour plate method using appropriate dilution and appropriate media, after varying periods of storage at 40C (on the 1st, 15th and 30th day of storage).

**Results:** An additive effect of nisin and lactoferrin on the growth inhibition of both Gram-positive and Gram-negative bacteria was found. Addition of 2% xylitol alone, or in combination with low doses of lactoferrin, reduced bacterial count by 2-logs in whey protein cream, during 30 days of storage at 40C. Addition of 4% xylitol in pesto spreads (pH 4.8) resulted in 0.8-log decrease in total number of bacteria and depression of aw from 0.890 to 0.864. In concentration of 8%, xylitol depressed both bacterial and yeast/mould growth in whey protein cream, which corresponded to the decrease in aw from 0.955 to 0.852. Addition of nisin (150 mg/kg) decreased bacterial growth by 1-log in 14 days, at 40C.

**Conclusions:** Reduction of water activity and addition of biopreservatives may be a valid alternative to traditional pasteurisation or acidification in maintaining safety and organoleptic characteristics of fresh food product.

**Key Words:** biopreservatives, nisin, xylitol, lactoferrin, water activity

27/374. Innovation in Food for Optimal Nutrition

### Kinetics and calculative colour analysis of “Pesto” Spreads browning process

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**Introduction:** Addition of natural antioxidative agents potentially influences lipid oxidation and browning (attributed to combined enzymatic and non-enzymatic oxidation processes). Oxidative browning of „pesto“, samples was determined by colour changes, as multivariate image analysis. The changes in colour, due to oxidation processes, known as “browning“, can be observed by processing of digitalised images.

**Objectives:** In studying non-enzymatic browning reactions it is of main interest to define their kinetic, especially the browning production rate, expressed as reaction rate constant. After the induction period the colour of product is getting darker.

**Method/Design:** After elaboration of each obtained image (CCD), the colour information were recorded, as R, G, B color frequency vectors. Kinetics models were developed for each spread, for each colour coordinates, and the fitting procedure was non-linear least squares regression (Levenberg–Marquardt method). The fitting function were exponential curve, and the goodness of fit were determined by statistic parameters (R<sup>2</sup>, P, RMSE,  $\chi^2$ ).

**Results:** The response surface methodology (RSM) and ANOVA were applied for statistic evaluation. Experiments were done on 0th and 30th day. The development of primary products of lipid oxidation was followed by peroxide value (PV), free fatty acids were analyzed by acid value (AV), and the oxidative stability was analysed by differential scanning calorimetry (DSC), expressed as oxidation induction time (OITDSC). The ANOVA, PCA and SWOT analysis were applied.

**Conclusions:** Multivariate image analysis, was applied for colour changes investigation of pesto spread. The product was treated with an antioxidative agents (lactoferrin and some organic acids). The colour information were evaluated, in the form of frequency colour vectors, by kinetics evaluation, RSM, ANOVA, PCA and SWOT analysis. Organic acids shown significant impact on prolonging lipid oxidation, according to statistic analysis, while lactoferrin had negative impact.

**Key Words:** Kinetics, colourgram, PCA, SWOT, ANOVA, RMS, browning



27/383. Innovation in Food for Optimal Nutrition

### Evaluation of cholesterol-assimilation capacity and survival in gastrointestinal tract of a Probiotic Bacteria

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**Introduction:** Probiotic bacteria are microorganisms that when ingested in sufficient viable numbers show a positive effect on health. Although the underlying cholesterol-lowering mechanism has not still been sufficiently elucidated, the metabolism of cholesterol and/or bile salts by the bacteria incorporated in products may be responsible for the cholesterol-lowering effect. Nevertheless, for probiotic to be able to deliver their health benefits, the bacteria need to be viable in the gut. Accordingly, the innovative aspect of the present project is the evaluation of the cholesterol-assimilation capacity of probiotic bacteria submitted before to a process of digestion.

**Objectives:** The aim of the present study is to investigate the cholesterol-assimilation capacity and survival in simulated gastrointestinal digestion of selected *Lactobacillus acidophilus* (LA5) incorporated in chocolate.

**Method/Design:** Chocolate samples are treated by a digestion assay with a Dynamic in vitro Digestor developed by AINIA Technologic Centre. The simulated gastro-intestinal digestion includes an enzymatic treatment in two stages, first with pepsin (pH=1.8-2.5) and second with pancreatin-bile extract (neutral pH). The survival of probiotic bacteria in the gastrointestinal tract was determined by plate count analysis. On the other hand, cholesterol-assimilation capacity was carried out by means of an assay in vitro. To evaluate this capacity, a probiotic strain (LA5) was isolated from chocolate intestinal digest. Later, it was cultivated at 37° C in a nutrient media enriched with cholesterol.

**Results:** Preliminary results suggest that the probiotic strain survive in sufficient numbers for supporting the cholesterol-assimilation capacity in the gastrointestinal tract. This activity is independent from the probiotic concentration in the chocolate and the temperature at with this product has been storage.

**Conclusions:** These results support that *Lactobacillus acidophilus* (LA5) incorporated in a food matrix survive stomach acidity and intestinal bile in sufficient number to be able to assimilate cholesterol.

**Key Words:** Probiotic Bacteria, Gastrointestinal In Vitro Digestion, Cholesterol-Assimilation.

27/394. Innovation in Food for Optimal Nutrition

### Tomato waste lipophilic extracts: antioxidant and antiproliferative activity

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**Introduction:** Tomato (*Lycopersium esculentum*) is one of the most popular vegetables, used as a salad, juice, soup, puree, ketchup or paste. The health benefits of tomatoes are attributed to lycopene, a strong antioxidant with antiproliferative actions. Tomato skin contains high levels of lycopene compared to the pulp and seeds.

**Objectives:** Commercial processing of tomato produces a large amount of waste at various stages. Since tomato waste generated during juice processing consists mainly of skin it could be utilized for extracting lycopene and other carotenoids. The aim of this research was to investigate the antioxidant and antiproliferative activity of tomato waste extracts, obtained from different tomato varieties (Novosadski niski, Knjaz i Rutgers).

**Method/Design:** The lycopene and  $\beta$ -carotene in tomato waste extracts were identified and quantified by HPLC method by matching their retention times (RT) and on-line ultraviolet (UV) spectra with those of standards. The antioxidant activity of extracts were investigated by measuring reducing power and 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging activity by spectrophotometric methods. The antiproliferative activity was measured using the sulforhodamine B colorimetric assay on cervix epitheloid carcinoma (HeLa) human cancer cell line.

**Results:** The Knjaz waste extract contained the highest content of lycopene (6.89 mg/g) and  $\beta$ -carotene (1.38 mg/g). The extracts were able to scavenge DPPH radical and the highest antioxidant activity, expressed as IC50DPPH value, was obtained in the case of the Knjaz waste extract (IC50DPPH = 0.06 mg/ml). The reducing power of all extracts increased with applied concentrations. The highest antiproliferative activity was obtained in the case of the Knjaz waste extract; (IC50HeLa = 0.57 mg/ml).

**Conclusions:** The obtained results show that tomato waste should be regarded as a valuable product and can be used as an easily accessible source of lycopene and  $\beta$ -carotene, which has potential as a value-added ingredient for functional foods.

**Key Words:** tomato waste, lycopene, antioxidant activity, antiproliferative activity

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**27/400.** Innovation in Food for Optimal Nutrition  
**Vitamins A, D3 and E content of eight marine and freshwater fish species**

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**Introduction:** Fishes are a good source of fat soluble vitamins. They are essential nutrients controlling a diversity of biologically important processes in human body. Retinol takes place in photoreception, regulates gene expression and cell proliferation, bone growth, reproduction etc. The biologically active isomer of vitamin E - alpha-tocopherol acts as an antioxidant protecting membrane structures and lipoproteins from oxidation.

**Objectives:** The aims of the present study were determined and compared contents of retinol, cholecalciferol and alpha-tocopherol in eight of most commonly eaten species of fish in Bulgaria. For evaluation the fat soluble vitamins content in the edible tissue were used four marine - Atlantic bonito (*Sarda sarda*), grey mullet (*Mugil cephalus*), Turbot (*Psetta maxima*), Garfish (*Belone belone*) and four freshwater Bulgarian fish species - wild Catfish (*Silurus glanis*), Common carp (*Cyprinus carpio*), breeding (Rainbow trout (*Oncorhynchus mykiss*) and Common carp (*Cyprinus carpio*).

**Method/Design:** All-trans-retinol (vitamin A), cholecalciferol (vitamin D3) and alfa-tocopherol (vitamin E) were analyzed simultaneously using HPLC with UV and fluorescence detection. Retinol and cholecalciferol were monitored by UV detection. Alpha-tocopherol was detected by fluorescence detection.

The sample preparation procedure includes saponification and liquid-liquid extraction of the unsaponifiable matter with n-hexan.

**Results:** The fat soluble vitamins content in the fresh edible fish tissue of analyzed species are in the ranges: for all-trans-retinol from 37.5±3.5µg/100g to 2.7±0.2µg/100g; cholecalciferol - 9.38±0.5 µg/100g - 1.1±0.1 µg/100g and alfa-tocopherol - 2836.6±56.0µg/100g - 121.3 ± 7.8 µg/100g.

**Conclusions:** Results showed that most fish species were characterized by good fat soluble vitamin contents.

**Key Words:** Keywords: Vitamin A, Vitamin D3, Vitamin E, Hplc Uv/Fl, Fish Species27/401. Nutrition and Healthy Lifestyle

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**27/404.** Innovation in Food for Optimal Nutrition  
**Improvement of intracellular glutathione content in baker's yeast for nutraceutical application**

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**Introduction:** Glutathione (GSH) is the most abundant non-protein thiol compound widely present in living organisms where

it plays a pivotal role in bioreduction, protection against oxidative stress, and in detoxification of toxic metabolites. These characteristics make this active tripeptide of interest in the food additive industry and sports nutrition. It is synthesized intracellularly by the consecutive action of g-glutamylcysteine synthetase, feedback inhibited by GSH, and GSH synthetase.

**Objectives:** The research was aimed at improving intracellular GSH concentration in samples of baker's yeast (*Saccharomyces cerevisiae*), by investigating the influence of amino acids concentration on GSH yield, applying a post-fermentative procedure.

**Method/Design:** Trials were performed suspending cells (5% dw) in a reaction solution, containing the chosen amino acids at different concentration, glucose as energy source, and ammonium and magnesium salts. A Face Centered Central Composite Design (FCCD) was applied, with 4 variables (cysteine-A, glycine-B, serine-C, glutamic acid-D) tested at two levels (0-4 g/L) with two replicates, for a total of 30 trials. GSH was evaluated by HPLC at 24 h incubation after cell permeabilization, and results analyzed employing the Design Expert software.

**Results:** By applying a power transformation ( $\lambda$ -1.6), the equation model was found significant (R<sup>2</sup> 0.9851, predicted R<sup>2</sup> 0.9599), and A, B, C, D, AC, BC, A2 and D2 were the significant model terms. Cysteine confirms to be a crucial element, to be set at least at 2 g/L. Glycine can be omitted from the biotransformation solution only if serine is present at high concentration (4 g/L). Glutamic acid has to be set at intermediate level (2 g/L) to achieve the highest GSH levels (1.7% dw).

**Conclusions:** Baker's yeast cells with increased intracellular GSH levels, suitable for nutraceutical applications, can be obtained in a post fermentative biotransformation process by means of combining the concentration of amino acids.

**Key Words:** glutathione, Design of Experiments, *Saccharomyces cerevisiae*, intracellular metabolite.

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**27/425.** Innovation in Food for Optimal Nutrition  
**Aldehydes as lipid oxydation markers in wheat and buckwheat crackers**

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**Introduction:** Lipid hydroperoxides, as primary products of lipid oxidation, are unstable and rapidly decompose yielding in a range of secondary lipid oxidation products. Some of them, such as aldehydes, are highly specific to the oxidative degradation of particular polyunsaturated fatty acids. Gas chromatographic analysis of those volatile compounds, has been widely used for monitoring the food products deterioration, while only few dealing with bakery products.

**Objectives:** The aim of this work was to validate the proposed SHS GC FID method for determination of five aldehydes selected as markers in bakery products with high content of fats. Developed method should be appropriate to monitor the aldehydes present in freshly baked and stored crackers.

**Method/Design:** Five selected aldehydes were determined in coarse crackers powder, without any sample preparation. SHS–GC analyses were performed on Agilent 7890A GC System equipped with a capillary split/splitless inlet, total electronic pneumatic control of gas flow, headspace autosampler and FID. Set chromatographic conditions allows the separation of propanal, pentanal, hexanal, heptanal and octanal, within 15 min.

**Results:** RSD of the retention times and peak areas for repeatability and intermediate precision for all compounds were within the range of 0.2 to 4.3%. Recovery was within the range of 60 to 99%. An excellent linear behaviour over the set concentration range was achieved. LOQs for aldehydes were within the range 0.02 to 0.10 µg, depending on the analyte.

**Conclusions:** The method accomplishes the requirements for the method validation for determination of aldehydes in bakery products. Quantification of aldehydes was achieved for both, freshly baked and stored crackers over a one year storage period. 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.

**Key Words:** Crackers; Aldehydes; Lipid oxydation; Static headspace gas chromatography (SHS–GC).

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### 27/439. Innovation in Food for Optimal Nutrition **Antitumoral effect of pine bark extract on breast cancer cells**

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**Introduction:** An adequate intake of dietary antioxidants plays a crucial role on cellular redox status. Phenolic constituents are frequently considered to be among the major compounds responsible for antioxidants effects. Enrichment of foods with phenolic compounds can therefore be considered an expedient way to obtain ‘functional foods’ with various beneficial effects on human health. The extract bark of pine (*Pinus pinaster* Ait.) consists of a concentrate of water-soluble polyphenols has been recently used as enrichment in fruit juices, demonstrating a high stability to gastrointestinal digestion conditions.

**Objectives:** The aim of this study was to assess the in vitro anti-tumoral effect of pine bark extract on a breast cancer cell line (MCF-7).

**Method/Design:** We examined the effect of the extract on cell migration capacity using a “wound healing” assay. Apoptosis was measured using a commercial kit containing AnnexinV-Alexa 488@.

**Results:** The exposure of breast cancer cells to the extract caused a significant decrease ( $p < 0.05$ ) on migration of cells. Moreover, a significant increase on apoptosis of MCF-7 cells was observed at different concentrations of pine bark extract, indicating that extract-

mediated programmed cell death is concentration dependent. The minimally effective concentration on cell migration and apoptosis was observed at 25 mg of pine bark extract /100 mL.

**Conclusions:** Results obtained suggest that pine bark extract compounds are able to decrease the malignancy of breast cancer cells (MCF-7) by reducing cell migration and inducing apoptosis.

**Key Words:** pine bark extract, breast cancer cells, antioxidant, antitumoral

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### 27/448. Innovation in Food for Optimal Nutrition **Infant cereal with multifiber mixture lowers glycemic response in healthy volunteers:**

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**Introduction:** An infant’s diet ideally consists of human milk, containing dietary fiber in the form of soluble, prebiotic oligosaccharides. When transferring from a milk-only diet to a mixed diet with solid foods, other types of dietary fiber are introduced. To facilitate transition to a more adult type diet, a special infant cereal product was developed with a multifiber mixture of pectin (2.1 wt%), inulin (47.9 wt%), resistant starch (8.1 wt%) and oat fiber (41.9 wt%). These soluble and insoluble fibers are also present in fruits, vegetables and grains in the regular infants’ diet.

**Objectives:** The current study aimed at determining the effect of this specific fiber mixture on the glycemic response of the cereal.

**Method/Design:** 10 healthy adult volunteers were recruited for a glycemic response test at Hammersmith Food Research in London, UK. In a cross-over design they consumed a cereal with or without 0.87 g of the fiber mixture. Both cereals contained 25 gram of available, digestible carbohydrates. Blood samples were collected after an overnight fast, at 15, 30, 60, 90 and 120 minutes after consumption of the cereal and the incremental area under the blood glucose response curve was calculated to assess the glycemic index. The results were statistically tested with paired t-tests.

**Results:** The multifiber mixture lowered the post-prandial blood glucose peak and concentration of the infant cereal. These results were statistically significant ( $p < 0.05$ ) at 30, 45 and 90 minutes after consumption. For the Glycemic Index there was a trend toward statistical significance between the two cereals ( $64 \pm 5$  vs  $43 \pm 5$ ,  $p = 0.078$ ).

**Conclusions:** An infant cereal with added dietary fibers significantly lowered the glycemic response in healthy volunteers. Health consequences of high glycemic diets during childhood are unknown, but effects might be similar or worse compared with adulthood due to the possible imprinting effects.

**Key Words:** Cereal, Glycemic Response, Dietary Fibers, Infants.

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**27/489.** Innovation in Food for Optimal Nutrition

**Compliance of zinc fortified snack among school age children in Iran**

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**Introduction:** Zinc deficiency is common nutritional problem in many countries due to inaccessibility to animal foods. Based on National Integrated Micronutrient Survey, zinc deficiency is serious nutritional problem in Iran. Targeted Snack fortification with zinc is a cost-effective and sustainable strategy to overcome zinc deficiency if the taste is accepted with target group.

**Objectives:** The aim of study was to determine the compliance of school age children to eat snack which is fortified with zinc (20% of RDA).

**Method/Design:** After fortifying snack with 20% of RDA for school age children, the taste study has been done in a panel test group in order to determine the probable organoleptic changes in the end product. 150 primary school children in fourth and fifth grade ate both fortified and unfortified snacks. Every student ranked the fortified and unfortified snacks based on its taste from one to five in a taste trial questionnaire. Analysis was done based on both Paired-Sample T Test, Wilcoxon signed-rank test and Marginal Homogeneity.

**Results:** About 70% of students ranked fortified snack as delicious and very delicious and 56% of them ranked the unfortified one as delicious and very delicious. Paired-Sample T Test for fortified and unfortified snack showed mean 3.82 and 3.65 respectively ( $p=0.276$ ). Wilcoxon signed-rank test shows no difference in fortified and unfortified cracker ( $p=0.336$ ). Marginal Homogeneity Test also shown no difference between fortified and unfortified snack ( $p=0.274$ ).

**Conclusions:** Fortifying snack with zinc (20% of RDA for schoolage children) has no effect on its taste. So to overcome zinc deficiency in this age group we can use this strategy.

**Key Words:** Zinc Deficiency, Fortified snack,

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**27/505.** Innovation in Food for Optimal Nutrition

**Effects of low dose betaine in subjects with mild fatty liver**

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**Introduction:** Fatty liver disease may originate from excessive alcohol consumption or may be associated with obesity and metabolic

syndrome. Betaine (trimethylglycine) has shown to inhibit accumulation of triglycerides on hepatic tissue in experimentally induced fatty liver. Moreover in humans with non-alcoholic steatohepatitis high-dose betaine supplementation may protect against worsening hepatic steatosis.

**Objectives:** To examine the effects of continuous intake of betaine on safety and liver function in Japanese males with mild fatty liver.

**Method/Design:** Altogether, 20 Japanese males (mean age 45 years; BMI 24.9 kg/m<sup>2</sup>) participated in a placebo-controlled, randomized, parallel double-blinded study. Selection criteria included fatty liver assessed by abdominal ultrasonogram, a modest habit of alcohol drinking, liver enzymes and body mass index (<27). Study subjects were allocated to receive either a 3 g daily dose of betaine (Betafin BF) or placebo (maltodextrin) for 12 weeks. Abdominal computed tomography was performed the beginning and at 12 weeks. Laboratory tests and tolerability were assessed during the whole intervention period.

**Results:** No differences in the occurrence of adverse events were observed between the groups.

Compared to placebo group, betaine group showed a significant increase in plasma betaine ( $p<0.0001$ ) and HDL cholesterol ( $P<0.05$ ) concentrations whereas plasminogen activator inhibitor PAI-1 ( $P<0.05$ ) was decreased in betaine group. There were no clinically significant differences in the liver fat content, liver enzymes, area of visceral and subcutaneous fat or the markers of sugar metabolism, triglyceride, total cholesterol, LDL cholesterol, fibrosis or oxidative stress between the groups.

**Conclusions:** Low-dose betaine supplementation did not demonstrate changes in liver fat content in subjects with mild fatty liver, but the increased plasma HDL cholesterol and decreased PAI-1 may reflect favourable effects of betaine on the liver function. However, further studies are required to clarify effect of betaine on lipid metabolism.

**Key Words:** betaine, fatty liver, HDL cholesterol, plasminogen activator inhibitor-1 (PAI-1), triglyceride

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**27/507.** Innovation in Food for Optimal Nutrition

**Effects of polydextrose on postprandial triglyceride response in healthy, hypertiglyceridemic and obese subjects**

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**Introduction:** Elevated postprandial plasma triglycerides concentration is believed to be an independent risk factor of atherosclerotic vascular disease. Overweight and high waist circumference are known to increase postprandial triglyceride response but the role of dietary fibers are not well known.

**Objectives:** The aim of the study was to examine the effects of soluble fiber, polydextrose on postprandial lipemia in healthy, hyper-

triglyceridemic and obese subjects.

**Method/Design:** Altogether, 19 healthy normolipidemic (mean age 22 years; BMI 24.1 kg/m<sup>2</sup>), 21 hypertiglyceridemic (mean age 42 years; BMI 29.6 kg/m<sup>2</sup>) and 18 obese (mean age 42 years; BMI 33.6 kg/m<sup>2</sup>) subjects ate twice a standard hamburger meal with and without a supplementation of polydextrose (Litesse®12,5 or 15g) in a double-blind and randomized design. Three hours before the hamburger meal the subjects got a standardized light breakfast, but thereafter only water was allowed in addition to the test meal until the last serum sample was taken. For plasma triglyceride measurements the venous blood samples were taken twice before the hamburger meal, and 30, 60, 120, 240 and 360 min after the meal. The data of three different studies were combined to find out the sources of variation.

**Results:** The most important variables explaining variation of the postprandial triglyceride responses (time point, max, AUC) were the baseline triglyceride concentration and age. Healthy subjects showed modest triglyceride response whereas the most exaggerated response was found in hypertiglyceridemic subjects. Irrespective to the study population polydextrose supplementation showed a significant decrease in plasma triglyceride response compared to control ( $p < 0.05$ ).

**Conclusions:** Polydextrose decreased postprandial triglyceride response in the combined data of healthy, hypertiglyceridemic and obese subjects, notably the decrease was strongest in healthy subjects. The study may contribute to develop dietary concepts that will reduce the postprandial hyperlipidemia in different target groups.

**Key Words:** postprandial, triglyceride, dietary fiber, polydextrose

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## 27/516. Innovation in Food for Optimal Nutrition

### Development of formulations with low energy density and with a greater nutritional value

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**Introduction:** Some clinical conditions as mellitus diabetes and obesity require permanent or prolonged restriction of sucrose, which determines the prescription of sweeteners.

Sweeteners are natural or artificial substitutes of the sugars that give sweet flavor and fewer calories per gram, sweetening substances, compounds with high ability to sweeten.

**Objectives:** Replace sucrose by two types of sweeteners, a basis of sodium cyclamate and saccharin and another a basis of sucralose.

**Method/Design:** Has been selected 13 different candy recipes where sucrose belonged. First the sucrose preparation was replaced by sweeteners, in the same proportions of sucrose.

**Results:** Lemon pie with Chantilly

Mass: were tests with 25% of oatmeal. The mass has similar characteristics with wheat flour.

Stuffing: for the preparation of the stuffing was used the condensed milk with the sucralose sweetener, which replaced the sucrose in this preparation.

Coverage of Chantilly: the two types of sweeteners were satisfactory in the confection of Chantilly, kept the characteristics of the product, especially in relation to the creaminess.

Carrot cake with chocolate: replacement of sucrose by sweeteners produced satisfactory results. The third modification was the addition of 25% of oatmeal. As the mass with the sweetener cyclamate gradually lost its softness, that preparation was deleted. Only the mass with the sweetener sucralose got the expected result.

Chocolate Mousse: modification performed was the replacement of sucrose by sweeteners and the replacement of traditional chocolate diet. Both preparations modified flopped as sweeteners kept aeration expected in the product.

Chocolate Brownie: the modification was the replacement of sucrose by sweeteners, where the two recipes achieved success.

**Conclusions:** It is possible to realize with this work, that preparations containing sucrose may be replaced by sweeteners with success.

**Key Words:** Sweeteners, Sucrose, Preparations.

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## 27/576. Innovation in Food for Optimal Nutrition

### Traditional foods of Black Sea Countries

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**Introduction:** Traditional dietary patterns, generally beneficial to health as judged over time, should be promoted beyond the native country's borders. Scientific data is a prerequisite for the successful promotion of a sustainable diet. The Mediterranean diet is a distinguished example of such a dietary pattern. Accumulating scientific evidence has established it globally as a model diet.

**Objectives:** A framework for the investigation of traditional foods, aiming primarily at the elucidation of their role on health, was recently expanded to the Black Sea Area Countries (BSAC) through BaSeFood. A principal objective of BaSeFood is to deliver information on bioactive substances and potential related health claims of BSAC traditional foods in order to give opportunities to stakeholders to develop sustainable diets.

**Method/Design:** Thirty-three BSAC traditional foods have been selected for in-depth investigation. The study includes:

- Nutrient and bioactive composition data.
- Information on microbiological aspects
- Recording of the traditional production methods.
- Technological study on their potential industrial or semi-industrial production.
- Integrated records related to their traditional character
- Historical and folkloric review, which documents their traditional identity.
- Food indexing using Languag

**Results:** Anticipated outcomes of the study on the BSAC traditional foods include:

- Insight on their impact on health
- Enrichment of the BSAC food composition tables with validated nutrient data
- Potential proprietary or health claims
- Promotion into new markets
- Preservation of the traditional culture
- Development of sustainable agriculture

**Conclusions:** Several Mediterranean traditional foods are likely to contribute to better health. It remains to be substantiated if the same also applies to BSAC traditional foods. BaSeFood has contributed to an initial registration of BSAC traditional foods and has provided essential tools for their promotion within and beyond the region.

**Key Words:** Traditional foods, Black Sea area, sustainability.

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#### 27/577. Innovation in Food for Optimal Nutrition

### **Blood lipid biomarkers after consumption of a commercial reduced milk fat cheese naturally-enriched in CLA**

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**Introduction:** There is much interest in adding value to dairy products by naturally increasing the levels of polyunsaturated fatty acids (PUFA). In this study, a commercial reduced milk fat cheese was made by using a mixture of CLA enriched milk (cows, ewes and goats) obtained by supplementation of ruminant diet with linseed. In addition to reduced saturated fat content, this functional cheese showed an enhanced amount in CLA and trans-11 C18:1 (CLA precursor in the mammary gland) and alpha-linolenic acid.

**Objectives:** Determination of the effects of the functional cheese (naturally CLA-enriched) consumption on plasma and erythrocytes lipids and investigate whether a reliable health biomarker can be identified.

**Method/Design:** Two groups (Light Cheese (LC) vs Light Functional Cheese (LFC) of healthy Wistar male rats (n=8 per group) were used in a dietary intervention trial. After 8-wk period, blood samples (plasma and erythrocyte) were collected for lipid analysis.

Lipids were extracted by Folch method. Direct transesterification method described by Lepage was also used to obtain FAME. Lipid profile was thoroughly monitored by GLC-FID and triacylglycerols, polar lipids and FAME were analysed. For statistical analyses SPSS 19.0 software was employed.

**Results:** In the plasma samples, lipid distribution in polar (65%) and neutral lipids (35%) remained stable in the two diets tested, but

a decrease in the polar compounds content from 50% in control diet to 40% in functional diet was detected in erythrocytes. Regarding FAME, LCF intake increased the linolenic acid and CLA contents in plasma, meanwhile a significant correlation between diet and the stearic, oleic, linolenic acids, total CLA and rumenic acid concentrations was found in erythrocytes.

**Conclusions:** The intake of LFC naturally enriched in healthy PUFA increase the presence of these fatty acids, used as biomarkers, in plasma and erythrocytes.

**Key Words:** CLA (conjugated linoleic acid), cheese, erythrocyte, PUFA

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#### 27/584. Innovation in Food for Optimal Nutrition

### **Comparative studies on anti-proliferative effects of anthocyanidins towards HeLa cells**

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**Introduction:** Anthocyanidins are basic structure of anthocyanins that naturally exist as polyphenolic plant pigments. Anthocyanidins have been shown to have anti-proliferative effect on various human tumor cells; however, the mechanistic insight of how anthocyanidins suppress tumor cell proliferation remains poorly understood.

**Objectives:** We aimed to reveal any functional differences among four anthocyanidins including pelargonidin, cyanidin, delphinidin and malvidin. In particular, we focused on uncovering the effects of four different anthocyanidins on growth, JUN-dependent transcriptional activity, apoptosis and autophagy induction in human cancer cells.

**Method/Design:** We performed the WST-1 assay, and then luciferase assay to detect the JUN-dependent transcriptional activity in anthocyanidins-treated HeLa cells. Subsequently, we detected apoptosis in delphinidin (100 µM)-treated HeLa cells by the criteria of annexin V and propidium iodide double staining for flow cytometry and caspase-3 and -7 activities, and also senescence by detecting the β-galactosidase activity. To monitor autophagy, Western blot analysis using anti-LC3 antibody was performed.

**Results:** We demonstrated that delphinidin (25 µM) and malvidin (50 µM) significantly suppressed the growth of HeLa cells. Cyanidin (100 µM) modestly suppressed the growth of HeLa cells in a time-dependent manner (24~72 hours). In contrast, pelargonidin failed to show any anti-proliferative effect on HeLa cells. Notably, anti-proliferative effects of anthocyanidins were well correlated with the suppressive effects on JUN-dependent transcriptional activity. Neither apoptosis nor senescence was induced by delphinidin (100 µM) in HeLa cells. Finally, we detected an increase in the protein level for LC3 form II, an autophagy marker, only by delphinidin in thapsigargin-treated HeLa cells.

**Conclusions:** Taken together, amongst anthocyanidins tested, delphinidin and malvidin are potent suppressors of proliferation of HeLa cells without apoptosis, and delphinidin could promote autophagy. These findings could be applied to proper regulation of

many tumor cells in which functional p53 is inactivated.

**Key Words:** Anthocyanidins: Hela Cells: Anti-Proliferation: Jun: Apoptosis

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**27/629.** Innovation in Food for Optimal Nutrition

**When satiety evaluation is inspired by sensory analysis: a new approach**

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**Introduction:** The current approach of satiety feelings evaluation is well developed but provides limited results depending on experimental conditions (e.g. subject selection, timing, portion size).

**Objectives:** The hypothesis of the new approach is that selecting sensory analysis experts used to evaluate food feelings, in combination to a training period and repetitive sessions provides relevant results to discriminate satiety feelings.

**Method/Design:** Eighteen sensory panellists were trained to evaluate appetite feelings using the motivation to eat questionnaire. Based on the sensory analysis method, a first session was dedicated i) to open discussions on the meaning of hunger, fullness, desire to eat and prospective consumption, and ii) to define appropriate descriptors graduating the visual analogues scales (VAS). A 'satiety dictionary' of definitions and references was then provided to each panellist. During the other training sessions, the fasting panellists having consumed a 250kcal-portion of product answered to VAS every 30min during 2h30. A reference product was tested 3 times, as well as several other breakfast items varying in macronutrients composition and sensory properties.

**Results:** Statistical analysis was conducted in 16 panellists (2 having difficulties using VAS were excluded from the group). No statistical difference was obtained between the repetitions of the reference product. A limited intra- and inter-individual variability was found so that isocaloric portions of products were differentiated in this small group. A ranking could be obtained based on satiety feelings. Interestingly, taste or shape did not influence the evaluation of the trained panellists.

**Conclusions:** Using sensory analysis method, sixteen sensory panellists were successfully trained into satiety experts, to build a reproducible and discriminatory tool, which can be used regularly. Such training may help focus the evaluation of appetite feelings on physiological cues. This quick and low-cost tool provides a relevant way of ranking various foods based on their satiety.

**Key Words:** Satiety, sensory analysis, evaluation tool.

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**27/647.** Innovation in Food for Optimal Nutrition

**Rheological behaviour of fiber-enriched biscuits during digestion: *in vitro* & *in vivo* study**

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**Introduction:** Increasing the viscosity of the bolus during digestion using viscous soluble fibers has been shown to improve blood glucose and slow down gastric emptying. However, some contradictory results have been reported in the literature, especially in dry and solid food matrices which need to rehydrate before texturing food bolus. Designing *in vitro* tools to monitor rheological changes during digestion could contribute to a better understanding thereof.

**Objectives:** Set up a new *in vitro* tool to monitor the kinetics of viscosity build-up during artificial digestion and correlate viscosity values with *in vivo* gastric emptying time.

**Method/Design:** Prototype biscuits containing highly viscous soluble fibers were formulated. *In vitro* evolution of the viscosity was monitored using a new set-up consisting of a high performance rheometer combined with an automatised titration station. The method consists in grinding the biscuit to a particle size distribution mimicking mastication, dispersing it into a gastric fluid and monitoring the evolution of the viscosity for 70 minutes, before shifting to small intestine conditions for 90 minutes, using appropriate pH and digestive enzymes delivered by the titration station. At the end of the gastric and small-intestine phases, a flow curve is recorded as a fingerprint of the rheological behaviour. Gastric emptying kinetics were measured using the <sup>13</sup>C-octanoic acid breath test on the same biscuits.

**Results:** the new *in vitro* tool allowed monitoring the kinetics of viscosity build-up as well as the impact of shear rate on the rheological behaviour. Viscosity was found to be a power-law of the viscous soluble fiber concentration, with an exponent depending on the shear rate considered. Gastric emptying time was positively correlated with viscosity.

**Conclusions:** The correlation observed between these *in vitro* and *in vivo* measurements suggest that simple *in vitro* tools can be used to foresee the impact of viscous soluble fibers on gastric emptying.

**Key Words:** In Vitro Digestion – Viscous Fibers – Gastric Emptying – Biscuits

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## 27/654. Innovation in Food for Optimal Nutrition

### Impact of attitudes towards functional food on acceptance of additives improving healthy values of sweets

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**Introduction:** The launched sweets with improved healthy value can arise a controversy mostly because of many negative consequences of eating sweets.

**Objectives:** Objective was to assess to what degree the consumers' attitudes towards functional food (FF) influence acceptance of additives improving healthy value of sweets.

**Method/Design:** The questionnaire survey was carried out in 2010 within 1000 Polish consumers. The questionnaire comprised questions on acceptance of fiber, minerals, vitamins, pro-biotic bacteria and organic ingredients as part of sweets. The attitudes towards FF was measured by using 26 statements. Factor analysis was used for grouping the statements into five factors including necessity, perceived reward, confidence; risk of FF; FF as a part of healthy diet and medicine. These factors were used in cluster analysis to create three types of consumers: with positive (63.3% of population), negative (14.8%) and ambivalent attitude (21.9%) towards FF.

**Results:** The most accepted component improving the healthy properties of sweets were vitamins (71.5% of population), than fiber (45.4%) and minerals (42.8%) and finally pro-biotic bacteria (28.1%) and organic ingredients (23.2%). More consumers with positive (49.3%) and negative (48.6%) attitudes towards FF than with ambivalent one (32.0%) accepted fiber. The more positive attitude was, the more consumers accepted vitamins. Almost 90% of consumers with negative attitude did not buy or put attention to sweets with claims "with special healthy properties" whereas 78% with positive attitude did that.

**Conclusions:** Attitude towards FF influenced acceptance of sweets with improved healthy value. Vitamins, minerals and fiber were most accepted by Polish consumers as added components in sweets. The survey was performed within the Project EUREKA E!4449 AKTINIDIA

**Key Words:** consumer, attitude, acceptance, functional food, sweets

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## 27/671. Innovation in Food for Optimal Nutrition

### Polish consumers' Intentions to buy genetically modified animal food and their cognitive determinants

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**Introduction:** Consumer acceptance of GM food is low, but it differs according to cultural background and type of food. Intentions to buy GM food are influenced more by consumers' attitudes towards GM food, different levels of risk perception and trust in food safety information than their socio-demographic characteristics.

**Objectives:** was to assess whether consumers are interested in purchase of three animal food with GM applications and which of psychosocial traits indicate the significant impact on declared intentions to buy.

**Method/Design:** The data were collected among 374 students of Warsaw University of Life Sciences. An interview-assisted questionnaire on opinions on the GM products, including intention to buy GM products next year, healthy properties, perceived risks and benefits related to consumption of GM food, was applied. Data collection took place from March to June 2007. Fat-free yoghurt, pork with lower fat content and salmon modified to grow faster than "normal" salmon were assessed.

**Results:** Consumers were in general unwilling-to-buy the GM animal products. Intentions to buy GM products were positively influenced by perception of risk and benefits resulting from their consumption. Familiarity had shown weaker correlations with declared intentions, but it was significant variable in differentiating consumers' perception of benefits and risk, and willingness to buy these products. The more familiar GM product was, the more positive opinions on it was given. The GM pork was perceived to be the most positive according to its healthy properties and benefits of eating, but GM yoghurt was perceived as less risky and more consumers declared intention to buy this product.

**Conclusions:** Polish consumers did not accepted GM animal products as a part of their diet.

**Key Words:** consumer, GM food, intention to buy

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## 27/689. Innovation in Food for Optimal Nutrition

### Innovative use of food proteins for improved postprandial glycaemia

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**Introduction:** Data from the latest decade repeatedly show that a high intake of milk and other dairy products decreases the risk of the metabolic syndrome. A variety of mechanisms have been put forward for metabolic benefits involving milk constituents such as Ca, protein and lipids. An interesting feature associated with milk is the insulinotropic properties, which have been assigned to the whey proteins. We have demonstrated that addition of whey proteins reduces post meal glycaemic excursions in both healthy subjects as well as in patients with type 2 diabetes. The insulinotropic effect of whey appears to stem from the generation of a particular amino acid (AA) pattern in postprandial blood after ingestion of whey proteins and the effect can to a large extent be simulated by use of specific mixtures of Valine, Leucine, Isoleucine, Lysine and Threonine.

**Objectives:** During the last years our research has focused on



establishing a suitable dose, food matrix and timing of intake for optimal effect of the AA mixture on glycaemic regulation.

**Method/Design:** Previously we used to study drinks in which the whey/AA was added together with the carbohydrate source. Using that study design the insulin release was markedly higher after whey/AA intake compared with a meal containing only carbohydrates. Lately, we have chosen to serve the AA-mixture as a drink together with a solid meal.

**Results:** We have found that the insulin response is less pronounced when serving AA to a solid meal but with a remaining glucose lowering effect, suggesting improvements in insulin sensitivity.

**Conclusions:** Using this innovation, glucose regulation can be improved in large populations just by adding a specific drink to their ordinary meals. A patent application has been filed in Europe, USA and Japan for the active combination of AA.

**Key Words:** glycaemic regulation, whey, protein, insulin sensitivity

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### 27/693. Innovation in Food for Optimal Nutrition

#### **Food derived peptides stimulate mucin secretion and gene expression in intestinal cells**

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**Introduction:** Certain dietary components, such as fiber, probiotics, etc, can positively influence characteristics of the intestinal mucus, although the mode of action of each compound may differ. Recently it has been demonstrated that specific peptide sequences, concretely  $\beta$ -casomorphin 7, induces a strong release of mucin the jejunum of the rat through the activation of the enteric nervous system and opioid receptors. The presence of opioid receptors on intestinal cells suggests the possibility that food-derived opioid peptides, which can be produced in the intestinal lumen during gastrointestinal digestion, might modulate the production of mucin via a direct action on epithelial goblet cells.

**Objectives:** The aim of this work was to evaluate the mucin secretion and MUC5AC expression induced by food-derived opioid peptides on intestinal cells.

**Method/Design:** Different opioid food derived peptides with ability to bind mu or delta opioid receptors were tested on HT29-MTX human colonic cells seeded until confluency. An enzyme-linked lectin assay (ELLA) was used to measure mucinlike glycoprotein secretion. In those peptides showing significant higher secretion, quantitative PCR was used to determine the level of transcripts.

**Results:** HT29-MTX human colonic cells exhibited increased secretion of mucin over time and therefore proved to be a reliable tool for the study of regulation of gastrointestinal mucin expression

and secretion. Significantly increased secretion of mucin after 2 or 4 hours after the exposure to some peptides was found. Among them,  $\alpha$ -lactorfin, a peptide derived from  $\alpha$ -lactalbumin, showed increased expression of MUC5AC.

**Conclusions:** Milk opioid peptides have shown to induce mucin secretion and regulate the expression of MUC5AC in HT29-MTX human colonic gobletlike cells. Milk opioid-derived peptides could thus provide new prospects for improving gastrointestinal protection.

**Key Words:** Opioid Peptides, Milk, Gene Expression, Intestinal Cells

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### 27/698. Innovation in Food for Optimal Nutrition

#### **Effects of a citrus-based functional juice on the markers of oxidative stress in metabolic síndrome patients**

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**Introduction:** The metabolic syndrome is a constellation of interrelated risk factors of metabolic origin that appear to directly promote the development of atherosclerotic cardiovascular disease.

**Objectives:** To analyze the effect of a citrus-based functional juice on 8-OHdG levels (damage DNA) and reduced and oxidized Glutathione (GSH/GSSH) in patients with metabolic syndrome (MetS) compared with healthy people.

**Method/Design:** The study included 53 subjects (24 men and 29 women), with an age between 50 and 65 years old. 20 healthy subjects (control group) and 33 patients who fulfilled the Adult Treatment Panel III criteria for the metabolic syndrome (MetS). To assess the effects of a citrus-based functional juice on 8-OHdG levels and reduced and oxidized Glutathione in MetS patients, 18 patients consume daily 300 mL of a citrus-based functional juice (CFJ) during six months and 15 patients consume 300 mL of a placebo beverage (PB). The control group (CG) consuming a citrus-based functional juice (CFJ). 8-OHdG analysis was carried out with an ELISA kit (Japan Institute for the Control of Aging, Fukuroi, Shizuoka, Japan). Reduced and oxidized Glytathione were determined by colorimetric determination (OxisResearch TM Bioxytech GSH/GSSH-412 TM Burlingame, USA )

**Results:** The levels of 8-OHdG in MetS patients were significantly higher ( $p=0,05$ ) than those observed in GC ( $20,2\pm 2,1$  ng/mL vs  $18,9\pm 1,9$  ng/mL). After consuming of a citrus-based functional juice (CFJ) during six months these values decrease significantly. According to the GSH/GSSH results, average values are higher in the control group than in patients with MetS. After consumption of CFJ by MetS patients and GC these values decreased and significant

differences were observed.

**Conclusions:** Conclusions: The levels of 8-OHdG and GSH/GS-SH in MetS patients were significantly higher than those observed in GC. After consuming of a citrus-based functional juice (CFJ) during six months these values decrease significantly.

**Key Words:** Oxidative stress, metabolic syndrome, GSH/GSSH, 8-OHdG.

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#### 27/707. Innovation in Food for Optimal Nutrition

##### **Photoprotective properties of aromatic carotenoids**

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**Introduction:** Carotenoids comprise a class of naturally occurring colorants with antioxidant and photoprotective properties. Dihydroxyisorenieratene (DHIR) and isorenieratene (IR) are structurally unusual carotenoids produced by the Brevibacterium linens used in dairy industry for the production of red smear cheeses.

**Objectives:** The structure of DHIR is composed of a polyenic backbone substituted with phenolic end groups. Structurally-related is the aromatic IR, lacking both hydroxyl groups. Objective of the study was to investigate the antioxidant and photoprotective properties of DHIR and IR in comparison to the non-aromatic lutein in cell culture

**Method/Design:** Experiments were performed in human dermal fibroblasts loaded with the different carotenoids. UV-induced photodamage to DNA was evaluated with the comet assay determining DNA strand breaks. Thymidine dimer formation was detected with immunostaining. Generation of reactive oxygen species (ROS) and zinc release after UV exposure were followed with redox- and zinc-sensitive fluorescent dyes. Malondialdehyde was used as a marker of lipid oxidation.

**Results:** Treatment with DHIR and IR led to a significant decrease in strand breaks and in the formation of thymine dimers after UV irradiation. ROS levels and intracellular zinc release were lower in the cells pretreated with DHIR or IR compared to control; lutein showed no effect. MDA levels in irradiated cells were decreased upon pretreatment with carotenoids

**Conclusions:** Aromatic carotenoids protect DNA against UV-induced thymidine dimer formation, likely due to UV absorbing effects of the aromatic ring systems. DHIR and somewhat less pronounced IR also act as antioxidants preventing photooxidative damage related to the presence of a conjugated diene system and in the case of DHIR a phenolic structure that can be oxidized to a quinone.

**Key Words:** aromatic carotenoids, photoprotection

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#### 27/728. Innovation in Food for Optimal Nutrition

##### **Improving biscuits nutritional profile: a successful step-by-step multi-disciplinary approach in Europe**

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**Introduction:** Eating well and being active work together for better health. The food industry can play a positive role in offering consumers healthier options. Reformulating existing products and developing innovations that contribute to smart choices are two of Kraft Foods' key global commitments towards WHO goals

**Objectives:** Improving nutritional density of biscuits while keeping the same feasibility in factory and sensorial quality is challenging. Reduction in fat solid and sugars generally leads to poor taste, texture modifications (harder or brittle) given the essential technologic and organoleptic roles of these ingredients.

**Method/Design:** Our strategy over ten years has been a multi-disciplinary approach: our Development and Ingredient & Process Research teams have been working closely with our nutritionists and sensory scientists. We mainly focus our efforts on improving step-by-step fat quantity and quality and carbohydrates quality. The use of a large range of sensory tests involving expert juries or consumers over the course of the product's development ensures that the final product meets consumers' expectations

**Results:** As reduction in sugar can have bigger impact on texture and consumer's satisfaction as showed by our consumer tests and leads to heavy problems in dough processing, we concentrate on reduction of fat and especially saturated fatty acids (e.g. reformulation of our major recipe has enabled us to gradually decrease its SAFA content from 2007 to 2010 by 45%). All reformulations need the combination of several 'tools' (specific ingredients, process adaptation, investments in equipment when required and sometimes research partnerships). Regarding trans fat, 100% of our biscuits in Europe contain less than 1% trans fatty acids (g/100g food) as recommended by scientific authorities. To take full advantage of wholegrain benefits, we have adapted our recipes and process to develop more than 120 wholegrain products in Europe. We also reduce sugar in our products when sensory qualities can meet consumers' expectations.

**Conclusions:** To go further and provide consumers healthier products, Kraft Foods conducts ongoing research to clear the technological barriers of further fat and sugar reductions associated with constant taste quality.

**Key Words:** Biscuit, Nutrition, Reformulation, Saturated Fat, Wholegrain

### Use of fermented kefir to increase the shelf life of cakes

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**Introduction:** Among the bakery, the cake is becoming more important with respect to consumption and marketing. The Kefir has potential for applications in baked products, which can be used to enhance flavor and prolong shelf life of baked goods.

**Objectives:** Optimize the formulation for cakes using fermented kefir in partial or total replacement of the water to get a product with good sensorial quality and longer shelf life.

**Method/Design:** The cake formulations were prepared in a conventional manner, by replacing part or all of 75 mL water for 15, 30, 45, 60 and 75 ml of kefir. We determined the physico-chemical properties: specific density of raw dough, specific volume, water activity and color of the cakes and an acceptance test with untrained assessors. The physico-chemical and sensory were interpreted by the Tukey test ( $p < 0.05$ ). Was evaluated the microbiological characteristics of the selected cake, stored for seven days at room temperature. The study was approved by the Research Ethics Committee under the protocol number 23087.002819/2009-41.

**Results:** The replacement of water by kefir did not significantly alter the aroma, texture, flavor and overall impression, the cake specific volume and density of the raw dough compared to the standard cake. These results have been beneficial, because high densities disadvantage the volume of the product and cause the formation of bulky core. Doughs with low specific volume, which looks disagreeable. The enhanced content of kefir contributed to a lower water activity. It was found that the formulation with 75 mL of kefir was more effective in inhibiting the growth of mesophilic bacteria than yeasts and molds in seven days of storage.

**Conclusions:** It's possible replace the water kefir without altering the sensorial characteristics and physical-chemical properties of the original formulation. Kefir is a promising biotechnology products to inhibit microbial growth and advance shelf life.

**Key Words:** Cake, kefir, quefir, shelf life

### Anti-salmonella spp. Activity of thymus vulgaris L., zingiber officinale and cinnamomum zeylanicum blume essential oils

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**Introduction:** The antimicrobial activities of many essential oils and their isolated components have been studied to control bacteria spoilage in food.

**Objectives:** The antimicrobial effects of essential oils obtained from *Thymus vulgaris* L. (EOT), *Zingiber officinale* Roscoe (EOZ) and *Cinnamomum zeylanicum* Blume (EOC) against *Salmonella* spp. strains were evaluated.

**Method/Design:** *Thymus vulgaris* L., *Zingiber officinale* Roscoe and *Cinnamomum zeylanicum* Blume were collected from of State University of Maringá herbarium (UEM). The essential oils were obtained hydrodistillation using a Clevenger apparatus. The essential oils constituents were identified by GC-MS and RMN. The antimicrobial effects of EOT, EOZ and EOC, performed by a micro-dilution assay were evaluated as the minimum inhibitory concentration assay (MIC) (micro-dilution assay) and as the minimal bactericidal concentration assay (MIB). In a Mueller Hinton Broth containing twofold serial dilutions of EOT, EOZ and EOC, a 10 $\mu$ l aliquot (5 x 10<sup>5</sup> cfu/ml) of *Salmonella* spp. strains was added. The microtiter plates were subsequently incubated at 37°C during 24h. MIC was determined as the lowest concentration of essential oils which inhibited the microbial growth. To MBC determination, 10 $\mu$ l of each essential oils dilution without a visible growth were plated on Hektoen Enteric Agar and incubated at 35 °C/24 hours. The MBC was determined as the lowest concentration of essential oils able to inhibit the bacterial growth on the plates.

**Results:** Since EOT showed increased MIC and MBC (1250 and 2500  $\mu$ g/mL, respectively) when compared that observed to EOC (MIC: 312  $\mu$ g/mL; MBC 625  $\mu$ g/mL) against all *Salmonella* spp. Strains in the tested concentration, our results indicated a remarkable antimicrobial efficacy of EOC. Furthermore, EOZ did not show any antimicrobial effect evaluated by MIC and MBC.

**Conclusions:** Our data suggest that EOC has potential to be used in the control of food contamination by *Salmonella* spp.

**Key Words:** *Salmonella* sp, antibacterial, essential oil, natural products.

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27/762. Innovation in Food for Optimal Nutrition

### The suitability of some probiotic bacteria in vegetable-fruit cocktail juice substrates

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**Introduction:** Lactic acid fermented vegetable/fruit juices are an alternative for healthy and tasty soft beverages.

**Objectives:** Considering adaptability as an expression of biomass growth in an unusual substrate environment, there was analysed the biomass accumulation and viability of a Christian Hansen lyophilized pure culture of Bifidobacterium BB12 and Lactobacillus acidophilus, grown separate and together on a vegetable fruit cocktail juice (carrot : celery : apple juice [6:1:2]) during the lactic acid fermentation process.

**Method/Design:** The growing rate was calculated by following the biomass accumulation, counted on MRS plates, during 48 hours of fermentation at 37°C. To evaluate the adaptability, the biomass accumulation was correlated with the most important substrate parameters (sugar content, lactic acid and acetic acid accumulation, pH) analysed in their dynamics.

**Results:** Both bacteria species growth well in the cocktail juice. Lactobacillus acidophilus, provided during lactic acid fermentation a biomass accumulation of 3-4 orders and Bifidobacterium 2-3 orders. Both bacteria types can perform the fermentation in microaerophylic conditions. This performance was accomplished with a lactic acid accumulation, after 48 hours of fermentation, of 5,9 g lactic acid/l using Bifidobacterium and 8,9 g lactic acid/l using Lactobacillus acidophilus that provided a good taste and medium preservation of the final product. The lactic acid fermentation of juice with Bifidobacterium sp. and Lactobacillus acidophilus using equal amount of inoculum (0.1g/l from each pure culture) had as consequence the decreasing of pH with 1,3 units, while the titratable acidity was increased 4,44 times and the reducing sugars were diminished with 64%.

**Conclusions:** Even if Bifidobacterium is more restrictive in metabolizing the vegetable substrate, it can be successfully used to obtain probiotic soft drinks. Both tested bacteria stains can be used as individual culture or in association.

The research has been funded by UEFISCDI (ID\_1359).

**Key Words:** probiotic bacteria, vegetable juice, biomass accumulation

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27/763. Innovation in Food for Optimal Nutrition

### Comparative study of probiotic bacteria stimulation by inulin addition in lacto-fermentation of vegetable juices

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**Introduction:** Because probiotic bacteria are not well adapted to survive and growth in substrates of vegetable origin, it is necessary to sustain their development during the production of lactic acid fermented vegetable drinks.

**Objectives:** The influence of Raftiline HP inulin on the survival and development of two strains of Christian Hansen pure culture of Lactobacillus acidophilus and Bifidobacterium BB12 in correlation with the physico-chemical parameters of a substrate of carrot and red beet juices was analysed.

**Method/Design:** Some parameters were determined in dynamics: pH by the electrometric method, titratable acidity, volatile acidity by steam distillation followed by titration, reducing sugars through the spectrophotometrical method with DNS. Viable cells were determined either by plate count method or directly counted using a Burkert-Turk chamber.

**Results:** In all the experimental, without depend on the dose of prebiotic added, the inulin hasn't an obvious influence on the lactic and acetic acids production, but it sustained the survival and the multiplication rate of both bacteria strains during the lactic acid fermentation. After 48 hours, the acetic acid increase more than 30 times in the case of the carrots juice fermented with Bifidobacterium sp., using 6% inulin added, while the highest lactic acid accumulation was determined in the case of the same vegetable substrat and probiotic strain, but in the batch sample. Considering the time to complete the fermentation (tpH 4,2, hours) one of the most important acidification kinetic parameters, the composition of the beetroot seem to have an inhibitory action both on bifidobacteria and Lactobacillus acidophilus metabolic activity. Thus, this time is about 48 hours in the case of Lactobacillus acidophilus, respectively far with 0.2 – 0.3 units in the case of Bifidobacterium sp. after the same interval.

**Conclusions:** Bifidobacteria were better adapted in red beet juice than Lb. acidophilus, while the lactic acid fermentation of the carrot juice with Bifidobacterium sp. assure the self life of the product and also a good taste. The final products contained the minimal value of 106–107 alive probiotic bacteria/g for a healthy influence on the human organism, the inulin addition being important from this point of view.

The research has been funded by UEFISCDI (ID\_1359).

**Key Words:** symbiotic, survival, vegetable juices

27/782. Innovation in Food for Optimal Nutrition

### Release of bioactive peptides by simulated gastrointestinal digestion of sea cucumber protein (*Isostichopus Badionotus*)

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**Introduction:** Sea cucumber is widely consumed as a putative functional food. Three sea cucumber species predominate off the coasts of the Yucatan Peninsula in southeast Mexico. Of these, *Isostichopus badionotus* is captured most intensively due to its turgid body wall, a desirable trait on international markets. The body wall is generally consumed after boiling of previously dried and salted organisms. It contains many biologically active substances, but only limited research on its properties *in vivo* has been done, mainly investigating nutritional value and the hypocholesterolemic effect. However, no data about activity of peptides released from Sea cucumber protein hydrolyzed under conditions simulating gastrointestinal digestion have been reported to date.

**Objectives:** The main aim of this work was to evaluate the biological activities of peptides released from Sea cucumber (*Isostichopus badionotus*) under simulated gastrointestinal digestion conditions.

**Method/Design:** Sea cucumber *Isostichopus badionotus* (Holoruria) were collected from the sea floor off the coast of Sisal, Yucatan state, Mexico and cooked in water for 1 h at 100°C followed by lyophilization. It was then processed with a two-stage *in vitro* enzymatic procedure simulating physiological digestion. First, the sea cucumber was digested with pepsin at pH 2.0 and 37 °C for 90 min. The enzyme was inactivated, the enzyme Corolase PP added, and the mixture incubated for 240 min at pH 7.5 and 37 °C. Aliquots were taken after the pepsin and Corolase PP digestions, centrifuged and subjected to ultra-filtration through a hydrophilic 3000 Da cut-off membrane. Different biological activities were analyzed in the hydrolyzates and the <3kDa and >3kDa fractions. Antioxidant activity was determined using two *in vitro* assays, oxygen radical scavenging capacity, and Fe<sup>3+</sup> to Fe<sup>2+</sup> reduction capacity. Angiotensin-converting enzyme inhibitory, antithrombotic, hypocholesterolemic and anti-proliferative activities were also analyzed.

**Results:** Hydrolyzates obtained from Sea cucumber hydrolyzed under simulated gastrointestinal digestion conditions exhibited potent *in vitro* antioxidant activity through different action mechanisms. Peptides released from pepsin and Corolase PP action were able to scavenge oxygen radicals and to reduce iron. Preliminary studies are showing that peptides generated after gastrointestinal digestion exert a notable angiotensin-converting enzyme inhibitory activity.

**Conclusions:** Sea cucumber protein is a promising source of biological peptides after simulated gastrointestinal digestion. Different activities demonstrated for these peptides increase the high nutritional

and functional value of this animal, making it a promising functional food.

**Key Words:** Sea Cucumber, Simulated Gastrointestinal Digestion, Biological Activity

27/793. Innovation in Food for Optimal Nutrition

### Weight Retention during 6 months postpartum in a group of croatian lactating women

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**Introduction:** Recent data has indicated that obesity is an important public health problem in Croatia. Postpartum weight retention is a risk factor for female obesity, and the relationship between postpartum weight retention and breastfeeding practice is controversial.

**Objectives:** To examine the effects of maternal characteristics (anthropometric and socio-demographic) and dietary intake on weight retention during postpartum

**Method/Design:** This prospective study examined changes in body weight and BMI via anthropometry. Socio-demographic characteristics were determined by questionnaire, and dietary intake was measured using two consecutive 24-hour dietary recalls. Data were collected among lactating women (n=83) studied at 1±0.25, 3±0.25 and 6±0.25 months postpartum. Multiple regression analysis was used to identify significant predictors of weight retention.

**Results:** Time since parturition was a significant predictor of weight retention ( $\beta=-0.411$ ;  $p<0.001$ ). Mean postpartum weight retention at the end of study was 1.3 kg. Women aged >30 and those who were not primiparous retained more weight than did younger or primiparous women. Results of multiple regression analysis have confirmed that gestational weight gain is the strongest predictor of weight retention ( $\beta=0.683$ ;  $p<0.001$ ), while BMI before pregnancy could also be used as a significant predictor ( $\beta=0.171$ ;  $p<0.001$ ). Women with a higher level of education continuously retained less weight during postpartum compared with less educated counterparts ( $p=0.002$ ). Although a positive relationship between marital status and weight retention was established, it was statistically insignificant. Regarding dietary intake, weight retention was significantly positively influenced by total energy intake ( $\beta=0.163$ ;  $p=0.015$ ) and by energy from fat ( $\beta=0.152$ ;  $p=0.035$ ). Energy derived from other macronutrients had statistically insignificant influence.

**Conclusions:** Croatian women should be advised to breastfeed at least 6 months, since these results support the hypothesis of an association between duration of breastfeeding – in addition to gestational weight gain, BMI before pregnancy and total energy intake – and postpartum weight retention.

**Key Words:** Breastfeeding, Lactation, Postpartum Weight Retention, Maternal Obesity and Dietary Intake

27/809. Innovation in Food for Optimal Nutrition

**Lactobacillus rhamnosus CNCM I-4036 decreases inflammatory responses induced by enterotoxigenic Escherichia coli in Caco-2 cells**

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**Introduction:** Intestinal epithelial cells, as important participants in the mucosal immune response, must respond to a variety of stimuli, including commensal and pathogenic bacteria. Interleukin-8 (IL-8) is a chemokine produced by macrophages and other cell types such as enterocytes, involved in the mucosal immune response. Probiotic bacteria may provide protection against intestinal damage induced by pathogens, but the underlying mechanisms are still largely unknown.

**Objectives:** The aim of this study was to determine whether *Lactobacillus rhamnosus* CNCM I-4036 protected intestinal Caco-2 cells from the inflammation-associated response induced by enterotoxigenic *Escherichia coli* (ETEC) CECT 515, by modulating cytokine secretion by Caco-2 cells.

**Method/Design:** Caco-2 cells were exposed to ETEC or co-cultured with ETEC and *Lactobacillus rhamnosus* CNCM I-4036 for 4 hours. IL-8 secretion by Caco-2 was measured by immunoassay, with a MILLIplexTMkit using the Luminex 200 system based in the xMap technology. Differences for secreted IL-8 between treated and untreated cells were assessed by the U Mann Whitney test.

**Results:** *Lactobacillus rhamnosus* CNCM I-4036 prevented the ETEC-induced increased secretion of IL-8 by human intestinal epithelial cell Caco-2, which was significantly reduced by 67% ( $p < 0.04$ )

**Conclusions:** The beneficial effects of *Lactobacillus rhamnosus* seems to be associated with a decrease in the secretion of IL-8 levels by enterocytes. This strain showed the potential to protect enterocytes from an acute inflammatory response and is a potential candidate for the development of new functional foods helpful in counteracting enteropathogen infections.

**Key Words:**

27/824. Innovation in Food for Optimal Nutrition

**Nutritional correlates of micronutrient intakes in European adolescents: the Helena Study**

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**Introduction:** Identification of modifiable food correlates could lead to targeted nutrition for adolescence, characterized by rapid behavioral changes and establishment of behavioral patterns affecting long-term wellbeing.

**Objectives:** This study aimed at identifying food items which best predicted low and high intakes of specified micronutrient intakes namely iron, calcium and vitamin C.

**Method/Design:** The HELENA study is a randomized multi-centre study in adolescents aged 12.5-17.5 in 10 European cities. Diet was assessed via two 24-h dietary recalls. Stepwise discriminant function analysis was used to identify discriminatory foods of intakes in the 1st and 3rd tertile of distribution (standardized coefficients of  $>.30$  and  $<-.30$ ) in 2330 adolescents (54% females).

**Results:** No marked differences in the makeup of the prediction models were observed by gender, unlike differences in univariate F-ratios and order of significance in most micronutrients. The best predictors of low and high iron intakes were bread, chocolate, carbonated drinks and meat in both genders, and pulses, vegetables, fruits only in females (variance explained in males: 92% and females: 95%). Margarine, butter (in males), fish, eggs, milk (in females), cheese and cakes (87%) distinguished low from high vitamin D intakes (males: 87%, females: 90%). Starchy foods and fruits and vegetables dominated in both prediction models of vitamin C intake (92%). White milk, milk beverages, cheese, dessert yogurt (females) and miscellaneous (females) were the best predictors of low and high calcium intakes for males and females respectively (91% and 97%). Regarding vitamin B12, meat and fish products, milk beverages and cheese explained 88% of variance in males, whereas fish products, white milk and cheese explained (89% in females).

**Conclusions:** Study findings indicated potential modifiable nutritional correlates which should be targeted when promoting long-term wellbeing during adolescence.

**Key Words:**

27/839. Innovation in Food for Optimal Nutrition

**Increased intake of salmon decreases F2-isoprostanes in pregnant women**

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**Introduction:** A high consumption of n-3 LC-PUFA can lead to increased oxidative state because of its high susceptibility to oxidation.

**Objectives:** Investigate whether the increased salmon consumption could affect the oxidative state in pregnant women.

**Method/Design:** 123 pregnant women were randomly assigned to one of two groups. Women in the control group (n=61) continued their habitual diet and women in the salmon group (n=62) incorporated two portions of farmed-salmon (150 g/portion) into their diet per week from week 20 until giving birth.

Fasting blood and urinary samples were collected at weeks 20, 34 and 38 of gestation. Urinary samples were analysed for 8-iso-PGF<sub>2α</sub> by radioimmunoassay and 8-hydroxy-2'-deoxyguanosine (8-OHdG) by an ELISA kit (JAICA, Japan). Creatinine concentration, using spectrophotometry. A colorimetric assay kit (Oxystat Biomedica, Austria), was used to determine the concentration of plasma lipid hydroperoxides (LPO). Differences between treatment groups over time were evaluated using a general linear model of variance for repeated measures. F<sub>2</sub>-isoprostanes were used as a covariant at 20 week of gestation. Mean comparisons for fish intake at 20 week were performed by a Student t-test, smoking habits using a Chi-square test. A posteriori Bonferroni tests were also performed (P<0.05).

**Results:** Urinary F<sub>2</sub>-isoprostane levels did not change during pregnancy but were significantly lower in the salmon group compared to the control group (P=0.021). No differences were seen for smoking habits but oily fish intake tended to be different between groups, even at baseline (P=0.05). Plasma LPO and urinary 8-OHdG levels did not change during pregnancy and were not different between the two groups.

**Conclusions:** Increased intake of farmed-salmon during pregnancy reduced the level of lipid peroxidation in pregnant women measured by urinary F<sub>2</sub>-isoprostanes.

Study supported by the European Union Commission under Framework 6: Sustainable Aquafeeds to Maximize the Health Benefits of Farmed Fish for Consumers (AQUAMAX; FOOD-CT-2006-16249).

**Key Words:** Isoprostanes, Oxidative Stress, Pregnancy and Diet

27/863. Innovation in Food for Optimal Nutrition

## HPLC determination in rat plasma of maslinic acid, a natural compound from olives

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**Introduction:** Maslinic acid is a pentacyclic triterpene found in olives and olive oil, both of which are regular components of the Mediterranean diet. The beneficial effects on health described for this compound, include antioxidant, antiinflammatory, hypoglycemic, antiviral, antimicrobial and antitumor activities.

**Objectives:** Notwithstanding the effects described, little is known about its bioavailability. Consequently, the aim of the present study was to develop an accurate and reproducible HPLC method to measure maslinic acid in rat plasma.

**Method/Design:** Maslinic acid contained in plasma samples was extracted with ethyl acetate. After centrifugation, the organic fraction was evaporated to dryness, and the residue was reconstituted with methanol-water (75:25 v/v). Analysis by HPLC with diode array-UV detection was carried out using a C18 column and mobile phase consisting of acetonitrile and water-acetic acid 0.05% v/v at 1 mL/min. To assess the performance of this method, 100 mg/kg of maslinic acid were administered by gavage to overnight fasted rats and blood was obtained at 15, 20, 30 and 60 min by cardiac puncture.

**Results:** The method was validated by the analyses of plasma samples spiked with maslinic acid. A linear correlation was obtained over the range of 1 – 25 μM (r = 0.9992). Precision expressed as coefficient of variation ranged from 2.06 to 8.81%. The recovery was > 95% and the limits of detection and quantification were 324 and 987 nM, respectively. Using the developed method, maslinic acid could be detected in plasma up to a concentration of 3.96 ± 0.04 μM at 20 min post-administration.

**Conclusions:** An accurate and reproducible method has been developed to determine maslinic acid in plasma, thus allowing a rapid analysis of the sample for absorption, distribution, and metabolism studies.

**Key Words:** Maslinic acid, olives and HPLC

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27/880. Innovation in Food for Optimal Nutrition

**Human bioavailability of curcumin and cocoa polyphenols by microencapsulated ingredients**

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**Introduction:** Polyphenols have been receiving increasing interest from food industry due to their several documented biological properties. However instability under food processing and storage conditions, as well as unpleasant taste and the low bioavailability of most polyphenols may limit their use as food ingredients. Encapsulation technology may overcome these physico-chemical and nutritional drawbacks.

**Objectives:** To evaluate the effect of microencapsulation on human bioavailability of curcumin and cocoa polyphenols from new enriched foods.

**Method/Design:** A new type of bread containing 1% of curcumin in free form (FCB) or encapsulated with cellulose derivatives (ECB), and a nut cream enriched with 1.5% of a polyphenol-rich cocoa extract, in free form (FCC) or encapsulated with high amylose corn starch (ECC), were formulated and produced in laboratory scale. Twelve healthy subjects were enrolled and randomized between two protocols, with a cross-over design. After a 3-day polyphenol-free diet, fasted subjects consumed the experimental foods. Blood, urine and feces at baseline and at different time points over 24 h were collected. Parental compounds and metabolites of curcumin and cocoa polyphenols were quantified in biological samples by HPLC/MS/MS.

**Results:** ECB consumption determined a four-fold increase of curcumin bioavailability vs FCB (serum AUC<sub>0-24</sub> of curcuminoids being 2.24 nmol/L•h vs 0.46 nmol/L•h, respectively,  $p < 0.05$ ) without variation of urinary excretion (urine AUC<sub>0-24</sub> of curcuminoids being 0.09 nmol/L•h vs 0.10 nmol/L•h,  $p = n.s.$ ). On the contrary ECC consumption determined a lower absorption of cocoa polyphenols vs FCC (serum AUC<sub>0-24</sub> of cocoa polyphenols being 0.89  $\mu$ mol/L•h and 15.44  $\mu$ mol/L•h, respectively,  $p < 0.05$ ), and an increased fecal excretion (114.3%,  $p < 0.05$ ).

**Conclusions:** Microencapsulation of curcumin increased its bioavailability. Ongoing researches focused on interactions and modifications of cocoa flavonols during encapsulation process, may clarify the reduced bioavailability of microencapsulated cocoa polyphenols.

**Key Words:** Bioavailability, Curcumin, Cocoa, Microencapsulation, Polyphenols

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27/909. Innovation in Food for Optimal Nutrition

**Computer estimation of the influence of diet supplementation on the total intake of Vitamins and minerals among citizens of Krakow. Poland**

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**Introduction:** Poland is located in the fifth position in Europe while taking into consideration the amount of consumed diet supplements. These products are sold without prescription even in filling stations and supermarkets.

**Objectives:** The estimation of the participation of vitamins and minerals coming from diet supplements in general supply of these nutrients among citizens of Krakow differentiated in the aspect of age, gender and health status.

**Method/Design:** A computer base of supplements composition that are present on Polish pharmaceutical market is being created in the Department of Hygiene and Dietetics. Jagiellonian University . Krakow. A special computer program is being created. Thanks to it, it is possible to: a) analyze 24-godz. nutritional recall based on the products of The National Institute of Food and Nutrition. Warsaw ; b) estimate the influence of diet supplementation thanks to full filling the basis with nutritional values of supplements; c) analyze the exceeding of RDA i UL norms during different supplementation used by particular diet.

**Results:** The type of used supplements is mainly differentiated depending on the age of examined persons. The exceeding of the limits of RDA i UL for vitamins and minerals by too high supplementation in the diet was especially showed in persons older than 50.

**Conclusions:** The new computer program is universal and will be used for the estimation of minerals and vitamins intake in the diet of a particular person. It will be possible to perform monitoring of the intake of these important for health nutrients and to answer the question which vitamins or minerals are supplied in not sufficient amounts and which are overdosed. 2. This program will be used in teaching medical students, future doctors, dentists, dietitians, physiotherapists. In the future they are expected to estimate properly the diet of their patients and diet supplements intake.

**Key Words:** Computer Program, Minerals, Vitamins, Base Of Supplements, Diet

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27/921. Innovation in Food for Optimal Nutrition

**Action of coadjuvants nutrition with complex natural products of aminoacids-minerals ( Trofin) in cancer patients**

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**Introduction:** Nutritional complex alternatives aiming at improving the quality of life reducing adverse effect in disease treatment, for example in cancer therapy, radiations and chemotherapy produced anaemia in these patients. Different diseases demand variety of nutritional supplements. A fundamental point is that when we look at recommended nutrient intakes; in the last 25 years, the levels for some of the micronutrients have been gradually increasing. Many studies was purpose to study the effect about natural products origine as coadjuvants to conventional therapies, but the question is whether this comes from better scientific knowledge and understanding of the biochemical role of these products and the nutrients, or whether the criteria for setting the levels of the requirements have changed. Even if the scientific knowledge base has expanded, it appears that the basic criteria for deciding on levels to recommend may be more of the responsibility.

**Objectives:** The objective of the study was to evaluate the effect of nutritional supplement complementary with natural product complex of proteins-iron on the quality of life of patients with cancer.

**Method/Design:** We study 100 cancer patients received chemotherapy treatment and were monitored during six month period. The protocol for the study was approved by the Ethical Committee of the hospital. In the study we evaluate the haematological, clinical-nutrition parameters and immunological cellular test before the beginning of the treatment and after the supplementation.

**Results:** The results compared before and each month after, showed increased the haemoglobin and immunological indicators. No adverse reaction were observed in the patients studied.

**Conclusions:** Results demonstrated that the natural products aminoacids –minerals (Trofin) reduced the anaemia in cancer patients and improve the quality of life in the patients.

**Key Words:** Anaemia in cancer patients. Antianaemic. Immunonutritions

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### 27/933. Innovation in Food for Optimal Nutrition

#### **A high-lycopene tomato sauce reduces oxidized-LDL levels in healthy adults**

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**Introduction:** Lycopene is a major carotenoid occurring in tomatoes, which may provide protection against cellular damage caused by reactive oxygen species (ROS) through antioxidant properties.

**Objectives:** To evaluate the effect of daily consumption of a high-lycopene tomato sauce on biochemical determinations related to oxidative stress.

**Method/Design:** Thirty healthy subjects (Age: 39±6 y; BMI:

24.5±3.3 kg/m<sup>2</sup>) participated in a randomized double-blind placebo-controlled crossover nutritional intervention with two 4-week experimental periods and a 2-week washout period between them. Volunteers daily consumed 160g of either the experimental (high-lycopene) or the placebo (commercial) tomato sauce, within their habitual dietary and physical activity habits. Adherence to the diet as well as body composition, lipid and glucose profile, and oxidative stress biomarkers were assessed.

**Results:** Consumption of tomato sauce compliance during both intervention periods was about 85% without differences between both experimental groups. In addition, energy and macronutrient intake were maintained between periods. Body composition as well as lipid and glucose profiles showed no significant changes associated to the dietary intervention. The most relevant outcome was the reduction of oxidized-LDL levels during high-lycopene tomato sauce consumption (-9.27±16.8%; p<0.05). Other oxidative stress biomarkers such as total antioxidant capacity (TAC), malondialdehyde (MDA) levels and glutathione peroxidase (GPx) activity, did not show significant changes throughout the nutritional intervention, although showed the expected protective trends.

**Conclusions:** A lycopene-rich tomato sauce consumption could be beneficial in disorders associated with oxidative stress, given that plasma oxidized-LDL cholesterol levels were reduced when it was consumed by the volunteers.

**Key Words:** Lycopene. Tomato. Oxidative stress. Oxidized-LDL. Nutritional intervention

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### 27/982. Innovation in Food for Optimal Nutrition

#### **Is it the oat a toxic cereal for coeliac patients? Its depends on the variety**

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**Introduction:** Coeliac disease (CD) is defined as an alteration of the mucosa of the proximal small intestine, associated with a permanent intolerance to gluten, a mixture of proteins present in certain cereals. CD is triggered by an abnormal reaction to peptides resulting from the fragmentation of the gluten not digested by human proteases. The safety of oats in a gluten-free diet has been a topic of debate for several years. Previous studies suggested that oats may induce the immunological response in coeliac patients and others confirmed the impossibility of consuming oats habitually by its toxicity.

**Objectives:** Monoclonal antibodies (moAbs) against the main immunotoxic 33-mer peptide (A1 and G12) obtained in a previous study, reacted strongly against wheat, barley and rye but had less reactivity against oats. The aim of the present study was to determine whether this observed reactivity could be related to the potential toxicity of oats for celiac patients.

**Method/Design:** Different oat varieties were used to examine differences in G12 moAb recognition by ELISA and western blot. Immunogenicity of oat varieties was determined by 33-mer concentration, T cells from patients with CD by measurement of cell proliferation and interferon  $\gamma$  release.

**Results:** Three groups of oat cultivars reacted differently against G12 moAb: a group with considerable affinity, other showing slight reactivity and a third with no detectable reactivity. Our results showed that the intensity of the signal obtained with this antibody was proportional to the responses in terms of cell proliferation and interferon  $\gamma$  release.

**Conclusions:** The results suggested that the reactivity of the G12 moAb with different varieties of oats was correlated with the potential immunotoxicity of the cereal cultivar. These results may explain the different clinical responses observed in patients suffering from CD and open up a means to identify immunologically safe oat cultivars, which could be used to enrich a gluten-free diet.

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27/987. Innovation in Food for Optimal Nutrition

### **Hyperproteic diet modifies microbiota composition and associated metabolites in rats**

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**Introduction:** Hyperproteic diet ingestion results in an increased transfer of luminal proteins from the small to the large intestine which could modify the nitrogenous sources available for the microbiota and the generation of related metabolites that ultimately may influence gut physiology.

**Objectives:** To determine the consequences of two weeks hyperproteic diet ingestion on the composition of the microbiota and metabolites in the large intestine.

**Method/Design:** The rats ingested either a normoproteic (NP) or an hyperproteic (HP) isocaloric diet for 15 days. Then the cecal and colonic contents were recovered in order to measure the amounts of several bacterial metabolites and bacterial groups by real time PCR.

**Results:** Hyperproteic diet ingestion resulted in marked modifications of several bacterial metabolites in both the cecum and the colon. In the HP rat cecum, formic acid was increased 1.7 fold when

compared with NP rats. Succinate was more than twofold increased in the cecum from HP animals. In the luminal colonic content, when compared with the NP diet, HP diet ingestion resulted in a nearly fourfold increase of L-lactate, a fourfold increase of D-lactate and a more than sevenfold increase of the amount of succinate. Interestingly, the ethanol content in the colon was more than twofold increased after HP diet ingestion when compared with NP diet. The hyperproteic diet reduced the numbers of *Clostridium coccoides* group, *C. leptum* group and *Faecalibacterium prausnitzii*, which may correspond to a change from carbohydrate to protein metabolism and loss of cross-feeding between different bacterial groups that convert intermediary metabolites (e.g. lactate and succinate) into short-chain fatty acids (e.g. butyrate). In contrast, prevalence of *C. perfringens* group, which include proteolytic and potentially pathogenic species, was significantly increased and could contribute to the generation of toxic metabolites for colonocytes.

**Conclusions:** Hyperproteic diet ingestion caused ample modifications of the amount of several organic acids in the colonic content; and to a lesser extent in the cecal content. Since some of these bacterial metabolites are known to be oxidative substrates for colonocytes and to impact electrolyte movements through the large intestine epithelium, the changes in the luminal composition may affect large intestine metabolism and physiology.

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27/988. Innovation in Food for Optimal Nutrition

### **A high-protein diet markedly modify colonic content composition and colonocyte morphology and metabolism in rats**

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**Introduction:** Hyperprotein diet (HP) are used for body weight reduction. Although increased dietary protein ingestion results in an increased transfer of nitrogenous material from the small to the large intestine, little is known on the consequences at the large intestine level.

**Objectives:** To determine the consequences of two weeks hyperproteic diet ingestion on the composition of the large intestine content as well as on the morphological and metabolic characteristics of colonocytes.

**Method/Design:** The animals ingested either normoproteic (NP) diet or HP isocaloric diet. Colonocyte morphology was visualized by electronic microscopy. Large intestine content was analysed by gas chromatography and biochemical assays. Colonocyte oxygen consumption was measured by polarography. Gene expression in colonocytes was determined by Real-Time PCR.

**Results:** Absorbing colonocyte brush-border membranes were 1.7-fold reduced after HP diet consumption. Accordingly, colonocytes

transport capacity for butyrate was decreased in HP. In the colonic content of HP, a 1.8-fold higher mass content, a 2.2-fold higher water content, a 5.2-fold higher protease activities, a 5.5-fold higher ammonia content and a more than twofold higher butyrate, propionate, isobutyrate, isovalerate and valerate content were measured indicating net increase of amino acid-derived bacterial metabolites. Acetate was also increased but to a lesser extent (1.75-fold). In the cecum, only acetate, isobutyrate and isovalerate were increased. Ammonia in the range of luminal concentrations provoked a dose-dependent decrease of oxygen consumption in colonocytes. Glutamine synthetase activity which condenses ammonia and glutamate was increased in HP colonocytes. Lastly, neither myeloperoxidase activity in the colonic mucosa nor expression of Toll Like Receptors (TLR-2, 4 and 5) and cytokine pattern in colonocytes were modified after HP diet ingestion.

**Conclusions:** Hyperproteic diet ingestion caused changes in the luminal environment of colonocytes and in the morphological and metabolic characteristics of these cells. However, there was no sign of mucosal inflammation associated with these changes.

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**27/990. Innovation in Food for Optimal Nutrition**  
**Two glasses of apple juice a day: Effects on markers of redox and iron status**

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**Introduction:** Organic food represents a growing niche in the food market. Their higher nutritional value and healthier properties as perceived by the consumer are among the main reasons for organic food consumption. However, these beliefs are based in very scarce scientific evidence especially considering the low number of well-controlled studies published so far. As shown in some studies, the flavonoid contents of organic fruits and vegetables seem to be higher than in the same varieties of conventional products. Since the antioxidant activity of flavonoids is well known, organic apple juice consumption might provide benefits for human health. We conducted a cross-over study to determine the potential of an apple juice to benefit redox and iron status markers in a healthy population.

**Objectives:**

**Method/Design:** Two apple juices, one conventional, one from organic production, both of them cloudy, were selected as test foods. In this randomized crossover study, twenty healthy volunteers consumed two glasses of apple juice, one in the morning, one in the afternoon, totalling 500 mL apple juice per day, during four weeks. After a washout period of two weeks volunteers were put on the other apple juice, conventional or organic, for another four weeks. Vitamin C, polyphenols, FRAP, DPPH, glutathione, iron and ferritin, were measured in blood before and after the two intervention arms.

**Results:** Statistically significant differences were found between organic and ecological juices ingestion in terms of plasma vitamin C levels and some of the polyphenol metabolites. Although the ingestion

of both types of juice seems to significantly improve the antioxidant capacity during the first arm of the study, the trends for an increase in iron levels was only observed after the ingestion of the organic juice.

**Conclusions:** Some trends were shown that indicate a beneficial effect of apple juice ingestion, regardless of its origin, on markers of redox status. The differences between organic and conventional origin of apple juice need to be further explored.

**Key Words:** Apple Juice, Polyphenols, Vitamin C, Antioxidant Capacity and Iron

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**27/991. Innovation in Food for Optimal Nutrition**  
**New possibilities for fat reduction and improvement of fatty acid content in North African fresh sausage (merguez).**

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**Introduction:** Healthier lipid meat products formulations are very important in all kinds of societies including Maghreb countries (North of Africa). Technological strategies using konjac gel (KG) and its combination with olive oil could be used as animal fat replacer to improve the fat content of meat products.

**Objectives:** The aim of this study is to develop a North African fresh sausage (merguez) using konjac gel and KG with olive oil as beef fat replacers in order to obtain a healthier meat lipid product.

**Method/Design:** From a traditional merguez formulation, different samples were elaborated testing different levels of beef fat substitution by konjac (K) and konjac with olive oil (KO). Four formulations were studied, Reduced Fat (RFK) and Low Fat (LFK) adding only Konjac and two similar formulations of Reduced Fat (RFKO) and Low Fat (LFKO) adding Konjac with Olive oil. Proximate composition, technological and sensorial characteristics were studied.

**Results:** Fat reductions were between 53 - 76 % in RFK and LFK samples respectively. On the other hand, the fat reduction in samples adding konjac with olive oil was lower with amounts of 34 and 49 % for RFKO and LFKO respectively. Olive oil improved fatty acid content increasing the proportion of oleic acid. Technological and sensory viability of these products were demonstrated.

**Conclusions:** The reformulation process with konjac gel and konjac gel with olive oil opens up new possibilities for fat reduction and improves fatty acid content in North African fresh sausage (merguez). This is an important processing strategy for the development of potential meat based on functional foods.

**Key Words:** Merguez, Konjac, Fat Reduction, Improving Fat and Olive Oil.

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**27/992.** Innovation in Food for Optimal Nutrition  
**Production of functional low-fat MUFA, PUFA n-3 enriched pork liver pâté**

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**Introduction:** Pâté is a very popular and cheap cooked meat product manufactured worldwide. However, pâté presents some negative health concerns related to their high fat (between 25% and 40%) and energy contents (around 300–400 kcal/100 g) as well as to the fatty acid profiles of the animal fat used in the manufacture.

**Objectives:** The development of a low-fat pâté with the lipid profile improved, replacing the animal fat by a mixture of vegetable and marine oils.

**Method/Design:** Control pâté is manufactured with fresh post-rigor pork meat, pork backfat, pork liver, flavouring and additives. In the modified pâté the pork backfat is replaced by an oil-in-water emulsion prepared with a mixture of olive, linseed and fish oils; and using soy protein isolate as emulsifier. Proximate analysis and fatty acid composition were carried out.

**Results:** Fat content of pâté was reduced from 30.8% (control pâté) to 15.5% (modified pâté), remaining protein content between 13.2% and 14.2%. Energy content was also reduced from 345 kcal/100 g to 212 kcal/100 g in the reformulated pâté. Modified pâté contained 13.4 g/100g of the mixture of oils; this mixture provided a significant change in the lipid profile. SFA content was lowered by a 34% and PUFA content was increased almost 400%. The modified pâté provided 723 mg/100 g of long chain n-3 PUFA and 2.6 g/100 g of alpha linolenic fatty acid.

**Conclusions:** Based on recommendations for optimal intake of total fat and unsaturated fatty acids, a reformulation of a high fat meat product (as pâté) has been obtained. A low-fat n-3 enriched pâté was produced using a healthier oil combination (of vegetable and marine sources) as pork backfat replacer. The modified pâté would be a very important dietary source of n-3 fatty acids.

**Key Words:** Pâté, N-3, Meat Product and Oil-In-Water Emulsion

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**27/1014.** Innovation in Food for Optimal Nutrition  
**The effects of yellow and brown oat on some biological parameters in serum rats**

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**Introduction:** Oat is a rich source of nutrients and non-nutritional bioactive compounds, and is very important in human nutrition. Therefore, numerous studies are undertaken to find out about new properties of this cereal.

**Objectives:** The aim of the study was to determine the effects of two oat varieties on some biochemical parameters in rat's serum.

**Method/Design:** Wistar rats were divided into 6 group (n=7) and fed with experimental diet (I) AIN-93G, (II) AIN-93G with yellow oat, (III) AIN-93G with brown oat. In the case to induced oxidative stress at the beginning of the experiment animals from IV- VI group were injected with Streptozotocin and fed AIN-93G diet (IV), AIN-93G with yellow oat (V), and AIN-93G with brown oat (VI). After 4 months rats were anaesthetized and blood was collected. The content of glucose, total cholesterol, HDL and triacylglycerol were measured according to protocol, whereas LDL + VLDL was calculated as the difference between total and HDL cholesterol. Additionally the activity of asparagine aminotransferase (AST) and alanine aminotransferase (ALT) were measure.

**Results:** The addition of yellow and brown oat did not affect significantly on total cholesterol, LDL cholesterol and triacylglycerol concentration in the blood serum of experimental animals. The concentration of HDL cholesterol increased slightly. The largest increase HDL was observed in the group of animals fed diet with yellowweed oat with induced oxidative stress. Significant differences in the concentration of ALT in the group of rats injected with streptozotocin was observed. There were no significant differences in the concentration of glucose and AST in blood serum of rats.

**Conclusions:** It is difficult to conclude that the addition of yellow or brown oats to the experimental diet improves the functioning of liver in rats with induced oxidative stress. Only yellow oat increased HDL cholesterol level in these rats.

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**27/1016.** Innovation in Food for Optimal Nutrition  
**Diet quality and household food expenses in Portuguese elderly**

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**Introduction:** Portugal has been identified as one of the Mediterranean diet countries but it is moving away from this food pattern. The country's social and economic transition includes an increase in the proportion of elderly, changes in lifestyle and food consumption patterns.

**Objectives:** To investigate the relationship between Mediterranean Adherence Index (MAI) and food expenditure in different Portuguese households (Hh): elderly-2 persons, adult-single, adult-2 persons, and other.

**Method/Design:** Portuguese household budget surveys - 1990 (N=12403) and 2000 (N=10020), a cross sectional survey with a national representative sample were analyzed. Household food availability represents food items entering the Hh (purchased, home produced or received). The average energy availability (Kcal/person/day) was estimated using MicrodietPlus for Windows Version 1.1 2000; MAI was calculated according to Alberti-Fidanza et al. (1999). The cost of a Kcal was obtained by dividing total energy available by total in

home food expenses (Euros/person/day).

**Results:** MAI means values were low (2.11 in 1990 and 2.10 in 2000) but slightly higher for Elderly Hh (in 1990, 2.17 and 2.22 for lonely elder Hh and two elders, respectively and for 2000, 2.11 and 2.10), although with lower income. Elderly also had higher proportion of food expenses than adult Hh but the per capita daily cost (in €) of each Kcal was lower (0.57 for elderly alone and 0.60 for two elderly in 1990; in 2000 1.35 and 1.13 respectively) compared to hh with adults (0.67 and 0.71 in 1990; in 2000, 1.45 and 1.33). Income, food expenses and cost of Kcal were negatively correlated with MAI values.

**Conclusions:** All households had low MAI values. Apart of the lower cost of Kcal unit, low income families, including elderly ones, were more vulnerable to food expenses and had higher values of MAI, which may be explained by their maintenance to traditional diets.

**Key Words:** Food Availability, Food Patern, Diet Quality, Household Budget Surveys, Elderly Families.

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### 27/1019. Innovation in Food for Optimal Nutrition Selecting options for national nutrition policy: a consideration of scientific evidence and alternative perspectives

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**Introduction:** Over the past decade, an emphasis on evidence-based policy has shaped nutrition policy making. However, in practice, policy decision-makers routinely balance scientific evidence with alternative perspectives, e.g. legal, economic and political issues, to select an appropriate policy option(s). In nutrition policy making, however, it is not clear nor transparent what types of evidence are taken into consideration and how the evidence is weighted and integrated into policy.

**Objectives:** This study explores how micronutrient-relevant policy options have been considered across Europe. It focuses par-

ticularly on the way in which relevant decision-makers weigh and integrate scientific evidence and alternative perspectives related to vitamin D, folate and iodine.

**Method/Design:** Researchers in ten European countries conducted qualitative semi-structured interviews. The countries involved were: Czech Republic, Denmark, England, Germany, Greece, Italy, Netherlands, Norway, Poland and Spain. Interviewees represented government, scientific advisory bodies, expert committees, NGOs or were recruited for their individual expertise. The interviews covered: a) the interviewee's influence on policy decisions, b) the policy decision-making process, and c) the types of evidence considered, both explicitly and implicitly, and how these were weighted and incorporated into decisions. The interview data was analysed using thematic analysis, including qualitative Nvivo software.

**Results:** This study provides a cross-European comparison of micronutrient-relevant policy development. It highlights differences and similarities across European countries and between the micronutrients, in the way policy decision-makers described, selected, weighted and integrated evidence to develop micronutrient-relevant policies.

**Key Words:** Eurreca, Micronutrients, Policy, Decision-making and Evidence.

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### 27/1031. Innovation in Food for Optimal Nutrition The effect of different nitrogen fertilization on the content and quality of lipids in covered and naked oat

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**Introduction:** in food production, oat grain is regarded not only as an important source of fibre but also as an important source of valuable fat. Because of a high, compared to other crops, content of fat, with an important amount of unsaturated fatty acids, oat is an important type of crop. The important factor effecting the amount and composition of fatty acids is fertilisation with nitrogen.

**Objectives:** the aim of the research was the assessment of the effect of varied nitrogen fertilisation and the conditions of the habitat on the amount and composition of fatty acids in the covered and naked oat genotypes.

**Method/Design:** : In the research conducted in the years 2008-2009, the effect of the different nitrogen fertilization on the content of fat, as well as the composition of fatty acids in the grain of two naked oats (cv. Krezus, cv. Ród 7105), and two husked oats (cv. Polar and cv. Ród 7505) genotypes was estimated. The field experiments were set in Podkarpackie region in Poland. In the experiment, four levels of nitrogen fertilisation had been applied: I - 0 kg.ha-1 (control), II - 40 kg.ha-1 (before sowing), III - 80 (40 kg.ha-1 before sowing + 40 kg.ha-1 in the last phase of spread) and IV - 120 (40 kg.ha-1 before

sowing + 40 kg.ha<sup>-1</sup> in the last phase of + 40 kg.ha<sup>-1</sup> at the early phase of a panicle). PK fertilisation was applied in the following amounts: 70 kg.ha<sup>-1</sup> P2O5 and 70 kg.ha<sup>-1</sup> K2O. The amount of fat was marked with CO2 extraction method in the overcritical state (fat analyser TFE 2000), and the fatty acids profile with gas chromatography method with Varian 3400.

**Results:** There was no significant effect of the habitat conditions on the content of fat in oat grain (4.89-5.06%) in the analysed vegetation seasons. Significant differences in the content of fat in the grain have been observed among the genotypes. Naked oat cultivars (cv. Polar - 5.46% and cv. R6d STH 7505 - 6.42%) contained more fat, than the husked cultivars (cv. Krezus - 3.92% and cv. R6d STH7105 - 4.09%). However, the covered oat genotypes had a higher content of saturated fatty acids (19,2-20,5%) and lower content of monounsaturated fatty acids (37,7-39,6%) compared to naked oat genotypes (18,2-18,6% accordingly and 40,6-42,8%). The most significant difference in the content of fatty acids had been observed between the compared genotypes, where the highest content of oleic (41,82%) fatty acid and the lowest content of linolenic acid (1,01%) had been observed in short-straw naked oat cv. R6d STH7505. The lowest amount of oleic acid (36.66%) and the highest content of linolenic acid (1.41%) had been observed in cv. Krezus. The varied nitrogen fertilisation did not have a significant effect on the increase of the content of saturated fatty acids and the decrease of the content of the monosaturated fatty acids.

**Conclusions:** The analysed oat genotypes differed significantly as to the content of the saturated and monounsaturated fatty acids. In the covered oat there was more of saturated fatty acids and less of monounsaturated fatty acids.

**Key Words:** grain of oats, content of fat, yield of fat, fatty acids composition

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**27/1032. Innovation in Food for Optimal Nutrition**  
**Green kiwifruit consumption favourably affects plasma lipids in hypercholesterolaemic men**

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**Introduction:** Diet and other lifestyle modifications are crucial elements in the reduction of risk of cardiovascular disease (CVD). Furthermore, response to dietary change may be influenced by genotype. Inclusion of various dietary components including soluble fibre and some vitamins and phytochemicals has been shown to improve dyslipidaemia and lower CVD incidence. Kiwifruit are a good source of several of these dietary components.

**Objectives:** To investigate the effect of consuming two green kiwifruit daily on plasma lipids and examine response according to

apolipoprotein E (APOE) genotype.

**Method/Design:** Eighty-six hypercholesterolaemic men (low-density lipoprotein cholesterol

(LDL-C) >3.0 mmol/L and triglycerides (TG) < 3mmol/L) completed an eight week randomised controlled cross-over study, after undergoing a four week healthy diet phase. The study consisted of two 4-week treatment sequences of 2 green kiwifruit/day plus healthy diet (intervention) or healthy diet alone (control). A fasting blood sample was taken at baseline and at 4 and 8, weeks for the measurement of plasma lipids (total cholesterol (TC), LDL-C, TG, high-density lipoprotein cholesterol (HDL-C)) and serum apolipoproteins A1 and B (apoA1 and apoB).

**Results:** There were no significant differences between the two treatments for plasma TC, TG, LDL-C and serum ApoA1 or ApoB. Compared to the control treatment kiwifruit increased plasma HDL-C concentrations by 0.05 (95% CI: 0.02, 0.08) mmol/L (p=0.003), decreased the TC/HDL ratio by 0.15 (95% CI: -0.24, -0.06) mmol/L (p=0.002) and decreased the apoB/A1 ratio by 0.02

(95% CI: -0.04, -0.0003) g/L (p=0.046). Stratifying for APOE allele carriers, a significant decrease in TG concentrations was seen for carriers of the E4 allele in the kiwifruit intervention compared to control.

**Conclusions:** The small but significant increase in HDL-C and decrease in TC/HDL, apoB/A1 ratios and TG (E4 carriers) suggests that the regular inclusion of green kiwifruit as part of a healthy diet may be beneficial in improving the lipid profiles of men with high cholesterol.

**Key Words:** Kiwifruit, Diet, Cardiovascular Disease, Lipids, Apolipoprotein E

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**27/1034. Innovation in Food for Optimal Nutrition**  
**Actinidin-containing kiwifruit extract enhances the gastric protein digestion of some dietary proteins in rats**

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**Introduction:** Kiwifruit (*Actinidia deliciosa* cv. Hayward) contains the protease actinidin and anecdotally kiwifruit is believed to aid digestion through the action of actinidin.

**Objectives:** Study the effect of actinidin on the gastric digestion and stomach emptying rate (SER) of different dietary proteins

**Method/Design:** A total of 104 Sprague-Dawley male rats were fed semi-synthetic diets containing either beef-muscle protein, whey protein isolate (WPI), soy protein isolate (SPI), gelatin, zein or gluten protein, as the sole nitrogen source, in either the presence (+A) or absence (-A) of an actinidin-containing kiwifruit extract. Titanium dioxide was used as an indigestible marker. Rats were fed freshly prepared diets, euthanized and the gastric content collected for electrophoresis

(SDS-PAGE), densitometry and titanium dioxide.

**Results:** The presence of dietary actinidin increased ( $P < 0.05$ ) the gastric digestion of beef-muscle protein, gelatin, SPI and gluten by 40, 60, 27 and 29% units, respectively. In contrast, actinidin did not affect the gastric digestion for zein or WPI ( $P > 0.05$ ). Beef-muscle protein and WPI were then chosen for determining SER using a magnetic resonance spectroscopy (MRS) technique. Eight rats (300 g bodyweight) were fasted overnight and received a single gavage dose of the dietary mixture (diet, AlCl<sub>3</sub> [marker detectable by MRS only in acidic environment] and pH 2 water, 7:1:9, w:w:v). The rats were immediately placed in the MRS and SER was estimated over 130 min. SER was greater for the containing-actinidin beef muscle-based diet ( $P = 0.001$ ; 10.6% per h, for [-A] and 18.5% for [+A]). In contrast, no difference was found for the WPI-based diets ( $P > 0.05$ ; 21.3 % for [A] and 24.0 % for [+A]).

**Conclusions:** Kiwifruit extract increases the gastric digestion and SER for some proteins, possibly through the action of actinidin, and may have a positive effect on feelings of gastric over-fullness associated with high protein diets.

**Key Words:** actinidin, kiwifruit, dietary proteins, stomach digestion, rats

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#### 27/1043. Innovation in Food for Optimal Nutrition

### **D-Fagomine, an iminosugar with physiological effects on postprandial blood glucose and bacterial adhesion**

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**Introduction:** Iminosugars are sugar analogues with a nitrogen atom within the cyclic structure. D-Fagomine is a natural iminosugar originally isolated from seeds of buckwheat (*Fagopyrum sculentum* Moench) that is present in the human diet as part of traditional recipes in many parts of the world.

**Objectives:** To evaluate D-fagomine for activities connected to a reduction in the risk of developing insulin resistance, becoming overweight and experiencing microbiota imbalances

**Method/Design:** The inhibition of brush-border sucrase (glycosidase EC 3.2.1.48) by D-fagomine was tested “in vitro” using two different methods: jejunal rat mucosa and everted intestine sleeves. The modulation of postprandial blood glucose was evaluated “in vivo” in Sprague-Dawley rats by sucrose/starch-loading after a 12-h food deprivation period. Bacterial agglutination by D-fagomine and the inhibition of bacterial adhesion to pig intestinal mucosa was evaluated against strains of Enterobacteriaceae, Lactobacilli and Bifidobacteria.

**Results:** D-Fagomine lowered blood glucose in a dose-dependent manner without stimulating insulin secretion after ingestion with sucrose or starch. At 1-2 mg/kg body weight it reduced the AUC (0-120 min) by 20% and shifted the T<sub>max</sub> by 15 min at doses of when given together with 1 g sucrose/kg body weight. D-Fagomine (0.14 mM) agglutinated *Escherichia coli*, *Salmonella Typhimurium* populations (60%) without affecting probiotic strains (*Bifidobacterium* spp. and *Lactobacillus* spp.). At this concentration, D-fagomine inhibited the adhesion of Enterobacteriaceae (95-99% cells in the supernatant) and promoted adhesion of *Lactobacillus acidophilus* (56% cells in the supernatant) without affecting bacterial viability.

**Conclusions:** D-Fagomine lowers post-prandial blood glucose when ingested together with sucrose or starch and selectively agglutinates enterobacteria. These effects make D-fagomine a suitable candidate for dietary ingredient or functional food component.

**Key Words:** Fagomine, Iminosugars, Insulin Resistance, Weight Management and Microbiota

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#### 27/1062. Innovation in Food for Optimal Nutrition

### **Dietary fibres from agave-tequilana and jamaica-calyces reduce weight-gain and improve redox status in hypercholesterolemic rats**

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**Introduction:** Dietary fibres (DF) obtained from Agave tequilana, rich in fructans and insoluble DF, and jamaica-calyces (*Hibiscus sabdariffa*), also rich in phenolic compounds, may be used as new potential functional ingredients.

**Objectives:** To evaluate the effects of consuming Agave fructans and jamaica-calyces on serum lipid and glucose, weight gain and redox status in hypercholesterolemic rats.

**Method/Design:** Wistar rats (200-250 g) were divided in 5 groups (n=8). Control rats (C) were fed a cholesterol-free diet. Another group (Chol) was fed a cholesterol-rich diet (Cholesterol 2%, Cholic acid 0.4%). The cholesterol diet was supplemented with cellulose, Agave-fiber and Agave-fiber with jamaica-calyces and fed to three other groups of rats: CC, AF, and AF-Hib, respectively. After 6 weeks, animals were sacrificed and blood and key organs were collected. Total, LDL, HDL-cholesterol and glucose in serum were determined. Serum and liver malondialdehyde (MDA) concentrations, as an oxidative stress biomarker, were measured by HPLC and antioxidant activity (AOA) was determined in serum by ORAC and FRAP assays. Kruskal-Wallis one-way analysis of variance and Mann-Whitney U test were applied to statistically study results.

**Results:** Although all diets were isocaloric, weight gain in AF-Hib

was significantly lower than in the other groups. Cholesterol treatment increased liver weights, total and LDL-cholesterol in Chol, CC, AF, and AF-Hib, however in AF group the LDL/HDL ratio significantly improved ( $p < 0.05$ ). Glucose levels were significantly lower in CC, AF, and AF-Hib than in Chol ( $p < 0.05$ ) after fiber treatments. In both AF and AF-hib groups, MDA levels measured in liver and serum were lower ( $p < 0.05$ ) whereas AOA in plasma was higher ( $p < 0.05$ ) compared to Chol group.

**Conclusions:** Dietary fibres from Agave tequilana and jamaica-calyces separately consumed improved redox status, and when ingested as a mixture they also reduced weight gain in hypercholesterolemic rats.

**Key Words:** Dietary fiber; Agave tequilana, Hisbiscus sabdariffa L, MDA, antioxidant activity.

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#### 27/4. Nutrition and Healthy Lifestyle

##### **Eating habits of preschool and young school Czech children**

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**Introduction:** Nutrition affects the health of a person from childhood to adulthood

**Objectives:** The main goal of our research was to assess the eating habits of preschool (PS) and primary school (YS) children.

**Method. Design:** The study included children from nursery school (4-6 years) and primary school (7-10 years). For these children the questionnaire was designed to fill the income of all food consumed over a period of two days. The figures were compared with reference values recommended intake of nutrients, which are in force in Central Europe (DACH). The results were evaluated statistically.

**Results:** Data were collected from 2792 children: 1087 PS and 1705 YS children. The study showed that diet is relatively followed the recommendations for intake of most nutrients, energy, fluid and fiber. However, it was a much higher intake of protein (+182.7% PS and +123.4% YS), saturated fat (+56.7% PS +61.9% YS) and sodium (+339.2% PS, 483.2% YS). We found a relatively high intake of vitamins B6, B12 and vitamin C in both groups of children. Intake of vitamin D was insufficient (46.38% PS, 54.8% of YS) and iodine intake was lower (76.6% PS and 74.4% YS).

**Conclusions:** The study showed that to ensure the healthy development of the population is necessary to continuously monitor the nutrition of children and the results transmitted in real life.

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#### 27/5. Nutrition and Healthy Lifestyle

##### **Serum level of selected components of antioxidants system depending on nutrition habits**

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**Introduction:** The work monitored nutrition habits in selected group with the focus on depending serum level of selected vitamin on eating fruit and vegetable or vitamin supplementation.

**Objectives:** Epidemiological evidence supports the concept that diets rich in fruits and vegetables promote health and attenuate or delay the onset of cardiovascular disease (CVD). Polyphenol extracts from fruits and herbs such as apples and green tea can inhibit inflammation, lower blood cholesterol and glucose levels, and reduce risks of heart diseases.

**Method. Design:** We studied the effects of dietary polyphenols or dietary supplementation on several cardiovascular risk factors. In order to generally evaluate up-to-date health condition of examined volunteers and to record their eating habits all the study participants received simple questionnaires, which were focused on the consumption of meat, fish, milk, eggs, vegetables, fruit, alcohol and supplements with vitamin preparations. The levels of vitamin C, A, beta-carotene, lycopene and alpha-tocopherol were determined in venous blood, withdrawn fasting in the morning in clinically healthy volunteers. In the project there were involved 933 healthy volunteers of the Czech Republic Rescue Fire Brigades from selected areas of the Czech Republic.

**Results:** Higher serum level at group eating fruit and vegetable or vitamin supplements was found only on vitamin C and beta-carotene. Statistically lower levels of vitamin C, beta-carotene and lycopene in the group of obese people (compared with the group of normal weight people) show decreased level of antioxidant protection of the organism and the risk of cardiovascular diseases, a significant finding of decreased vitamin C and beta-carotene serum levels were confirmed in individuals with a high atherogenic index value.

**Conclusions:** The results show that it is necessary to ensure optimal food not only with an energetic diet value but also with a proper input of antioxidant carriers.

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## 27/7. Nutrition and Healthy Lifestyle

### **Dietary habits at children in basic school in district hr. Kralove**

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**Introduction:** This work is part of Project of Health Support No. 9985 and the main aim was to evaluate nutrition habits at school children.

**Objectives:** More and more school-age children are becoming overweight or obese. Obesity is a consequence of an energy imbalance. Many of children are not meeting dietary recommendations.

Food habits are characterized by an irregular meal pattern, skip breakfast, also school lunch, increases in soft-drink consumption, and are not eating fruits and vegetables..., simultaneously become less active and watch tv or computer each day.

**Method. Design:** The target population was elementary school children in 2nd, 4th, 6th and 8th grade. The data were collected from 2042 children (987 girls, 1055 boys). In order to generally evaluate up-to-date health condition of examined children and to record their eating habits all the study participants received simple food frequency questionnaire., which were focused on the consumption of meat, fish, milk, eggs, vegetables, fruit, type of beverage and sweets. Dietary intakes were analyzed using nutrient analysis software NUTRIDAN.

**Results:** The majority of children are not meeting recommendations for energy intake. Much of this deficit is attributed to changing beverage consumption patterns, characterized by declining milk intakes and substantial increases in soft-drink consumption. On average children are not eating the recommended amount of fruits and vegetables. Overall, children consumed larger part of their total daily energy from fat. Boys consumed higher portion of energy derived from fat and girls consumed more energy from carbohydrates. The daily fiber intake was similar in both gender and lower than recommendations.

**Conclusions:** Parents' food choices and purchasing behaviors may affect how their children purchase both healthy and unhealthy foods.

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## 27/10. Nutrition and Healthy Lifestyle

### **Relationship between dietary intake and the clinical parameter of periodontitis in perimenopausal Japanese female patients**

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**Introduction:** Periodontal diseases constitute a variety of inflammatory conditions affecting the health of the periodontium. Dietary intake and life style were associated with the severity and progression of periodontal diseases.

**Objectives:** The purpose of this study was to investigate whether dietary intake were associated with periodontal conditions in perimenopausal Japanese female patients.

**Method. Design:** This study design was a cross-sectional study. We studied 20 perimenopausal Japanese female patients with periodontitis, aged 42 to 55 years. A dietary survey was conducted three days using dietary records. Periodontal diseases were diagnosed by a periodontist, based on the 1999 classification system of the American Academy of Periodontology, and divided according to percentage of teeth with more than 4 mm probing depth (4PD%) and percentages of teeth with more than 4mm attachment level (4AL%). Analysis of correlation between dietary intakes and periodontal status was used Pearson's correlation. Adjustment was made for cigarette smoking, race, ethnicity, and body mass index.

**Results:** The mean intake of protein, calcium, vitamin B6, vitamin B12, vitamin C, fishes and shellfishes and algae showed a negative correlation with the clinical parameter of periodontal disease, 4PD% and 4AL%.

**Conclusions:** Dietary intake was associated with periodontal disease conditions in perimenopausal Japanese female patients with periodontitis.

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## 27/13. Nutrition and Healthy Lifestyle

### **Traditional vs. Modernized dietary pattern among Tunisian adolescents: The good vs. The bad?**

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**Introduction:** In south Mediterranean countries, adolescents are at the forefront of the dietary and lifestyle changes linked to the nutrition transition.

**Objectives:** We assessed dietary intake and association with socioeconomic factors and health outcomes among adolescents in Tunisia.

**Method. Design:** Cross-sectional survey (year 2005); 1019 subjects 15-19y. from a clustered random sample. Dietary intake measured by a validated semi-quantitative frequency questionnaire (134 items) as was physical activity; the Diet Quality Index International

assessed diet quality; dietary pattern scores were derived by multivariate analysis. Body Mass Index (BMI)  $\geq$  85th percentile (WHO) defined overweight. Waist Circumference (WC) assessed abdominal fat. High blood pressure (HBP) defined according to international references for 15-19y.

**Results:** Energy intake was quite high, especially for females. The macro-nutrient structure was close to recommendations; only 38% had a satisfactory diet quality. A main traditional to modern dietary gradient, linked to urbanisation and increased economic level, featured an increasing consumption of white bread, dairy products, sugars, added fats and fruits and decreasing consumption of oils, grains, legumes and vegetables; it featured a decreasing relationship with total fat and an increase of calcium intake, but with an increase of energy, sugars and saturated fat, while vitamin C, potassium and fibre decreased. Adjusted for age, energy and physical activity, this modern score was associated with increased overweight in males (2nd vs. 1st tertile: Prevalence Odds-Ratio (POR) =4.0[1.7-9.3], 3rd vs. 1st: POR=3.3[1.3-8.7]) and a higher WC. Adjusting also for BMI and WC, among females, it was associated with decreased prevalence of high blood pressure (2nd vs. 1st tertile: POR=0.5[0.3-0.8], 3rd vs. 1st tertile: POR=0.4[0.2-0.8]).

**Conclusions:** The observed traditional to modern gradient of dietary intake, characteristic of a nutrition transition situation, featured associations with several nutrients involving a higher risk of chronic diseases but might have not only negative characteristics regarding health outcomes.

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#### 27/15. Nutrition and Healthy Lifestyle

##### **Adherence to the Mediterranean food pattern in Portugal - 1961 to 2007**

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**Introduction:** Despite of the recognition that behind the Mediterranean diet concept there is a large heterogeneity, its major characteristics have been identified and largely accepted as a healthy dietary pattern to be preserved and encouraged.

**Objectives:** To evaluate along time adherence to the Mediterranean food pattern in Portugal.

**Method. Design:** The Portuguese FAO food balance sheets (FBS) data from 1961 to 2007 (46 years) were used. Adherence to the Mediterranean food pattern was determined by applying the Mediterranean Adequacy Index (MAI), which is obtained by dividing the energy contribution from typical Mediterranean food groups (cereals, pulses, potatoes, vegetables, fruit, nuts, fish, vegetable oils, wine) by that from non-typical Mediterranean food groups (milk, dairy products, meat, eggs, animal fats, soft-drinks, sugar, sugar products). Values equal or above 4 reflect adherence to the Mediterranean food pattern. Spearman's correlation was used to assess association between MAI and time.

**Results:** Along time, MAI significantly decreased ( $r=-0.967$ ;  $p=0.0001$ ); its values varied from 1.69 (in 2001) to 4.64 (in 1963).

MAI was above 4 only between 1961 and 1968. The availability of typical Mediterranean food groups such as cereals, pulses, wine and fish significantly decreased. On the contrary, vegetables significantly increased. The availability of non-typical Mediterranean food groups like animal fats, milk and dairy, eggs and meat and meat products significantly increased.

**Conclusions:** From FBS data it was possible to perceive that Portugal is running away from the traditional Mediterranean food pattern, which results in a general decrease in diet-quality.

**KeyWords:** Diet quality, Food Balance Sheets, Mediterranean Adequacy Index, Portugal

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#### 27/16. Nutrition and Healthy Lifestyle

##### **Isoflavone profile of selected soy-products commercialized in Europe**

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**Introduction:** Acknowledging of the exposure of the European population to soy isoflavones is crucial for risk assessment and also to elucidate the possible role of soy isoflavones in chronic disease prevention.

**Objectives:** The aim of this study was to provide an overview of the isoflavone profile of selected soy products commercialized within Europe.

**Method. Design:** A total of 115 soy-based products were purchased at local retailers and natural health food stores in Finland, Spain, UK and Portugal during the years 2002-2005. Commercial availability and European manufacture were the only selection criteria. The selected items belong to different groups of soy foods and a classification was needed in order to allow the comparison between levels of isoflavones provided by the different products. Items were divided into four different groups: 1) Traditional soy foods, 2) Non-dairy soy products, 3) Meat analogues, 4) Second-generation soy foods and 5) Health supplements. Food samples were (when necessary) freeze-dried, homogenized and stored at -70 °C until analysis. Soy isoflavones in samples were quantified using a HPLC systems equipped with a Coularray detector or diode array detection and peaks corresponding to soy isoflavones were confirmed by LC-MS-MS.

**Results:** After the food analyses, genistein was found to be the most prevalent isoflavone. Levels were lower in the non-dairy group (mean 7.32 mg aglycone. 100g wet basis) and the higher in traditional soy foods (mean 53.5 mg aglycone. 100g wet basis). In the health supplements group, daidzein was the most prevalent isoflavone, and the mean total concentration was 103.2 mg aglycone. g wet basis, a

lower value than the one reported in the product labels.

**Conclusions:** Dietary isoflavone levels vary widely between food groups. Values reported for health supplements differ from those found in our analyses. The content of isoflavones in aglycones after the hydrolysis being in general lower than the values reported in the labels.

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#### 27/17. Nutrition and Healthy Lifestyle

### Do dietary patterns differ in relation to level of alcohol intake?

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**Introduction:** There is a paucity of research-based evidence to assess the association of the nutritional patterns amongst alcohol drinkers; thus there is a need for intensive studies.

**Objectives:** This cross-sectional study assessed the differences in the dietary patterns in relation to the level of alcohol intake amongst middle-aged Finnish men.

**Method. Design:** Data came from the Kuopio Ischemic Heart Disease Risk Factor (KIHD) Study, an ongoing population-based cohort study since 1984 aiming at investigating the risk factors of cardiovascular diseases and other chronic illness. 2634 male participants aged 42-60 years were recruited at the baseline for this study. Food intake was collected by a 4-day food diary method. Self-reported alcohol consumption was assessed with quantity-frequency method based on the Nordic Alcohol Consumption Inventory from which average weekly alcohol consumption was calculated. Analysis was performed using ANOVA and Pearson's  $\chi^2$  tests.

**Results:** Heavy drinkers had a lower intake of milk (P-value 0.001), whole grains (P = 0.020), fiber (P < 0.001), folate (P < 0.001), vitamin C (P = 0.015), tea (P = 0.008) and iron (P = 0.002) than previous and moderate drinkers. Intake of legumes (P = 0.001), fish (P < 0.001) and beef (P = 0.005) amongst previous drinkers was lower when compared with heavy drinkers. There is statistical significant difference which revealed a higher mean intake of vitamin D, MUFA, PUFA, protein and fat in heavy drinkers than previous and moderate drinkers.

**Conclusions:** Intensive assessments of these outcomes are very vital when studying dietary patterns of alcohol drinkers as a risk factor for health outcomes.

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#### 27/18. Nutrition and Healthy Lifestyle

### Nutritional status of 4- and 8-year old children in the Netherlands

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**Introduction:** Nutritional status assessment is an important part of the Dutch National Food Consumption Survey (DNFCS) system. Through biochemical measures it provides insight into the nutrient status of the population, or certain risk-groups therein. Results of the DNFCS-Young children (2005-2006) showed that compared to the current Dutch dietary recommendations, young children in the Netherlands have adequate intake of most vitamins and minerals except vitamin D and folic acid. Furthermore, proper evaluation of the intake of iron, selenium, zinc, vitamin E, and retinol activity equivalents was hampered by the lack of clarity on average requirements. Therefore, additional nutritional status assessment was recommended.

**Objectives:** To assess the nutritional status of children 4- and 8 years of age in the Netherlands

**Method. Design:** Cross-sectional analysis within the PIAMA (Prevention and Incidence of Asthma and Mite Allergy)-birth cohort study. Vitamin D, iron, zinc, magnesium and selenium were measured in serum samples of 4-year old (n=373) and 8-year old (n=336) subgroups. Summary statistics were calculated for each parameter and prevalence of inadequate micronutrient status was determined using established cut-off points and/or reference values.

**Results:** Mean serum zinc concentration in 4-year olds (9.9  $\mu\text{mol. L}$ ; SD 2.0) was lower than in 8-years olds (11.6  $\mu\text{mol. L}$ ; SD 1.9). Furthermore, prevalence of impaired iron status based on 3 indicators (serum iron <10 $\mu\text{mol. L}$ , serum ferritin <15 $\mu\text{g. L}$  and transferrin saturation <15%) was 4-5% in 4-year olds and 1-3% in 8-year olds. Signals of inadequate status for vitamin D and selenium were not confirmed. Magnesium status was adequate. Similar to dietary reference intakes, inconsistency on the use of cut-off and reference values for biochemical parameters hampered good interpretation of the data.

**Conclusions:** No major problems regarding vitamin D, selenium and magnesium status were observed in this study. For zinc and iron status further investigation of the appropriate cut-off values is warranted.

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## 27/20. Nutrition and Healthy Lifestyle

### **Preliminary results of an accelerometer based physical activity measurement in Austrian school-aged children**

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**Introduction:** Overweight and obesity are caused by an imbalance of energy expenditure versus energy intake. Consequently, insufficient participation in physical activity leads to energy storage and weight gain. Pertaining to children, a minimum of 60 minutes of moderate-to-vigorous physical activity (MVPA) per day is an acknowledged recommendation. Up to now, there exist only limited measured data on children's physical activity.

**Objectives:** To picture the situation of energy expenditure and health enhancing physical activity in Austrian children, based on objective measures.

**Method. Design:** As part of the Austrian Study on Nutrition and Health Status 10-11 (commissioned by the Austrian Health Ministry), 400 children aged 6-14 years are about to wear an Actigraph GT1M accelerometer for 6 consecutive days. Performance data are captured from the second day on. MET-levels are accounted with Actilife 5 software. For diet induced thermogenesis a flat rate value of 10% of total energy expenditure is factored in. Body composition is captured by bioelectrical impedance. Family affluence is surveyed using the family affluence scale by William Boyce et al. Data from 107 children, aged 6-14 years, have been analyzed so far.

**Results:** Preliminary results suggest that about 95% of the children meet the recommendation of 60 minutes MVPA per day. PAL values are significantly higher in boys (mean 1.76; SD 0.19) when compared to girls (mean 1.67; SD 0.22). Older children show lower levels of physical activity and higher percentage body fat when compared to the younger ones. Highest levels of physical activity were observed in children with low family affluence (boys: mean 1.81; SD 0.19. girls: mean 1.78; SD 0.28).

**Conclusions:** Young children are, almost entirely, sufficient physically active. However, physical activity declines from early school age on. What can be learned from young children is, their lifestyle characterized by plenty of spontaneous physical activity instead of a calm sedentary lifestyle.

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## 27/23. Nutrition and Healthy Lifestyle

### **Nutritional status of Asian and African Surinamese and ethnic Dutch in the Netherlands? The sunset-study**

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**Introduction:** Little is known about the nutritional status of non-western immigrant populations in the Netherlands. It is assumed that potential problems in nutritional status may differ between the ethnic Dutch and non-western immigrant populations. Therefore the latter group deserves special attention.

**Objectives:** To assess the nutritional status of Asian and African Surinamese in the Netherlands.

**Method. Design:** Biochemical markers for nutritional status of vitamin D, iron, vitamin B12, zinc, and magnesium were measured in participants (N=1432; 35-60 years (yr)) of the SUNSET-study (Surinamese in the Netherlands: Study of health and Ethnicity). This study was conducted in 2001-2003 and was based on a sample of the Surinamese and ethnic Dutch population in Amsterdam.

**Results:** Compared to the guidelines for inadequate vitamin D-status (i.e. <30 nmol. L, for women >50 yr <50 nmol. L), ~40% of the Surinamese had an inadequate vitamin D-status. Among women aged >50 yr, this percentage was ~80% in Surinamese versus ~40% in ethnic Dutch women. Vitamin D-status was moderate (<50 nmol. L) in ~40% of the ethnic Dutch. Iron deficiency was observed in ~10-30% of women of childbearing age in general. Moderate vitamin B12-status (<148 pmol. L) was observed in ~10% of the population. There were no indications for inadequate magnesium- or zinc-status, however relatively low zinc-status was more prevalent among African Surinamese women.

**Conclusions:** The vitamin D-status of large part of the Surinamese and the iron status of substantial part of women of childbearing age are inadequate. Furthermore, attention is needed for moderate vitamin D-status of ethnic Dutch, moderate vitamin B12-status of the whole population and moderate zinc status of women from African Surinamese descent.

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## 27/29. Nutrition and Healthy Lifestyle

### **Effect of common supplements on status of micronutrients of lactants of a human milk bank**

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**Introduction:** Can the supplements usually indicated at pregnancy improve the micronutrients status in lactant?

**Objectives:** This study evaluated the effect of mineral and/or vitaminic supplements, usually consumed during pregnancy or breastfeeding, on nutritional status of iron, copper and zinc (blood and mature breast milk) of lactants of a Brazilian Human Milk Bank.

**Method. Design:** To this study 134 lactant were included. They answered a questionnaire to obtain data on use of mineral and/or vitaminic supplements and if this was to treat or prevent anemia. Blood samples were collected for analysis of hemoglobin, iron, transferrin, ferritin, ceruloplasmin, copper and zinc. Mature breast milk samples were collected for analysis of iron, copper and zinc. Firstly, mothers were divided in three groups: 1- took supplements to treat anemia; 2- took supplements to prevent anemia; 3- did not consumed supplement (weren't anemic).

**Results:** Variance analysis and Tukey test were applied, and showed that hemoglobin mean were lower in anemic lactant ( $p=0,0002$ ), but superior than limit for anemia - 11,9g. dL. No difference was observed in iron, copper and zinc from milk between groups. Thereafter, lactant were redistributed in: group 4- lactant who were consuming supplements during breastfeed; group 5- lactant who were not consuming supplements during breastfeed. This redistribution has showed association between supplements consumption and nutritional status of copper, evaluated thru serum ceruloplasmin and copper. Both indicators were lower in lactant who were consuming supplements during breastfeed.

**Conclusions:** Containing iron supplements usually indicated to treat anemia were efficient for anemic lactant studied, mainly facing the losses expected from iron to compose breast milk. The consumption of supplements to prevent anemia was positive, considering that this group presented higher levels of hemoglobin. We advise the development of further studies to confirm the associations observed between consumption of supplements and status nutritional of copper in lactant.

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### 27/32. Nutrition and Healthy Lifestyle

#### Body composition measurements in subjects with metabolic syndrome

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**Introduction:** Body composition can be measured using several available techniques. However, dissimilarity between results has been reported. In a multi-center SYSDI ET-intervention study, bioelectrical impedance analysis (BIA) was the selected method to measure body fat mass (FM) and fat-free mass (FFM).

**Objectives:** To investigate the agreement of BIA values measured by two independent BIA-methods.

**Method. Design:** At Lund University, 42 patients with metabolic syndrome completed the study. During this 6-month dietary intervention period, body composition measurements were performed at 7 different time points with 2 types of devices: single-frequency BIA (SF-BIA; PreNet, Malmö, Sweden) and bioelectrical spectroscopy (BIS; Xitron Hydra 4200, Xitron Technologies, San Diego, USA). Results are expressed as mean (SD) and  $p$ -values  $<0.05$  were considered significant. Bland-Altman analysis was used to test the absolute agreement between the methods.

**Results:** In total, 269 measurements by both devices were collected. Body weight and BMI at baseline were 95.7 (13.3) kg and 33.1 (3.3) kg. m<sup>2</sup>, respectively. FM (kg) and FM (%) measured by SF-BIA was 32.7 (6.7) kg and 34.2 (6.7) %, respectively, and 38.2 (8.7) kg and 39.6 (7.8) %, respectively, when measured by BIS. FFM (kg) was 64.0 (12.9) kg using SF-BIA and 58.6 (12.2) kg using BIS. All three body composition variables were significantly different between the two methods. However, a high significant correlation was found for FM (kg and %) and FFM between SF-BIA and BIS (all  $r \geq 0.89$ ,  $p < 0.001$ ). The bias (SF-BIA minus BIS) was -5.4 (4.1) kg for FM (kg), -5.5 (3.7) % for FM (%) and 5.4 (4.1) kg for FFM. Bland-Altman analysis showed wide limits of agreements for FM (kg and %) and FFM.

**Conclusions:** In subjects with metabolic syndrome, body composition values obtained by SF-BIA and BIS are highly correlated but not interchangeable. Body fat mass is systematically lower when measured by SF-BIA compared to BIS.

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### 27/33. Nutrition and Healthy Lifestyle

#### Effect of food on learning: views of parents in four European countries

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**Introduction:** Nutrition is one of many factors influencing a child's learning ability.

**Objectives:** This study aims to assess parents' views on the effect of food on children's ability to learn in four European countries (England, Germany, Hungary, Spain).

**Method. Design:** Parents of children aged 4 to 10 years were recruited through state elementary schools. Participants were asked

to sort 18 cards representing possible determinants of learning (in 6 categories: 4 food related, 3 educational, 2 physical, 4 social, 2 psychological, 3 biological) according to their views about strength of effect. Determinants were identified from the literature. Effects were scored: 0=none; 1=moderate; 2=strong.

**Results:** 201 parents took part. There were no significant differences among countries in age, gender, number of children of participants. Higher proportions of parents in England and Germany had received university education than in the other countries ( $p=0.015$ ); significantly fewer parents in Spain were in employment ( $p<0.001$ ). Taking all countries together, respondents felt that physical (sleep and activity), psychological (mood and behavior) and educational (class size, teaching quality, school discipline) determinants had the largest effects on learning (means 1.72, 1.71, 1.63, respectively). Social (birth order, income, parent's education, stimulation at home) and biological determinants (birth weight, IQ, genetic factors) had the lowest effect (1.20, 1.06). Food determinants were ranked 4th out of 6 categories (mean 1.34). Within the food category, regular meals (and nutrition as a baby) are the most (and least) important determinants (1.59, 1.06, respectively). Food at school (1.37) and a child's current diet (1.36) were intermediate. Responses from parents in Spain on some food determinants differed significantly from those of parents in the other countries.

**Conclusions:** Parents do not perceive food as a major determinant of learning in children; better formulated and targeted communication with parents is needed.

Supported by the European Communities 7th Framework Programme (NUTRIMENTHE Grant agreement number: 212652).

### 27/38. Nutrition and Healthy Lifestyle

#### **Effect of Camelina sativa oil a source of non conventional dietary PUFA omega-3 on immune response in fattening-finishing pigs**

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**Introduction:** Flax represents a potential commercial source of n-3 PUFA for pigs by their high content in  $\alpha$ -linolenic acid (C18:3 n-3) and there are data showing that flax could have an impact on immune response.

**Objectives:** The aim of the current study was to investigate the effect of a 47 days experimental diet rich in PUFA omega 3 derived from wild flax oil (a non conventional alternative to dietary lipid source), on several innate and aquired immune parameters in fattening-finishing pigs.

**Method. Design:** Thirty Large White pigs  $64.5 \pm 7.9$  kg were randomly assigned to 3 treatments groups (control, wild flax seeds 3 % and wild flax seeds 3 % plus a natural antioxidants premix), with 10 pigs. group. Concentration of plasma immunoglobulin (IgA, IgM,

IgG) and of cytokines (IL-1 $\beta$ , TNF- $\alpha$ , IL-8, IFN-g), as well as neutrophils or monocytes oxidative burst of stimulated blood were measured by ELISA and flow cytometry at the end of experiment

**Results:** An increase in plasma Ig A concentration (20.7%) higher in both experimental treatments than the control was identified and no effect on IgM, IgG and pro-inflammatory (IL-1 $\beta$ , TNF- $\alpha$ , IL-8) cytokines production was observed in plasma of treated pigs. By contrast IFN-g decreased significantly in plasma of pigs receiving camelina oil and camelina oil plus natural antioxidant diets. The percentages of blood neutrophils or monocytes undergoing oxidative burst in response to E. coli increased with 3.2% (neutrophiles) and 7.1% (monocytes) in pig fed wild flax seeds and with 8.2 % (neutrophiles) and 20.3% (monocytes) respectively in pigs fed wild flax seeds plus antioxidant.

**Conclusions:** Intake of n-3 PUFA from the wild linseed diet may have beneficial effects on immune response in growing-finishing pigs; further feeding experiments, using different wild flax dietary rates, are required in order to study in more detail the health promoting effects of this dietary PUFA source.

### 27/51. Nutrition and Healthy Lifestyle

#### **Antioxidant capacity of human milk. Relationship with dietary factors**

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**Introduction:** Maternal diet can influence breast milk composition

**Objectives:** To study the influence of maternal diet on the antioxidant capacity of human milk and its relationship to maternal and newborn parameters. It will be also analyzed according to mother's diet changes and after diet supplementation with non-alcoholic beer

**Method. Design:** Sixty mothers of healthy uncomplicated delivery newborns were included. Randomly 30 participants were invited to supplement their diet with 660 mL of alcohol-free beer for 30 days. Samples of blood, urine and maternal milk and also urine samples of their newborns were taken at three different lactation times to assess the differences with the maturation stage. Dietary surveys have been conducted to assess the mother nutritional status. Antioxidant capacity of human milk has been analyzed by two different methods: ferric reducing antioxidant power [FRAP] and 2,2-diphenyl-1-picrylhydrazyl [DPPH]. Routine biochemical parameters were determined in mother blood samples.

**Results:** There is a tendency to hyperlipidemia in the postpartum period while other biochemical parameters remain normal. Analyzing the antioxidant activity of human milk and its comparison with other variables shows that there is an inverse relationship between oxidant activity and the birth weight newborn. Also, antioxidant capacity decreases as milk matures being more pronounced trough the first fifteen days. This decrease is smaller and more slowly progressive in the beer supplemented group.

**Conclusions:** The antioxidant capacity of human milk is related to the birth weight. It is a protective factor that could counteract the increased cardiovascular risk in small newborns for gestational age. The antioxidant activity of human milk shows a progressive decline with lactation stressing the importance in the early periods. The ingestion of beer slows this evolution. These facts emphasize breastfeeding as a measure of cardiovascular protection and to supplement maternal diet with antioxidants to prevent subsequent cardiovascular risk.

**Key Words:** antioxidants: breast milk: newborn: small for age newborn

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## 27/52. Nutrition and Healthy Lifestyle

### Plasma response to fasting ingestion of mandarin juice

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**Introduction:** Citrus fruit are rich in phytonutrients such as vitamins, carotenoids, polyphenols and limonoids. These fruits are commonly consumed as fresh fruits at the dessert of the traditional Mediterranean diet. Nevertheless, nowadays there is an increasing availability of freshly and pasteurized juices that are preferably consumed at the breakfast. Based on the form in which it is consumed, the bioavailability of the different compounds is likely to vary.

**Objectives:** Systemic levels of carotenoids ( $\alpha$  and  $\beta$ -carotene,  $\beta$ -cryptoxanthine and lycopene) were determined after the ingestion of a single dose of 500 ml (two glasses) of mandarin juice in order to determine their bioavailability.

**Method. Design:** After information, seven volunteer female subjects between 38 and 50 years, members of university laboratory, accepted to participate at the project. They consumed a Mediterranean type diet, without vitamins or foods supplements and were advised to avoid citrus fruits intake for 72 hours previous to the study. At 8:00 am, after a blood sample to determine the basal levels of carotenoids, the volunteers taken two glasses of a commercial pure (100%) juice obtained from Citrus clementina. This juice has a content of 184 kJ per 100 mL and 35 mg of vitamin C, and hesperidin and naringenin are the predominant flavonoids. Total carotenoids content was of 700  $\mu$ g. L. After ingestion, the levels of different carotenoids were determined in plasma at 30, 60 and 120 minutes by high performance liquid chromatography.

**Results:** All carotenoids levels, except  $\beta$ -cryptoxanthine, increased after ingestion, with the maximum at 120 minutes. There was also an increase in total antioxidant capacity.

**Conclusions:** Although  $\beta$ -cryptoxanthine is the predominant carotenoid in the mandarin juice, its levels do not increase at the same time than the other major carotenoids after their ingestion. The levels of carotenoids can contribute to antioxidant capacity of plasma.

**Key Words:** Antioxidants: carotenoids: mandarin juice

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## 27/53. Nutrition and Healthy Lifestyle

### Body composition is related to metabolic risk in obese children

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**Introduction:** Obesity related diseases are among the most prominent health problems nowadays. Although the definition of obesity lies on the values of body mass index [BMI], this is a measure of excess weight relative to height, rather than excess body fat. BMI does not provide information on either fat free mass [FFM] or fat mass [FM], that should be determined as part of health assessment.

**Objectives:** The purpose of the current study is to describe the relation of body composition determined by bioelectrical impedance analysis [BIA] and metabolic risk factors in obese children.

**Method. Design:** Body weight and height of 120 obese children were measured to the nearest 0.1 kg and 0.5 cm respectively by standardized methods, and BMI was calculated (weight/height<sup>2</sup>). Obesity was defined as BMI >95th percentile according Spanish data. Waist circumference was measured to the nearest 0.1 cm. Body composition was determined by BIA using the Tanita BC-418 Ma segmental impedanciometer. FM and FFM were standardized with respect to height<sup>2</sup>, and referred as FM index [FMI] and FFM index [FFMI]. Biochemical tests included lipid profile glucose, insulin and homocysteine. Insulin resistance was estimated by the homeostasis model assessment [HOMA]. Blood pressure was measured by automated sphygmomanometer.

**Results:** When we adjusted by genre and Tanner stage, both, FMI and FFMI were positively or negatively related to markers of carbohydrate metabolism (insulin, HOMA). However, only FMI was associated to HDL-C ( $r=-0.256$ ,  $p<0.01$ ), high-sensitive C-reactive protein ( $r=0.274$ ,  $p<0.01$ ), and homocysteine ( $r=0.190$ ,  $p<0.05$ ). FFMI was related to systolic blood pressure ( $r=0.222$  ( $p<0.05$ )).

**Conclusions:** Determination of body composition is a useful clinical tool in the estimation of metabolic risk. Obese children should be evaluated in this sense to establish preventive actions.

**Key Words:** Body composition: fat free mass index: fat mass index: metabolic risk factors.

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## 27/54. Nutrition and Healthy Lifestyle

### Validation of a physical activity questionnaire in schoolchildren

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**Introduction:** Physical activity is an important health behavior in adult life and is associated with a lower risk of obesity and serious illnesses such as cardiovascular disease and diabetes mellitus. A physical activity measuring instrument would detect sedentarism early and prevent health problems in youth and adulthood.

**Objectives:** The aim of this study was to determine the level of physical activity in a sample of 9-11 year-old-schoolchildren and the association between physical activity and obesity in childhood; and to validate a physical activity questionnaire compared with an objective method (accelerometer).

**Method. Design:** Twenty-four schoolchildren were studied and anthropometric measures as body weight, height, circumferences, skinfolds, blood pressure and heart rate were considered. Physical activity was estimated by the children using an adapted questionnaire and registered by an hourly activity diary completed also by the children during the same week they wore the accelerometer.

**Results:** Of the total 24 children the data are summarized as follows. The children spent most time of the day in sedentary activity, approximately 17.30 h hours. day (SD: 1.6), 5,5 hours. day (SD: 0.92) in light activity, 45 minutes. day (SD: 20) in moderate activity and 11 minutes. day (SD: 11) in vigorous activity. We found a negative correlation between activity counts and body weight in girls; and total energy expenditure and BMI in boys and girls. There were significant differences between questionnaire, activity diary and accelerometer. Light activity is underestimated and vigorous activity is overestimated in the questionnaire and activity diary compared to the accelerometer.

**Conclusions:** Schoolchildren spend most time in sedentary activity and less time than it is recommended in vigorous activity. There is a correlation between physical activity and obesity especially in girls. The questionnaire is valid for sedentary activity but not for vigorous activity so further studies are needed.

**Key Words:** accelerometer: children: obesity: physical activity.

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## 27/55. Nutrition and Healthy Lifestyle

### Nutritional and anthropometric evaluation in children with autism

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**Introduction:** Autism spectrum disorder is a syndrome that affects psychic and cognitive development, including a large range of complex neurodevelopment disorders notable by social and communication hitches and also by limited and repetitive conductual patterns. Children with autism generally have also chewing difficulty and problems to include new food because of their rejection to colours, textures and flavours, and their diet is often restricted, reiterative and monotonous.

**Objectives:** The aim of the current study was to estimate and to evaluate the anthropometric profile, the usual dietary intake and the parents' perception of mealtime behaviours in these children by using analytic and anthropometrical indicators, a physical examination and personal data collected by parents' interviews.

**Method. Design:** A case-control study was designed including children between 17 months and 15 years old diagnosed in our hospital. The population sample consisted of 44 children (22 autistic children and 22 control children) in whom blood extraction was done. The anthropometric indicators included: weight, height, BMI, body circumferences (arm, waist, hip), skin folds (bicipital, tricipital, subscapular, supriliac) and body fat mass. Biochemical markers of nutritional status were measured by standardised methods.

**Results:** Related to the control group, the children with autism had significantly lower baseline IgA, retinol binding protein and vitamin D plasma concentrations and higher concentration of vitamin B12, vitamin E and cholesterol. No significant differences in weight and BMI were found. Sixty per cent of children were submitted to restricted diet.

**Conclusions:** Our findings suggest that food selectivity is more common in children with autism than in typically developing children, and that a limited food repertoire may be associated with nutrient inadequacies. Larger studies are needed to determine optimum multifactorial treatment, nutrition plans, and behavioural therapies.

**Key Words:** anthropometry: autism: nutrition: vitamin D

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## 27/60. Nutrition and Healthy Lifestyle

### Quality sleep and energy balance

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**Introduction:** Epidemiologically, BMI is inversely related to sleep duration. In addition to sleep duration, quality sleep has been



suggested to be a contributing factor.

**Objectives:** Investigate intra-individual effects of sleep fragmentation on quality sleep [QS=percentage slow-wave-sleep(SWS)+Rapid-eye-movement(REM)-sleep of total sleeping time] and energy balance (EB =Energy expenditure–Energy intake, MJ/d). Investigate inter-individual relationships between QS and EB.

**Method. Design:** Sixteen men (age 23±4y, BMI 23.9±1.9 kg. m<sup>2</sup>) stayed in the respiration chamber twice for 48hrs. Polysomnography was used to monitor sleep (23h30–07h30). Total energy expenditure (TEE) and its components sleeping metabolic rate (SMR), diet-induced thermogenesis (DIT), activity-induced thermogenesis (AEE) and substrate-oxidation were measured continuously. Blood samples were taken; appetite-related feelings were scored by VAS; ad libitum energy intake was determined during the last dinner.

**Results:** Intra-individually, sleep-fragmentation reduced QS (32.3±2.0 vs. 38.3±2.2%; P<0.01). Following fragmented sleep, postprandial insulin secretions increased (F=4.0, P<0.05) without affecting glucose concentrations. GLP-1 concentrations and fullness scores were reduced, while desire to eat was increased (P<0.05). TEE, SMR and DIT were not affected; yet AEE was higher after fragmented sleep (1.63±0.15 vs. 1.42±0.13 MJ. d, P<0.05). Physical activity, exhaustion, sleepiness, respiratory quotient (RQ), and carbohydrate oxidation were elevated (P<0.02), while fat oxidation was reduced (P<0.05). Inter-individually QS was inversely related to a positive EB (R<sup>2</sup>=0.31, p<0.004) and positively related to TEE (R<sup>2</sup>=0.31, P<0.03) and AEE (R<sup>2</sup>=0.48, P<0.01). A positive EB was mainly due to overeating from the ad libitum dinner related to relatively higher ghrelin concentrations (R<sup>2</sup>=0.25, P<0.01) and higher hunger scores (R<sup>2</sup>=0.10; P<0.05).

**Conclusions:** Fragmented sleep reduced quality sleep, insulin sensitivity, satiety, fat-oxidation, and increased AEE, physical activity, exhaustion, sleepiness, RQ and carbohydrate oxidation. Inter-individually reduced QS was related to a positive energy balance underscored by overeating and reduced AEE. Reduced QS may create a vulnerable condition in the etiology of overweight.

**Key Words:** Quality Sleep, Energy Expenditure, Energy Intake

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## 27/62. Nutrition and Healthy Lifestyle

### The application of Eatwell Plate advice to weekly food intake in the UK

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**Introduction:** The eatwell plate provides consumers and organisations in the UK with consistent visual messaging on the requirements for a healthy balanced diet. To assist in translating and applying this advice, a new resource, the eatwell week, has been developed.

**Objectives:** To design an eatwell week sample menu and supporting information to illustrate how a healthy balanced diet might look over the course of one week

**Method. Design:** Market research data on meals and snacks

commonly consumed by UK adults (Taylor Nelson Sofres, UK) guided development of an illustrative 7-day menu to conform to eatwell plate advice and meet current UK Dietary Reference Values (DRVs) for foods and nutrients, with a daily energy intake of 2000 kcal. 8368kJ. Analysis used the dataset from year 1 of the UK National Diet and Nutrition Survey rolling programme. Portion sizes were based on typical portion sizes in the UK.

**Results:** Each day comprised three main meals plus snacks. Differentiation was made between foods more likely to be consumed on week- and weekend days. To meet UK dietary recommendations, two portions of fish were included, one oily, to meet current UK dietary targets, the 5-a-day target for fruit and vegetables was achieved daily (range: 5-6.7 portions) and mean salt content was below maximum recommended levels (<6g. day). Red or processed meat was included on three days. All key macro and micro-nutrient values met DRVs.

**Conclusions:** Foods that are widely consumed by British adults can be incorporated within a sample 7-day healthy balanced menu comprising meals and snacks. The eatwell week shows promise as a resource to support the implementation of the principles of the eatwell plate. Future research should investigate the effect of using the eatwell week on adults dietary habits.

**Acknowledgements:** Food Standards Agency Scotland commissioned this work.

**Key Words:** Healthy Eating, Adults, Illustrative Menu

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## 27/64. Nutrition and Healthy Lifestyle

### Evaluation of a resource to facilitate implementation of UK Eatwell Plate advice

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**Introduction:** The UK eatwell plate provides consistent visual messaging on the requirements for a healthy diet. We have developed an “eatwell week” menu to aid implementation and assessed its face validity.

**Objectives:** To determine; clarity, understanding, relevance, acceptability and usability of the eatwell week resource using focus group testing.

**Method. Design:** Evaluation was carried out by independent research agency, Ipsos MORI. Consumers with different cooking habits and demographic characteristics participated. Testing was also conducted with health professionals (practice nurses, cardiac rehabilitation nurses, dietitians, occupational health nurses and health promotion specialists).

**Results:** Reactions to the style and presentation of the resource were positive. It was seen to fill a gap in current resources. The content of eatwell week was surprising to consumers who expected more fruit and vegetables and fewer ‘treats’. Dietitians felt that it would not help people to lose weight and therefore was of limited use to them. Consumers found the recipes simple, which encouraged them to cook, although preparation time was a barrier. The message of balance was

poorly understood as some consumers perceived all foods in the eatwell week as 'healthy'. Consumers often lacked the knowledge to make informed substitutions in the 'week'.

**Conclusions:** There is need to emphasise the role of healthy eating in obesity and disease prevention. Focus group responses may be undermined by the poor understanding of the correct composition of a healthy diet shown by participants. Further information is needed within the eatwell week resource to help users implement the principles of the UK "eatwell plate". This should include information on adaptation of recipes and meals to facilitate sustained use of the eatwell week. Focus group data has informed revision of the eatwell week.

Acknowledgements: Food Standards Agency Scotland commissioned this work.

**Key Words:** Healthy Eating, Menu, Focus Groups

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### 27/65. Nutrition and Healthy Lifestyle Plasma fatty acid status in elite female athletes

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**Introduction:** Fatty acid (FA) content of plasma phospholipids (PL) depends on dietary intake and endogenous metabolism. Although chronic, intensive exercise markedly influences lipid metabolism, the FA profile of plasma PL in elite female athletes has not been studied so far.

**Objectives:** To investigate plasma PL FA profiles in elite female water polo and football players compared with sedentary women.

**Method/Design:** Cross-sectional study included 15 female water polo players, 19 female football players and 20 age-matched sedentary women. All study participants were apparently healthy and aged 20-23 years. Dietary intake was obtained by food frequency questionnaire.

**Results:** Female athletes had higher energy intake and energy expenditure but not significantly different macronutrient composition of their diet from non-athletes. However, plasma FA profile in football players showed significantly higher proportion of stearic acid, oleic acid and monounsaturated FA (MUFA), and significantly lower proportion of total polyunsaturated FA (PUFA) and n-6 PUFA than both water polo and control groups. Additionally, football players had lower linoleic acid than sedentary women. Water polo players had quite similar plasma FA profile as control subjects, but with higher percentages of palmitoleic acid and arachidonic acid.

**Conclusions:** Our results indicate that long-term, intense physical training significantly affects FA status of plasma PL in women athletes. The observed differences between water polo and football players suggest that the type of regular training along with nutritional and other factors may contribute to the altered metabolism of fatty acids.

**Key Words:** Fatty Acids. Plasma Phospholipids. Female Athletes.

Football. Water Polo.

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### 27/67. Nutrition and Healthy Lifestyle Effect of iron intervention on growth in infants, children and adolescents: a systematic review

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**Introduction:** Iron-deficiency anemia (IDA) is a major global public health problem. Observational studies have linked IDA with impaired physical growth in children, but the results of intervention trials, which addressed the effects of iron supply on growth, are contradictory.

**Objectives:** To evaluate the effect of iron intervention on physical growth in infants, children and adolescents until 18 years of age through a systematic review with meta analysis of randomized controlled trials (RCTs).

**Method. Design:** Structured electronic searches were conducted to February 2010 on MEDLINE, EMBASE and the Cochrane Library. Bibliographies of the articles retrieved and proceedings of conferences were also reviewed. RCTs evaluating change in anthropometry with adequate control groups which included iron fortified foods, formula, or supplements, were analyzed for inclusion. No language restrictions were applied.

**Results:** Twenty supplementation RCTs and one fortification study met the inclusion criteria. Most of the studies were conducted in developing countries and had a high or moderate risk of bias. The overall pooled beta-coefficient (random effects model) did not show statistically significant effects of iron intervention on any of the anthropometric parameters measured (height, weight, mid arm circumference and head circumference). No heterogeneity between studies was found, as shown by the I-squared statistics (I<sup>2</sup> = 0%, P = 1.00).

**Conclusions:** Our meta analysis did not document association between iron intervention and the physical growth in infants, children or adolescents.

This research was undertaken as an activity of the European Micronutrient Recommendations Aligned (EURRECA) Network of Excellence ([www.eurreca.org](http://www.eurreca.org)), funded by the European Commission Contract Number FP6 036196-2 (FOOD). The original conception of the systematic review was undertaken by the EURRECA Network

and coordinated by partners based at Wageningen University (WU), the Netherlands and the University of East Anglia (UEA), United Kingdom.

**Key Words:** Iron Intervention, Physical Growth, Infants, Children, Adolescents

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**27/68. Nutrition and Healthy Lifestyle**  
**Food Consumption and Greenhouse Gas Emissions: Changing Food Consumption Patterns or Consuming less?**

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**Introduction:** Meat production is a major contributor to the diet-related greenhouse gas emissions (GHGE).

**Objectives:** The aims of this study were to estimate the daily GHGE of self-selected diets in France and to simulate the impact on dietary GHGE of decreasing meat consumption.

**Method. Design:** Dietary data from 1918 adults participating in the national INCA2 survey were used to estimate daily GHGE for each individual, based on the GHGE (in CO<sub>2</sub>-eq. 100g edible weight) of 74 highly consumed foods, representative of their food category. The mean percent contribution of food categories to total GHGE was calculated. For each individual, the potential impacts, on dietary GHGE, of (scenario 1) a reduction of 20% of red meat & processed meat (RMPM) consumption, or (scenario 2) a daily reduction of 50g of RMPM (or its suppression when its consumption was < 50g. d) were tested. For each scenario, the intake of RMPM was either a) not substituted, or was iso-energetically substituted for b) fruit and vegetables (fruit&vegs) or for c) mixed dishes.

**Results:** The mean dietary GHGE was 4090 g. person.day. Individual GHGE showed a great variability, and was highly correlated with both total food intake and total energy intake. The strongest GHGE contributor was the RMPM category, and this contribution increased with increasing quintiles of daily GHGE. For each scenario, the highest GHGE reductions were seen (1a: -4.1% CO<sub>2</sub>-eq; 2a: -12% CO<sub>2</sub>-eq. d) when the decreases in energy intake associated with RMPM reduction (-35 kcal. d and -133 kcal. d for 1a and 2a respectively) were not compensated for. When RMPM intake was iso-energetically substituted for mixed dishes, the GHGE variation stayed negative (1c: -2.8%; 2c: -7.2%). However, when RMPM was substituted for fruit&vegs, either nul or even positive GHGE variations were observed (1b: 0%; 2b: +2.7%).

**Conclusions:** Therefore, substituting meat for fruit&vegs may not be the best option to reduce dietary GHGE.

**Key Words:** Greenhouse gaz emissions, nutrition, diet, meat

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**27/75. Nutrition and Healthy Lifestyle**

**Obesity, stunting and Psico-motor Impairment go Hand in Hand as Global Problem of Early Infancy**

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**Introduction:** Science demonstrated early life is highly sensitive to external influences, starting in the uterus, and with lifelong effects. This study has hypothesized that taller as well as stunted children are at greater risk of obesity and low birth weight is good a predictor of psico-motor impairment.

**Objectives:** The objective was to ascertain the relationship and predictor variables of Low birthweight (LBW), reduced cephalic growth, stunting, obesity and psico-motor in children under five years old. We analyze these problems together because we think it could be useful to look for integral solutions.

**Method. Design:** We studied a stratified random sample of 2046 households in urban areas of Canelones, Uruguay. We used multiple logistic regression analyses. The goal of the statistical analysis was to find the best reasonable model to describe the relationship between LBW, macrosomía, stunting, reduced cephalic growth, obesity and psico-motor impairment and a set of predictor factor. We used multiple logistic regression analyses (Stepwise method) for simultaneous assessment. The impact of predictor variables was explained in terms of adjusted odds ratios.

**Results:** Main results were that LBW was a predictor for stunting {P=0,0001, OR:4,606, 95% C.I. (2,802-7,573)}, reduced cephalic growth {P=0,0001, OR:3,861, 95% C.I. (1,872-7,964)} and psico-motor impairment {P=0,014, OR: 2,264, 95% C.I. (1,182-4,337)}. Stunted children were twice as likely to be obese {P=0,0001, OR:2,366, 95% C.I. (1,593-3,515)}. Reduced cephalic growth was a predictor of psycho-motor impairment {P=0,029, OR 3,163, 95% C.I. (1,122-8,197)}. Taller children were no more likely to be obese.

**Conclusions:** This study demonstrated close relationships and complex causal web between stunting, obesity and psico-motor impairment. They coexist in infants and predict one another.

**Key Words:** Stunting, Obesity, Psico-motor Impairment, Early Infancy

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### 27/79. Nutrition and Healthy Lifestyle

#### **Anthropometric staff assessment and educational holdings in a Hospital within the Bahia, Brazil**

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**Introduction:** The Food and Nutrition Units (foodservices) are units that belong to the food service sector, whose purpose is to manage the production of nutritionally balanced meals with good hygiene and sanitary standard for drinking outside the home, which could contribute to maintaining or restoring the health of communities, and also assist in the development of eating habits, without, however, exceed the financial resources previously established. A hospital can be characterized as "end organ" responsible for supporting directly to reach the goal of mor entity which is to prevent and . or restore the health of the population they serve (in the case patients) and as a "medium body," insofar as it provides meals to their employees.

**Objectives:** The aim of this study was to evaluate the nutritional status of employees who perform most of the meals in a hospital in Bahia, and later implement nutritional education activities.

**Method. Design:** We performed an anthropometric evaluation with staff, which were measured and recorded in form, measures of weight, and status of waist circumference (WC). Data were analyzed by the WHO reference values, and reference values of Body Mass Index, ranking as thinness, weight, overweight or obesity, and waist circumference that classifies the individual holds or not risk for cardiovascular disease. At end evaluation, we obtained a sample of 28 subjects, this sample collected in a single moment.

**Results:** The results of the Anthropometric Assessment showed that 82.13% of the employees present Overweight . Obesity, BMI, and second that 67% of them are at risk for cardiovascular disease, according to measure waist circumference.

**Conclusions:** Despite the findings, officials have shown themselves very satisfied with the evaluation and the Nutrition Education and further reported that changes need to occur in the menu, as it contributes significantly in Nutritional Status.

**Key Words:** Nutritional status, hospital, employees.

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### 27/87. Nutrition and Healthy Lifestyle

#### **The nutritional status and food habits of adolescents in two public boarding schools in tamale of the northern region of Ghana**

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**Introduction:** Good nutrition is essential during adolescent as it support the increased rate of growth that characterized puberty and

the teen years. Adolescent nutritional problems are common in the developed countries and throughout the world. According to Einstein, (1997), some people lack adequate food and others make poor food choices.

**Objectives:** The objective was to determine the nutritional status and food habits of adolescents.

**Method. Design:** A cross sectional study was conducted in two public boarding second cycle schools in the Northern region of Ghana The study involved 90 randomly selected adolescents (45 males and 45 females) aged between 12 and 19 years. The data collected includes: height and weight measurements, 24hr recall, reason for eating and source of food.

**Results:** Results from the study indicated about 74.4% of the adolescents have BMI 18.5-25 kgm<sup>-2</sup>. Females were significantly better nourished than males (p<0.05). About 83% and 61.1% of subject study admitted to snacking after supper and before supper respectively. Food served at the dining hall provided an average of 3060kcal ± 90.2SD of energy per daily meal per person. On the average, about 48% of respondent ate because they were hungry and 50% of subjects indicated the dining hall as their main food source.

**Conclusions:** In conclusion adolescents were found to have good nutritional status.

**Key Words:** Adolescent, Puberty, Nutritional Status, Body Mass index, snacking, food habits.

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### 27/88. Nutrition and Healthy Lifestyle

#### **Efficient evaluation of healthy tea, Gromwell Seed against**

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**Introduction:** In our continuous search for anti-tumor promoting, chemopreventive active potency from natural source material, a kind of healthy tea, Gromwell seed(Coix lachryma-jobi) ext. have been screened using the in vitro synergistic assay indicated by inhibitory effects on the induction of Epstein-Barr virus early antigen (EBV-EA) by TPA. In this assay, Gromwell seed aqueous extract and ethanol extract exhibited the potential inhibitory effects on EBV-EA activation without strong cytotoxicity on Raji cells. In our experimental system, the inhibitory effects of both Gromwell extracts were greater than that of beta-carotene, which is known anti-tumor promoting agent and. or chemopreventive agent. On the basis of the results by the in vitro assay, the inhibitory effects of these samples were investigated in a two-stage carcinogenesis test of mouse skin papillomas using DMBA as an initiator and TPA as a potential promoter.

**Objectives:** In this study, the purpose of other potency of these useful material was to develop new active effect, anti-tumor promoting potency as an effective chemopreventive test.

**Method. Design:** Effect of healthy tea type material on tumor promoting potency was investigated using in vitro and in vivo carcinogenesis system.

**Results:** These compounds were evaluated for their in vitro inhibitory effect on EBV-EA activation induced by TPA. The percentage of the inhibition of TPA-induced EBV-EA activation for these material were 60% and 30% at concentration 100 µg. Based on the results obtained in vitro, we studied the inhibitory effect of compounds, in an in vivo two-stage carcinogenesis test. The control animals showed a 100% incidence of papillomas at 20 weeks after DMBA-TPA tumor promotion, while treatment with compounds reduced the percentage of number of tumor to 60 % after 20 weeks.

**Conclusions:** The results of this study should encourage future efforts toward obtaining an important new interesting material for chemopreventive activity

**Key Words:** Gromwell seed, Healthy tea, Chemoprevention

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## 27/90. Nutrition and Healthy Lifestyle

### The impact of antioxidant vitamins on DNA protection from oxidative stress

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**Introduction:** There is no conclusive results on the role of antioxidant vitamins in repair of DNA damages caused by oxidative stress and their impact on transcription of p53 gene.

**Objectives:** The role of antioxidant vitamins (alpha-tocopherol, ascorbic acid and beta-carotene) in preventing DNA damages was aim of this study.

**Method. Design:** Wistar rats (64 animals), males with body weight 140-160 g were used. During 14-day experiment (after 7-day adaptation period), the rats were divided into 8 groups, caged individually and fed with tested vitamins free diet AIN-93M and water ad libitum. Tested vitamins were administered orally in two drops daily at 2, 12 and 1 mg, respectively. Control group received solutions free of them. Half of animals were trained for 15 minutes on a track with tape speed 20 m. min. Vitamins (alpha-tocopherol, ascorbic acid and dehydroascorbic or retinol) as well as lipid peroxides were measured in blood plasma. 8-hydroxy-2'-deoxyguanosine in liver and activity of protein product of p53 gene in jejunal mucosa were checked.

**Results:** Statistically significant effect of alpha-tocopherol as well as beta-carotene on plasma lipid peroxides was demonstrated but not statistically significant for DNA damages (8-hydroxy-2'-deoxyguanosine) in liver for both groups of rats trained and untrained. However, in trained animals measured parameters reached higher values and effect of tested vitamins was stronger. Ascorbic acid showed no statistically significant reduction in oxidative stress. In addition, preliminary analysis of the studies show that administered beta-carotene may affect amount of protein, p53 gene product. Other

tested compounds, ie, alpha-tocopherol and ascorbic acid did not show such properties.

**Conclusions:** Alpha-tocopherol and beta-carotene intake may directly protect DNA from oxidative stress.

**Key words:** alpha-tocopherol, ascorbic acid, beta-carotene, oxidative stress, dna damages

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## 27/91. Nutrition and Healthy Lifestyle

### Addressing Childhood obesity How Prepared is Ghana?

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**Introduction:** The double burden of malnutrition (Under nutrition and Over Nutrition) among children in Ghana is of public health concern. Under nutrition has been widely addressed. Childhood obesity has been one of the neglected conditions mostly in the developing world. Many have related neglect to the cultural acceptance of over nutrition as good living and sense of pride in Ghana. The issue underlying over nutrition is far from just the cultural issues. GDHS, 2008 reported 7% and 4% children under 5 years of age overweight in urban and rural Ghana respectively.

**Objectives:** The objective is to highlight the problem of childhood obesity in Ghana, the challenges and actions in addressing the menace.

**Method. Design:** The paper was a review of publications and articles on childhood obesity and measures to addressing the menace.

**Results:** The presentation address the prevalence of childhood obesity in Ghana, current programmes in addressing childhood obesity in Ghana, the challenges and the way forward calling on the European organisations working in the developing world to consider the opportunities in addressing over nutrition issues in Ghana.

**Conclusions:** Childhood over nutrition is a public concern in Ghana that needs the attention of all stakeholders.

**Key Words:** Over nutrition, Under nutrition, Childhood Obesity,

## 27/92. Nutrition and Healthy Lifestyle

### Supermarket food shoppers in Tunisia: who, why and what about diet quality?

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**Introduction:** In several south Mediterranean countries, the marked changes in diet and lifestyles linked to the nutrition transition involve the food retail sector, including the development of supermarkets.

**Objectives:** Assess prevalence, socioeconomic cofactors, motivations and association with diet quality, of food shopping at supermarkets (SM) vs. traditional retail formats.

**Method. Design:** Cross-sectional study (2006) in the Tunis area. Random cluster sample of households (n=724): the person in charge of food shopping is interviewed. Were assessed: -socio-economic characteristics, -type of retail outlet for main food shopping (large supermarkets i.e.  $\geq 10000\text{m}^2$ , or LSM), medium size supermarkets (MSM), neighborhood grocer (grocer), market), - motivations for use of different types of outlets, - diet quality (DQI-I: Diet Quality Index International, derived from a 146-item semi-quantitative, context specific, validated food frequency questionnaire). Socio-economic profiles of supermarket shoppers were analyzed by multinomial regression, motivations by correspondence analysis.

**Results:** Overall 58.8%[51.0-68.0] of households shopped at SM (4.5%[1.9-7.1] exclusively) and 27.3%[20.1-34.5] at LSM. Most households (93.8%[90.6-97.0]) also used the grocer for main food shopping. Use of SM vs. traditional outlets was more frequent among urban and/or higher socio-economic status customers; customers of LSM were specifically much wealthier and more often had a credit card or steady income while those of MSM were more urban and of higher education level. Motivation differentials were mainly between LSM ("leisure") and the grocer ("credit availability", "proximity", "fidelity" but not "quality, choice" nor "good prices"), with differences according to socio-economic status. Adjusted for socio-economic characteristics, shopping for food at supermarkets vs. traditional outlets was associated with a marginally higher diet quality (adjusted DQI difference: +3.0[1.4-4.6],  $P < 0.0001$ )

**Conclusions:** In a context of the nutrition transition and the management of rising prevalences of obesity and non communicable diseases, any nutrition intervention only through centralized retail outlets such as supermarkets would risk of increasing health inequalities instead of reducing them.

**Key Words:** supermarkets, diet quality, socioeconomic, lifestyle, Tunisia.

## 27/98. Nutrition and Healthy Lifestyle

### No effect of 3 g oat or Barley $\beta$ -Glucans on cholesterol levels in healthy adults

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**Introduction:** Dietary fibers are well known for their beneficial health effects, among these an improved lipid profile. The European Food Safety Authority has accepted health claims related to 3 g. d of oat or barley  $\beta$ -glucans and maintenance or lowering of blood cholesterol levels. Oat and barley  $\beta$ -glucans are long linear glucose polymers with mixed  $\beta$ -(1 $\rightarrow$ 4) and  $\beta$ -(1 $\rightarrow$ 3) links with an approximate distribution of 70% to 30%, only the distribution of the  $\beta$ -(1 $\rightarrow$ 3) links is slightly different in the two  $\beta$ -glucan sources.

**Objectives:** Our objective was to perform a comparative investigation of the effects of highly purified oat and barley  $\beta$ -glucans on cholesterol levels in healthy adults.

**Method. Design:** Fourteen participants (8 women, 6 men) completed this single-blinded randomized crossover study with four 3-week periods with daily consumption of fibers (control (no fiber), oat  $\beta$ -glucan, barley  $\beta$ -glucan, and mutant barley  $\beta$ -glucan). Before and after each period, fasting blood samples were collected and analyzed for total cholesterol, low-density lipoprotein (LDL) cholesterol, and high-density lipoprotein (HDL) cholesterol.

**Results:** None of the  $\beta$ -glucans resulted in significantly greater reductions in total (control: -0.02 mmol. L; oat: -0.29 mmol. L; barley: -0.11 mmol. L; mutant barley: -0.04 mmol. L;  $p=0.64$ ), LDL (control: -0.04 mmol. L; oat: -0.24 mmol. L; barley: -0.09 mmol. L; mutant barley: -0.08 mmol. L;  $p=0.63$ ), or HDL (control: 0.03 mmol. L; oat: -0.05 mmol. L; barley: -0.04 mmol. L; mutant barley: -0.02 mmol. L;  $p=0.75$ ) cholesterol compared to control.

**Conclusions:** No significant differences between oat and barley  $\beta$ -glucan were observed, and 3.3 g. d purified  $\beta$ -glucan was not enough to reduce cholesterol levels in healthy adults. The health claim is related to maintenance of blood cholesterol, and the result may therefore be related to the health status of the participants. Future studies in hypercholesterolemic subjects will reveal if the functional basis of the fibers have been removed in the purification procedure.

**Key Words:**  $\beta$ -Glucan, oat, barley, blood cholesterol

## 27/99. Nutrition and Healthy Lifestyle

### The influence of nutrition intervention on nutritional and functional status among community-dwelling older people

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**Introduction:** Possible malnutrition among community-dwelling older people is common because of physiological, psychological and social changes affect food and nutritional intake and body weight. The promotion of their nutritional health might help to prevent adverse health outcomes, such as institutionalization.

**Objectives:** The objective of the present study was to investigate the effects of a one-year nutritional-promoting intervention and one-year follow up on nutritional and functional status among community-dwelling people aged 75 years or older and to compare the results with a control group.

**Method. Design:** Data were obtained from a subpopulation of participants in a population-based Geriatric Multidisciplinary Strategy for the Good Care of the Elderly (GeMS) intervention study in 2005 to 2007. Nutritional status was assessed using the Mini Nutritional Assessment (MNA), Instrumental activities (IADL) with the Lawton & Brody scale, and grip strength with the Saehan dynamometer. The intervention and control group consisted of 71 and 67 individuals respectively.

**Results:** At the two-year, mean MNA scores increased by 0.8,  $P=0.040$ , mean S-albumin level by 0.9 g. L,  $P=0.017$ , and mean B-haemoglobin level by 2.1 g. L,  $P=0.049$  in the intervention group. Most changes happened after one-year intervention. In contrast, in the same group significant decrease was observed IADL scores ( $-0.7$   $P<0.001$ ) and men's grip strength ( $-1.4$  kg,  $P=0.049$ ). In the control group significant decrease was found IADL scores ( $-0.8$ ,  $P<0.001$ , walking speed ( $-0.2$  m. s,  $P=0.041$ ), men's grip strength ( $-3.0$  kg,  $P=0.01$ ) and women's grip strength (1.2 kg,  $P=0.021$ ).

**Conclusions:** The nutritional status of community-dwelling older people can be improved by nutrition intervention. There was positive effect on walking speed and men's muscle strength in favor of the intervention group. Overall nutritional status improved during the intervention, but not during the follow-up year, suggesting that nutrition intervention should be throughout in old age.

**Key Words:** nutrition intervention; MNA; aged; community-dwelling

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## 27/111. Nutrition and Healthy Lifestyle

### **Does breastfeeding at 9 months of age influence dietary habits?**

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#### **Introduction:**

**Objectives:** To test the hypothesis that children partly breastfed at 9 months eat a less diversified diet (smaller range of foods), than those completely weaned.

**Method. Design:** 312 healthy term infants with the age of 9 months ( $9.1 \pm 0.3$ ) were examined in a cross-sectional study (SKOT-cohort) in the area of Copenhagen, Denmark.

**Results:** The infants partly breastfed ( $n=168$ ) at 9 months had a significantly lower bodyweight ( $<0.0001$ ), were significantly shorter ( $P=0.0022$ ), and were introduced to complementary foods significantly later than completely weaned infants ( $n=141$ ) ( $<0.0001$ ) of similar age. Furthermore, they had a lower intake of energy, both in absolute amounts ( $P<0.0001$ ) and analyzed per kilogram of bodyweight ( $P=0.049$ ). A significantly lower intake of most energy yielding nutrients, in both absolute amounts and as energy percentages, was seen for the partly breastfed compared to the completely weaned infants. Only small differences were found for absolute intakes of foods, although fatty spread showed significantly higher intake rates and consumption ( $P=0.0004$ ) among partly breastfed compared with completely weaned infants.

**Conclusions:** At 9 months the infants partly breastfed did not eat less diversified compared to those completely weaned at the same age. Despite later introduction to complementary foods than those completely weaned, their intake of foods was similar and no delay in their progression towards the family foods was noted.

**Key Words:** Breast Feeding, Infant Nutrition, Dietary Habits

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## 27/115. Nutrition and Healthy Lifestyle

### **Linseed and Pomegranate Seed Oils: effects in lipoperoxidation in brain of rats**

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**Introduction:** Conjugated linolenic acids (CLNAs) are a term for positional and geometric isomers of  $\alpha$ -linolenic acid (LNA; 9c12c15c-C18:3) with conjugated double bonds. In nature, are found in many seed oils and have been shown to be suppressor of various human tumor cells growth through a mechanism that involves lipoperoxidation. The punicic acid (PA; 9c11t13c-C18:3) is a CLNA isomer found in high percentages in pomegranate seed oil (PSO). Studies on the PA effects in the animal body are scarce and researches about their participation in physiological processes are necessary.

**Objectives:** The aim of this study was to assess the effect of LNA and PA in lipoperoxidation and activity of antioxidant enzymes in brain of rats.

**Method. Design:** Linseed oil (LO) and PSO, as sources of LNA and PA, respectively, were provided to animals by orogastric intubation at concentrations 1%, 2% and 4% of the daily consumption of diet for 40 days. 56 rats were distributed into seven groups: Control (water), LNA (1, 2 and 4%) and CLNA (1, 2 and 4%). After treatment, the animals were euthanized, brain tissue was collected and analyzed

through measured thiobarbituric acid reactive substances (TBARS) and activity of antioxidant enzymes (Superoxide Dismutase - SOD, Catalase - CAT, Glutathione Peroxidase - GPx).

**Results:** LO and PSO supplementation significantly reduced the TBARS values in animals brain compared to control group. However, there were no differences between groups regarding the activity of antioxidant enzymes.

**Conclusions:** The results indicate that the LNA and CLNA may have a protective effect on brain tissue that can be related with the lipoperoxidation reduction, but this mechanism should be better investigated.

**Key Words:**  $\alpha$ -Linolenic Acid, Conjugated  $\alpha$ -Linolenic Acid, Lipoperoxidation, Antioxidant Activity.

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### 27/125. Nutrition and Healthy Lifestyle

#### **Posting nutrition information on meals in university canteens: effects on meal choice and nutrient intake**

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**Introduction:** Eating out has been associated with lower diet quality. Following the use of simplified nutrition labels on pre-packed foods, posting point-of-purchase nutrition information on out-of-home foods is a potentially effective way to help consumers making more healthful food choices when eating out.

**Objectives:** The objectives were (1) to evaluate the effect of posting nutrition information in canteens on consumers' meal choice and (2) to investigate whether and how the information impacts determinants of meal choices for subgroups.

**Method. Design:** A one-group pretest-posttest design was used. 224 customers of two university canteens completed the study. The nutrition information consisted of a star rating and a descriptor for eventual non-complying nutrients (energy, saturated fat, sodium) or food group (vegetables). The meal choice and 24-h nutrient intake at baseline and follow-up were measured using three-day food records. Structural equation modelling was applied to test causal pathways of intervention effects in subgroups.

**Results:** Meal choice and nutrient intake were generally not improved by the intervention. Meal choices reflected the total and not the recommended meal offer, and were not compensated later during the day. Participants affected by the intervention had at baseline a higher objective nutrition knowledge, stronger health and weight control motives, and were more open to meal changes. Those liking the label more, declared to use the label more often and were more likely to positively change their attitude towards healthy meals. Motivation to change diet and sufficient objective nutrition knowledge were re-

quired for effective label use and to maintain or improve the energy intake from meals.

**Conclusions:** Posting nutrition information in canteens did not effectively change meal choice and nutrient intake. Nutrition information interventions in canteens may be more effective with a healthier meal offer and a label that is generally liked by the target population when combined with nutrition education.

**Key Words:** nutrition information intervention; university canteen; meal choice; dietary change; out-of-home eating

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### 27/126. Nutrition and Healthy Lifestyle

#### **Efficacy of trisodium phosphate and modified atmosphere packaging against *Listeria monocytogenes* in poultry**

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**Introduction:** Raw poultry is a well-recognized source of *Listeria monocytogenes* and many surveys have confirmed the presence of this pathogen on fresh poultry. Some authors have associated cases of listeriosis with the consumption of undercooked chicken. There is a great interest in reducing surface microbial contamination of poultry, with particular regard to reducing the levels of pathogens

**Objectives:** The aim of this study was to evaluate the combined effect of trisodium phosphate washing and packaging in modified atmospheres on the growth of *Listeria monocytogenes* on poultry legs stored at 4°C.

**Method. Design:** Fresh chickens legs were inoculated with *Listeria monocytogenes*. After the inoculation, the chicken legs were dipped into a 12% trisodium phosphate solution or distilled water (control). Inoculated samples were packaged under different gas mixtures: vacuum, 20%CO<sub>2</sub> . 80%N<sub>2</sub>, 40%CO<sub>2</sub>. 60% N<sub>2</sub>, 60%CO<sub>2</sub>. 40% N<sub>2</sub> or air.

Surface pH values, sensorial characteristics and *Listeria monocytogenes* and mesophiles counts were evaluated after treatment (day 0) and after 1, 3, 6, 8, 10, 13, 15 and 17 days of storage at 4°C.

**Results:** Significant differences (p<0.05) in mesophiles counts were found between the legs treated with 12% trisodium phosphate and the control legs. The air-packaged legs had the fastest increase in mesophiles counts. The lowest mesophiles counts were observed in those samples packaged in 60%CO<sub>2</sub>. 40% N<sub>2</sub>. Legs washed with 12% trisodium phosphate solution showed a significant (p<0.05) inhibitory effect on *L. monocytogenes* compared to control legs. Significant reduction on *Listeria monocytogenes* was observed in samples treated with trisodium phosphate and packaged under 60%CO<sub>2</sub>. 40% N<sub>2</sub>, but this pathogen can grow in all the atmospheres studied and high levels were reached at the end of the shelf life.

**Conclusions:** In conclusion, immersion of chicken legs in a 12% trisodium phosphate can reduce *Listeria monocytogenes* populations on fresh poultry. Chicken legs packaged in atmospheres containing 20%CO<sub>2</sub> . 80%N<sub>2</sub>, 40%CO<sub>2</sub>. 60% N<sub>2</sub> or 60%CO<sub>2</sub>. 40% N<sub>2</sub> had an



extended shelf life.

**Key Words:** Food Safety, Pathogens, Poultry and Modified Atmosphere Packaging

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27/127/Nutrition and Healthy Lifestyle

**Efficacy of acetic acid and modified atmosphere packaging against *Campylobacter jejuni* in poultry**

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**Introduction:** Raw poultry is a well-recognized source of *Campylobacter jejuni* and many surveys have confirmed the presence of this pathogen on fresh poultry. There is a great interest in reducing surface microbial contamination of poultry, with particular regard to reducing the levels of pathogens

**Objectives:** The aim of this study was to evaluate the combined effect of acetic acid washing and packaging in modified atmospheres on the growth of *Campylobacter jejuni* on poultry legs stored at 4°C.

**Method. Design:** Fresh chickens legs were inoculated with *Campylobacter jejuni*. After the inoculation, the chicken legs were dipped into a 2% acetic solution or distilled water (control). Inoculated samples were packaged under different gas mixtures: vacuum, 20%CO<sub>2</sub> . 80%N<sub>2</sub>, 40%CO<sub>2</sub>. 60% N<sub>2</sub> or air

Surface pH values, sensorial characteristics and *Campylobacter jejuni*, mesophiles and psychrotrophs counts were evaluated after treatment (day 0) and after 1, 3, 6, 8, 10, 13, 15 and 17 days of storage at 4° C.

**Results:** Significant differences (p<0.05) in mesophiles and psychrotrophs counts were found between the legs treated with 2% acetic acid and the control legs after treatment. The air-packaged legs had the fastest increase in mesophiles counts. The lowest mesophiles counts were observed in those samples packaged in 40%CO<sub>2</sub>. 60% N<sub>2</sub>. Legs washed with a 2% acetic acid solution showed a significant (p<0.05) inhibitory effect on *Campylobacter jejuni* compared to control legs, being about 1.14 log units lower in the first ones than in control legs after treatment. No significant reduction on *Campylobacter jejuni* was observed in samples packaged under vacuum, 20%CO<sub>2</sub> . 80%N<sub>2</sub> or 40%CO<sub>2</sub>. 60% N<sub>2</sub> .

**Conclusions:** In conclusion, immersion of chicken legs in a 2% acetic acid solution can reduce *Campylobacter jejuni* populations on fresh poultry. Atmospheres containing 20%CO<sub>2</sub> . 80%N<sub>2</sub> or 40%CO<sub>2</sub>. 60% N<sub>2</sub> are not able to reduce *Campylobacter jejuni*

**Key Words:** Food Safety, Pathogens, Poultry and Modified Atmosphere Packaging

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27/136. Nutrition and Healthy Lifestyle

**Body composition and lipid profile in female water polo and football players**

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**Introduction:** Lipid metabolism depends on dietary fats and physical activity. Regular and moderate physical activity is associated with a healthy serum lipid profile and reduced risk of cardiovascular disease. However, prolonged intensive exercise, such as in elite athletes, induces changes in lipid metabolism that often depend on the type of sport.

**Objectives:** To investigate body composition and serum lipid profile (triglycerides, total cholesterol, HDL cholesterol, LDL cholesterol, LDL HDL index and total cholesterol. LDL index) in elite female water polo and football players compared to sedentary women.

**Method. Design:** Elite female water polo (N=15) and football players (N=19) were included in this study. Control group was composed of 19 sedentary women. All study participants were apparently healthy and aged 20-23 years.

**Results:** No significant differences were found in BMI among the examined groups. Body fat (%) and serum levels of triglycerides were significantly lower in female football players than in control group (p<0.05). Furthermore, football players had significantly lower serum concentration of total cholesterol and LDL cholesterol than both water polo (p<0.05) and control groups (p<0.001), and the same parameters were also significantly lower in water polo group than in control subjects (p<0.05). The LDL. HDL-cholesterol ratio and the total cholesterol. HDL cholesterol ratio were both significantly lower in athletes than in control group.

**Conclusions:** Differences in body composition and in lipid profiles in our study indicate that physical activity and type of exercise affect body fat and biochemical parameters in women.

**Key Words:** Body Composition, Lipid Profile, Elite Female Athletes, Football, Water Polo

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27/139. Nutrition and Healthy Lifestyle

**Maternal L-Leucine supplementation promotes changes in milk and plasma offspring fatty acid composition in rats**

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**Introduction:** Early nutrition plays an important role in long-term health of individuals.

**Objectives:** We have already shown that dietary supplementation with leucine may contribute to a healthier profile of body composition in lactating rats. Here, we tested whether leucine could also contribute to the fine tuning of milk composition and then to modulation of long-term effects in offspring's health.

**Method. Design:** We used Wistar dams that received a control diet (C) or 2% L-Leucine supplemented diet (L) from delivery to the end of lactation (21days) and their offspring, which from weaning received control diet. Milk samples (17d of lactation) and offspring plasma samples (21d and 9 months of life) were obtained and fatty acid content (FA) was analyzed by gas chromatography. Data were normalized by total area of detected peaks in each sample.

**Results:** The milk from L dams showed a statistically significant increase in the short and medium-chain FA (C8:0, C10:0, C14:0 and C16:0) and a relative increase in the C18 unsaturated serie: vaccenic, linoleic and  $\alpha$ -linolenic, together with increased proportion of eicosapentaenoic and docosahexaenoic. Plasma FA in offspring showed associated changes in both genders (21d): increased C15:0, C17:0, vaccenic and eicosatrienoic and decreased oleic acid. Interestingly, increased proportion of gadoleic acid was exclusively seen in males and of  $\alpha$ -linolenic in females. In adult life, females from L supplemented dams did not differ from controls in plasma FA composition, whereas males, still had a different ratio in specific FA versus the respective age-controls (increased C15:1, oleic and  $\alpha$ -linolenic).

**Conclusions:** Leucine maternal dietary supplementation during lactation has a significant impact on milk FA composition, which is also reflected in plasma FA of offspring. Interestingly, although similarities between young males and females were present, we also found gender-specific effects at both early- and adult age. Study of metabolic consequences of these effects is ongoing.

**Key Words:** leucine, milk fatty acids, biomarkers, early-nutrition

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### 27/143. Nutrition and Healthy Lifestyle

#### **Is there a relation between the nutritional adequacy of diets and their greenhouse gas emissions?**

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**Introduction:** Food is a contributor to the greenhouse gas emissions (GHGE).

**Objectives:** The aim of this study was to compare the GHGE of self-selected diets, depending on their level of nutritional adequacy.

**Method. Design:** Food consumption data from 1918 adults participating in the national INCA2 survey was used to identify 4 groups of eaters for each gender, based on the nutritional adequacy of their diets. Adequate eaters were defined as those having a diet complying with three nutritional objectives: a Mean Adequacy Ratio

(MAR, mean of % recommended intakes for 20 essential nutrients) above the median; a Mean Excess Ratio (MER, mean of % maximal recommended values for sodium, SFA and free sugars) below the median; an Energy Density (ED, in kcal. 100g of solid food intakes) below the median. Intermediate+, Intermediate- and Inadequate diets were defined as those fulfilling 2, 1 or 0 nutritional objectives, respectively. Dietary GHGE was estimated for each individual, based on the GHGE (in CO<sub>2</sub>-eq. 100g edible weight) of 74 highly consumed foods, representative of their food category.

**Results:** Adequate eaters had both the lowest energy intake and the highest food intake. In adequate diets, the energy contribution from plant-based foods (which have lower GHGE than animal products, on a per weight basis) was higher than in inadequate diets (49% vs 32% of total energy intake, respectively). Dietary GHGE did not differ between the 4 groups of men (p=0.16). Among women, the adequate eaters had the highest GHGE (p=0.005). However, whatever the gender, adequate diets presented the lowest GHGE when adjustments were made on daily quantities consumed and the highest GHGE when adjustments were made on daily energy intakes.

**Conclusions:** The relation between the nutritional adequacy of self-selected diets and their greenhouse gas emissions seems to be weak because nutritionally adequate diets contain high amounts of foods with low GHG emission.

**Key Words:** Greenhouse gas emissions, nutrition, diet

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### 27/144. Nutrition and Healthy Lifestyle

#### **Consumption of fried foods and weight gain in a Mediterranean cohort: The SUN Project**

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**Introduction:** The consumption of fried foods is believed to be linked with obesity and higher weight gain, however, the evidence from long-term randomized trials or prospective epidemiological studies is scarce.

**Objectives:** Therefore, the aim of our study was to prospectively evaluate the association between the consumption of fried foods and weight change and the incidence of overweight, obesity in a Mediterranean cohort.

**Method. Design:** Prospective cohort study of 9850 men and women with a mean age of 38.1 years (SD 11.4) who were followed-up for a median of 6.1 years to assess average yearly change in body

weight, and incidence of overweight. obesity.

**Results:** The consumption of fried foods was associated with higher weight gain, but the differences were of small magnitude and statistically non-significant. The incidence of overweight. obesity during follow-up was also assessed in the subset of 6821 participants with initial body mass index <25 kg. m<sup>2</sup> (initially free of overweight. obesity), after adjusting for potential confounders, the odds ratio for developing overweight. obesity among participants who consumed fried foods >4 times. week was 1.37 (95% confidence interval: 1.08 to 1.73) in comparison with those who consumed fried foods <2 times. week (p for trend = 0.02).

**Conclusions:** In this Mediterranean prospective cohort, a more frequent consumption of fried foods at baseline was associated with a higher risk of subsequently developing overweight. obesity during follow-up.

**Key Words:** fried food intake, obesity, overweight

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## 27/145. Nutrition and Healthy Lifestyle

### Dietary fat intake and quality of life: the Sun Project

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**Introduction:** Few studies have related nutritional factors with quality of life in healthy populations.

**Objectives:** To assess whether mental and physical health related quality of life (HRQL) were associated with dietary fat intake.

**Method. Design:** This analysis included 8,430 participants from the "Seguimiento Universidad de Navarra", SUN cohort study (1999-2010). The intake of saturated fatty acids (SFA), polyunsaturated fatty acids (PUFA), trans unsaturated fatty acids (TFA), and monounsaturated fatty acids (MUFA) was assessed through a 136-item food-frequency questionnaire at baseline. HRQL was measured with the SF-36 Health Survey after 4 years of follow-up. Generalized Linear Models were fitted to assess the regression coefficients (b) and their 95% confidence intervals (95% CI) for the 8 domains of the SF-36 according to successive quintiles of each kind of fatty acids intake.

**Results:** The multivariate-adjusted models revealed a significant inverse association between TFA intake (grams per day) and most of the mental (vitality, social functioning and role emotional), and physical (physical functioning, bodily pain and general health) domains. For vitality: highest quintile of intake (Q5) vs. lowest quintile (Q1), b=-2.0, 95% CI= -3.1, -0.9. Moreover a dose-response relationship (p for trend<0.05) was found for each domain. For SFA intake, a significant inverse association was found for vitality and most of the physical domains (role physical, general health and physical functioning). For vitality :( Q5 vs. Q1), b=-1.7; 95% CI= -2.8, -0.6. Vitality, physical functioning, and general health also showed a dose response relations-

hip (p for trend<0.05). After adjusting for potential lifestyle or dietary confounders, including adherence to a Mediterranean Dietary Pattern, the association with the mental domains and general health for TFA and social functioning and role physical for SFA remained significant.

**Conclusions:** A detrimental relationship between SA and TFA intake at baseline and quality of life measured 4 years later was found.

**Key Words:** dietary fats; SF-36; quality of life

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## 27/154. Nutrition and Healthy Lifestyle

### Heart symbol: a tool to decrease salt intake

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**Introduction:** Salt intake has decreased in Finland over the past decades, but still exceeds the recommended intake level. The main sources of salt are main dishes and cereal and bakery products. Every day over 2 million meals are served by catering services in Finland (population 5.2 million people). Since 2000 Heart Symbol has been one tool to decrease salt intake and also raise public awareness about nutritional quality of food. Foods and nowadays also meals of lower salt content can be labeled with the Heart Symbol. The criteria of the symbol include also fat, fiber and sugar.

**Objectives:** To illustrate tailored criteria of Heart Symbol and to estimate their potential for reducing salt intake components of a regular meal were changed to components that fulfill Heart Symbol criteria.

**Method/Design:** An example meal included: Fillet of salmon (portion size 120 g; salt 1.30 g→0.95 g), rice (110 g; 1.10 g→0.30 g), salad dressing (15 g; 0.20 g→0.15 g), bread and spread (35 g; 0.40 g→0.25 g).

**Results:** Total salt intake from a regular meal (3.0 g) reduced to 1.65 g when Heart Symbol meal was chosen. In addition, if for example bread eaten daily in Finland would be replaced by bread complying with the criteria, the salt intake would be 0.6 grams lower.

**Conclusions:** The Heart Symbol (on food packages as well as in lunch) has effected to salt intake reduction. Besides it has effected on fat, fiber and sugar intake also. Co-operation with food industry is important since their efforts on reformulating and developing new products including less salt is needed to have better options available for consumers and for those working at catering sector. Heart Symbol criteria set useful goals for product reformulation and recipes for meals served by catering service, which helps to meet goals for better food quality.

**Key Words:** labeling, salt intake, salt reduction, food nutritional quality.

**Plasma interleukin-6 (IL6), IL6 soluble receptor levels and energy intake after exercise in monozygotic twins**

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**Introduction:** It has been described an increase in circulating levels of Interleukin-6 (IL6) during exercise. However, it is not precisely known how an episode of physical activity is related with the relative reduced energy intake that some authors have reported immediately after exercise

**Objectives:** Given the proposed effect of central IL6 on appetite, we have assessed whether an exercise bout is related with IL6 and IL6 soluble receptor (IL6sR) plasma levels, as well as reduced energy intake immediately after a controlled physical activity intervention

**Method/Design:** A co-twin control study was carried out with five young male monozygotic twin pairs (range: 18-24y). Within each pair, one twin performed 45 minutes of exercise on a treadmill belt at 95% of anaerobic threshold plus 7 minutes at 90% VO<sub>2</sub> max, while his co-twin remained non-active for the same period of time. Energy intake was registered in all twins. Venous blood samples were taken at baseline, immediately after exercise and after ingestion. Hemoglobin concentrations and hematocrit were measured to estimate changes in plasma volume during exercise. The concentration of IL6 and IL6sR were measured via ELISA.

**Results:** Plasma IL6 levels increased after the physical activity bout ( $p < 0.05$ ), with statistically significant differences between the pattern of IL6 plasma level curves in active twins versus their non-active cotwins. A trend for increased IL6sR plasma levels were also noted after exercise, without achieving statistical significance. Plasma levels of IL6 also increased in twins submitted to exercise after subsequent ingestion of a high-carbohydrate ad-libitum meal. Active twins showed a lower energy intake after exercise compared to non-active cotwins ( $p < 0.005$ ).

**Conclusions:** The present study supports the hypothesis of increased plasma levels of IL6 during exercise with a possible involvement in post-exercise energy intake. Supported by FONDECYT 1090388.

**Key Words:** Interleukin 6, Interleukin 6 soluble Receptor, exercise, energy intake, twins

**Polyunsaturated fatty acids as biomarker of their dietary intakes in adult Serbian population**

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**Introduction:** The fatty acid composition of serum and erythrocyte phospholipids reflects the type of dietary fat and may be used as an objective estimate of the type of fats proportionally consumed by an individual. Dietary habits in our population were energy-dense diet, high in saturated fat with imbalance intake of polyunsaturated fats which may be important in the pathogenesis of many lifestyle-related diseases.

**Objectives:** In a cross-sectional study, we investigated the relationship between habitual intakes of individual n-6 and n-3 PUFA and their percentages in serum and erythrocyte phospholipids in a population of adults men and women.

**Method. Design:** In 157 participants (50 men, 107 postmenopausal women, aged  $54 \pm 8$ yr, BMI  $< 25$ kg. m<sup>2</sup>) nutritional habits have been evaluated by Food Frequency Questionnaire. Serum phospholipids was separated by one dimensional thin-layer chromatography and fatty acid analyses (expressed as mean %) were performed using gas-liquid chromatography

**Results:** Dietary intakes of linoleic acid, arachidonic acid, alpha-linolenic acid, EPA and DHA were in strong positive correlation ( $r = 0.814$ ,  $r = 0.918$ ,  $r = 0.863$ ,  $r = 0.910$ ,  $r = 0.892$ ) with their respective percentage in serum phospholipids. In erythrocyte phospholipids, linoleic acid, EPA and DHA were significantly associated ( $r = 0.848$ ,  $r = 0.802$ ,  $r = 0.816$ ,  $p \leq 0.0001$ ) with corresponding dietary intakes. No correlation was observed between erythrocyte levels of arachidonic acid and alpha-linolenic acid and its habitual intake.

**Conclusions:** N-3 fatty acid measured in serum and erythrocyte phospholipids appear to be strongly associated with dietary intake. Erythrocyte levels of some specific acids linoleic acid, EPA and DHA are acceptable markers of their habitual intakes. These findings suggest the usefulness of measurements phospholipids fatty acid status in supplementation-intervention and nutrition-epidemiological studies in relationship between diet intake and disease. health outcome.

**Key Words:** Dietary intake;fatty acids;biomarker; phosholipids; erythrocyte

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**27/166. Nutrition and Healthy Lifestyle**  
**Hydration strategies during ultra-endurance cycling. Do they differ with age?**

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**Introduction:** The drinking strategies and hydration beliefs of runners differs by age. Running and cycling provide different nutritional challenges therefore the drinking habits of runners may differ from those of cyclists.

**Objectives:** The present study aimed to describe the hydration practices of ultra-endurance cyclists aged 50 years and older (OLD) compared to the practices of cyclists aged 49 years and younger (YOUNG) during a 387 km cycle race. A secondary aim was to describe the effects of these practices on blood sodium concentration.

**Method. Design:** Fifteen male participants (9 YOUNG, 6 OLD) provided blood and urine samples pre- and post-race in order to measure sodium concentration and hydration status. Body weight was measured at the start and end of the race. Post race a questionnaire on hydration was completed. Food and fluid intake was assessed via information supplied by support crews and cyclists. All data were analysed for normal distribution and differences between the two groups determined by independent t-tests using SPSS software.

**Results:** At the end of the race those indicating a feeling of thirst tended to be younger 39.7 (7.6) years than those who did not feel thirsty 49.3 (11.3) years ( $P=0.055$ ). There was no significant correlation between fluid intake and age but there was a significant difference in the fluid intakes of OLD group and the YOUNG group ( $P=0.050$ ). The mean (SD) fluid intake rate the YOUNG group was 0.61 L.h<sup>-1</sup> compared to 0.42 L.h<sup>-1</sup> for the OLD group. The mean (SD) blood sodium concentration at the end of the race was 137.1 (3.4) mmol.L<sup>-1</sup> for the OLD and 135.1 (2.6) mmol.L<sup>-1</sup> for the YOUNG ( $P=0.231$ ).

**Conclusions:** There is a difference in the nutritional habits of ultra-endurance cyclists based on age. This may have implications for the nutritional support and advice provided to these athletes.

**Key Words:** Hydration; Sodium; Age.

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**27/171. Nutrition and Healthy Lifestyle**  
**The environmental nutrition model: a tool for societal change toward sustainable food production and consumption**

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**Introduction:** Food production and consumption patterns have drastically changed during the last century. Current food systems

are unsustainable. A new paradigm is needed for sustainable food systems from the ecological and societal aspects.

**Objectives:** To develop a comprehensive model for understanding how food systems shape and are shaped by biological, social and environmental relationships and interactions.

**Method. Design:** Research was conducted on the following: 1) Life cycle analysis on multiple foods of plant and animal origin; 2) Current food production practices; 3) Quantification of food systems waste generation, including greenhouse gas emissions; 4) Population food eating patterns; 5) Determinants consumer demand for food.

**Results:** The Environmental Nutrition Model resulted from these methods. It is a graphic conceptual framework that encompasses the multifaceted associations of the food system with the physical and social worlds, and its intended and undesirable consequences in the environment and in the health of populations. Inputs and outputs of the food system are shown, including those intended (food) and those unintended (waste). The processing, transportation, storage, retail and waste disposal practices are incorporated in the food lifecycle. These are affected by consumer demands in a given society.

**Conclusions:** This Environmental Nutrition Model will be a useful didactic and research tool to explain, understand and ultimately contribute to the necessary modifications and changes of the current food systems to achieve more sustainable practices, and will be presented.

**Key Words:** food systems, environment, nutrition, model sustainability

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**27/174. Nutrition and Healthy Lifestyle**  
**Availability, usage and nutritional significance of worksite canteens in Finland**

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**Introduction:** In Finland lunch is mainly eaten at worksite canteens or, especially among women, as a packed meal at workplace's break room. Worksite canteen can be useful place for improving employees' diets by offering servings that are balanced according to dietary guidelines. Well-planned catering services at workplaces could since have major effects on nutrition and well-being of employees as well as on public health.

**Objectives:** Our aim was to study the availability and usage of canteens according to socio-demographic factors and characteristics of the workplace. Further aim was to study the nutritional quality of lunch in worksite canteen.

**Method. Design:** Data was derived from the Health Behavior and Health among Finnish Adult Population survey, Work and Health in Finland survey, and National Findiet 2002 Study. Employed Finns

aged 19-64 years were included.

**Results:** Worksite canteen was best available to well-educated white-collar workers working in large workplaces at capital area. The most unsatisfactory situation was among men working at small workplaces with physically demanding jobs, and private enterprises. The educational level and occupational status of the respondent were strongly associated with the use of worksite canteen. Employees with higher educational level used canteens more often than those with lower education. Male employees consumed more fresh vegetables and vegetable foods when eating at worksite canteen. Women have more fresh vegetable, poultry, and salad dressings at canteen.

**Conclusions:** The availability of the canteen, education, occupational status, and work-related factors played an important role in lunch place choice among Finnish employees. To ensure the nutrition, health and well-being of employees, employers should enable them to have good quality meals during working hours. The availability of worksite canteens should be supported especially in lower socioeconomic groups. In addition, employees should be encouraged to have lunch at a worksite canteen when it is available by removing its structural barriers.

**Key Words:** Worksite canteen, packed lunch, eating out of home, socioeconomic differences, working conditions

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27/177. Nutrition and Healthy Lifestyle

**Dietary taurine reduces hepatic secretion of cholesteryl ester and enhances fatty acid oxidation in rats**

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**Introduction:** Taurine, a sulfur-containing amino acid present in high concentrations in animal tissues, is available from dietary sources and also can be synthesized *in vivo* from other amino acids. Dietary taurine exhibits various physiological and pharmacological actions, including hypocholesterolemic and antiatherogenic effects, in experimental animals, especially rats, mice, and Japanese (LAP) quail fed high cholesterol diets.

**Objectives:** We investigated the fate of exogenous fatty acid in connection with decreased hepatic accumulation and secretion of cholesteryl esters in rats fed diets containing taurine.

**Method. Design:** Five week-old male Wistar rats were fed the control diet or the experimental diet containing 5% taurine for 14 days. Fresh livers were excised and perfused shortly with the recirculating Krebs-Henseleit buffer (pH 7.4) and 25% washed bovine erythrocytes at 37°C. AT the beginning of recirculation, [1-14C]oleate was added as an exogenous fatty acid, and the same solution was continuously infused. At 1-h intervals, the perfusate was taken for analyses of ketones and lipids. The liver perfusions of the control and taurine groups

were performed at the same time, and continued for a total 4 h.

**Results:** Providing taurine as 5% of the diet for 14 days significantly decreased concentrations of cholesterol, especially cholesteryl esters in both serum and liver. Ketone body production and incorporation of exogenous [1-14C]oleate into ketone bodies in liver perfusate were consistently higher during a 4-h perfusion period in taurine-fed rats than in control rats. The elevation was accompanied by increased activity of liver mitochondrial carnitine palmitoyltransferase, a rate-limiting enzyme for fatty acid oxidation. Dietary taurine significantly reduced hepatic secretion of cholesteryl ester and decreased incorporation of exogenous oleic acid substrate into this lipid molecule.

**Conclusions:** Taurine-induced reduction in hepatic accumulation of cholesteryl ester was associated with reduced hepatic secretion of this lipid molecule, and was inversely related to enhanced ketone body production and fatty acid oxidation.

**Key Words:** Taurine, cholesterol ester secretion, fatty acid oxidation, rat liver

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27/181. Nutrition and Healthy Lifestyle

**Maternal L-leucine supplementation during lactation affects food preferences in adult offspring**

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**Introduction:** Early nutrition plays an important role in long-term health of individuals.

**Objectives:** We have shown that maternal dietary supplementation with L-leucine promotes changes in the expression of hypothalamic neuropeptides associated with food intake control. The objective of this study was to evaluate long-term effects of maternal supplementation with L-leucine on the food preferences of adult offspring.

**Method. Design:** Food preference was assessed by the two-bottle preference test, carried out in control rats (from dams fed with control diet all along the experiment) and in Leu rats (offspring from dams fed a chow diet supplemented with 2% of L-leucine during lactation and then, since weaning exclusively fed with the control diet). Two bottles, containing either a carbohydrate rich- (CR) or fat rich-liquid diet (FR), with identical caloric density (2.31 Kcal. g), were offered to the animals 4h after the beginning of the light cycle at the age of 5.5 months. One hour later, the intake of each diet was determined and corrected for spillage.

**Results:** Leu rats showed a decreased total energy intake in comparison to the control group (17% in females ( $p=0.037$ ) and 21% in males ( $p=0.017$ )). This was mainly due to a decreased selection of CR diet respect to the FR. Therefore, female Leu rats ingested a 27% ( $p=0.006$ ) less CR diet than controls and, male leucine rats ingested a 24% ( $p=0.041$ ) less CR diet than the respective controls. Differences in FR intake were not statistically significant between groups.

**Conclusions:** Although maternal L-leucine supplementation was performed only during lactation (for 20 days after delivery), this had a significant impact in food preferences manifested by adult offspring (determined at 5.5 months of age). In particular, a decreased preference for carbohydrate-enriched liquid food versus fat-rich food was observed in both genders. Study of molecular mechanism involved is ongoing.

**Key Words:** leucine, food preferences, obesity, biomarkers, early-nutrition

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27/188. Nutrition and Healthy Lifestyle

### Optimization of peak bone mass by maternal LCPUFAs consumption in a model of early programming

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**Introduction:** Maximizing the peak bone mass is currently considered as a key preventative strategy against osteoporosis. Peak bone mass is partly inherited and is strongly influenced by environmental factors, including maternal diet, during uterine and early postnatal life.

**Objectives:** The aim of this study was to determine the relationship between maternal dietary intake of long chain polyunsaturated fatty acids (LCPUFAs) and offspring peak bone mass. architecture in early adulthood female rats.

**Method. Design:** Offspring from Sprague-Dawley dams were fed either standard rodent AIN93-G diet (C) or the same diet supplemented with LCPUFAs (50% of the total fat) (LCP), during gestation and lactation periods. The animals were maintained on the AIN93-G diet to adulthood. Femur, tibia and vertebrae samples were taken at 16 weeks of age and bone mineral density (BMD), mineral content (BMC) and structure were analyzed by dual energy X-ray absorptiometry (DXA) and computed tomography ( $\mu$ -QCT), respectively.

**Results:** BMD. BMC as well as bone structure of axial bones were significantly influenced by maternal consumption of LCPUFAs. BMD and BMC of lumbar vertebrae of the offspring were increased around 20% by maternal intake of LCPUFAs maternal intake as compared to the control group. In the female offspring, cancellous and cortical vertebrae structural parameters such as BV. TV, trabecular thickness, vBMD and cortical thickness were enhanced between 10 to 15% by maternal intake of LCPUFAs with a parallel reduction in trabecular separation and cortical porosity

**Conclusions:** Adolescent offspring from mothers fed with LCPUFAs during gestation and lactation displayed an increased BMD. BMC and improved bone architecture in lumbar spine as compared

to the offspring of mothers receiving the standard diet. Based on our study results, in non deficient conditions, LCPUFAs supplementation might be considered as a plausible nutritional option for optimizing the peak bone and architecture as a strategy to increase bone strength and to prevent bone fragility.

**Key Words:** Programming, Bone ,LCPUFAs

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27/191. Nutrition and Healthy Lifestyle

### Effects of dietary bread crust maillard reaction products on phosphorus bioavailability

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**Introduction:** Maillard reaction products (MRP) improve food palatability and are linked to some positive biological actions. However, diverse negative consequences, some of them related to protein damage and mineral availability have been established.

**Objectives:** To investigate effects of consumption of MRP from bread crust on phosphorus balance, trying to find out the responsables of the action among the different high and low molecular weight compounds present in the soluble fraction of the bread crust.

**Method. Design:** METHOD: Bread crust was submitted to enzymatic hydrolysis, separating its soluble fraction, subjected to ultrafiltration (5 kDa cut-off) to obtain compounds with molecular mass > 5 kDa (HMW) and < 5 kDa (LMW). The AIN-93G diet was used as control diet and the bread crust was incorporated to it to reach a final concentration of 10% (bread crust diet). The LMW and HMW fractions were individually added to the control diet in the proportion corresponding to bread crust (LMW and HMW diets).

Forty-four weanling rats were involved in an 88-d study, distributed into four groups and assigned to one of the dietary treatments. Two different balances were carried out in the experimental period: global phosphorus balance and last week balance. On 88-d animals were anaesthetized and sacrificed, removing small intestine and femur.

**Results:** Phosphorus balance in the last week was unchanged. However, considering the whole experimental period, a trend to improve bioavailability, significant in the HMW group, was observed. Higher phosphorus concentrations were measured in small intestine and bone.

**Conclusions:** During the last week of assay MRP from bread crust consumption does not alter phosphorus balance or bioavailability; however in the whole experimental period phosphorus retention tended to increase, despite a lower food intake. This fact increased

final phosphorus bioavailability, which was manifested in the incremented concentration of the element in small intestine and bone.

**Key Words:** Maillard reaction products, phosphorus bioavailability, bone, small intestine

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## 27/196. Nutrition and Healthy Lifestyle

### **Institutional capacity development in urban obesity prevention: results of EEN case studies in Flemish cities**

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**Introduction:** Screening of policy documents, academic literature on local politics and implementation theory leads us to think that institutional capacity should be developed at the local government level in order to promote healthy diets and physical activity towards children and adolescents.

**Objectives:** This abstract argues that the ‘institutional capacity’ is a critical success factor for the effectiveness of a local policy on the prevention of obesity.

**Method. Design:** Within the framework of the EEN-project (Epoque European Network) we have studied the development of institutional capacity for childhood obesity prevention in two case studies. In two Flemish cities we have used qualitative research methods by interviewing key persons in the obesity prevention policy towards children and adolescents.

**Results:** The results of these case studies indicate that the role of local political leaders in the development of institutional capacity for obesity prevention is bigger than was suggested in theory. First of all, their ‘sense of urgency’ about obesity problems in their own city is the cornerstone of any public intervention in this field. At the same time their awareness is motivating them to take up a steering role in the collaboration with all stakeholders in public health networks. Comparison between the two cities illustrates the importance of the political, electoral and institutional context for the development of an urban institutional capacity.

**Conclusions:** In sum, we argue that local political leadership and policy networking, which are the essential components of any institutional capacity, are ‘critical success factors’ for tackling obesity. More importantly, we recommend to develop ‘learning networks’ with local political leaders in obesity prevention in order to get the innovative knowledge on ‘institutional capacity development’ implemented in European cities and towns.

**Key Words:** institutional capacity development, public health policy networking, childhood obesity prevention

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## 27/198. Nutrition and Healthy Lifestyle

### **Factor-analytic structure of dislike food in kindergarten children**

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**Introduction:** Studying the correlative structure of young children’s dislike food may help us to understand the way to reduce dislike foods.

**Objectives:** This study analyzed children’s dislike foods to classify the dislike foods, in order to find the way of reducing them.

**Method. Design:** A questionnaire was given to the guardians of 754 children at 3 - 5 years old at 4 private kindergartens. Collection number was 722 (95.8 %). The questions included their choice of children’s dislike foods from 21 common foods. The dislike foods were classified by the factor analysis.

**Results:** Of the 3 to 5-year-old children, 78.6% had dislike food: 82.3, 83.4 and 70.1 % had dislike food at 3, 4 and 5 years old, respectively. There were significant differences by ages ( $p < 0.001$ ). The number of the dislike foods ranged 1 to 19 ( $2.8 \pm 3.0$ ). Examination of the scree plot suggested six factors for the factor analysis, which explained 44.3% of the variance ( $p < 0.001$ ). The six factors were interpreted from food factor loadings as “Meat”, “Vegetables”, “Tomato”, “Dry foods”, “Fruit” and “Dairy products”. Children tended to dislike foods within one or two particular factor category. The first factor “Meat” was composed of pork, chicken and beef. The second factor “vegetables” included cabbage, broccoli, spinach, green pepper, pea, cucumber and pumpkin. The third factor “tomato” consisted of tomato and cherry tomato. The second factor and third factor varied with ages significantly ( $p < 0.05$ , each): when the age raised, dislike food was reduced. The other factors were independent of ages.

**Conclusions:** The improvements of dislike food by age were different among the groups. It may be helpful in reducing the dislike foods, to do with attention to some of specific groups which were classified by this factor analysis. Children’s dislike food may be classified by some food groups.

**Key Words:** Dislike food, Children, Kindergarten, Nutrition Education 27/201. Nutrition and Healthy Lifestyle



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## 27/211. Nutrition and Healthy Lifestyle

### Food habits of Lithuanian adult population in relation to social determinants and lifestyle factors 1998-2010

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**Introduction:** Diet is associated with the risk of a range of health problems. Unhealthy nutrition habits are not equally distributed in different population groups. In addition, unhealthy habits tend to cluster.

**Objectives:** To evaluate the associations of nutrition habits of Lithuanian adult population with social and health behaviour factors.

**Method. Design:** From 1998 to 2010 seven cross-sectional Lithuanian health behaviour surveys were carried out using postal self-administered questionnaire. For every survey random sample of 3000 Lithuanians aged 20-64 was taken from the National Population Register. The response rates varied from 53.8% to 74.4%. Data of Food-frequency questionnaire were used to calculate the diet quality index (DQI). The DQI consisted of ten items reflecting the dietary guidelines. A high DQI score indicated healthy diet. Associations of the DQI score with social and health behaviour factors were investigated using regression analyses.

**Results:** The DQI score varied across socio-economic groups, being highest in the oldest age group, among women and high educated persons. Men and women drinking strong alcohol and beer at least once a week had lower DQI scores compared with those drinking alcohol less frequently. Regular smokers had a significantly lower DQI score than non smokers. DQI scores increased with increasing level of physical activity of men and women.

**Conclusions:** Dietary quality index may provide a comprehensive assessment of diet in the population and may be used for evaluation of health activity.

**Key Words:** Population Survey, Food Consumption, Socio-Economic Factors, Diet Quality Index (Dqi)

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## 27/212. Nutrition and Healthy Lifestyle

### Determinants of Vitamin D status in a general population of Danish adults

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**Introduction:** Danish legislation regarding food fortification has been very restrictive and vitamin D deficiency is thought to be common in Denmark due to inadequate dietary intakes and the fact that in

Denmark (latitude 56°N) vitamin D is only synthesized in the skin after exposure to solar radiation during summertime (April-September).

**Objectives:** The purpose of this study was to evaluate the vitamin D status of a general adult population in Denmark and, in addition, associations between vitamin D status and distinct life style factors were studied.

**Method. Design:** A random sample of 6,784 persons from a general population aged 30-60 years participated in a health examination in 1999-2001. Serum samples from all participants were stored and levels of 25-hydroxyvitamin D (25(OH)D) were measured by HPLC in 2009. Information on dietary intake of vitamin D and other life style factors were obtained by questionnaires. A total of 6,146 persons defined as ethnic Danes and with successful measurements of 25(OH)D were included in the analyses.

**Results:** The overall prevalence of vitamin D deficiency (25(OH)D < 25nmol. l) and insufficiency (25(OH)D < 50nmol. l) were 13.8% and 52.2%, respectively. A marked seasonal fluctuation was seen in serum levels of 25(OH)D - median values of 25(OH)D were lowest in February and highest in August. In multiple logistic regression models, low vitamin D status was significantly associated with obesity (BMI > 30), daily smoking and a sedentary lifestyle. However, measurements of 25(OH)D were not associated with the estimated dietary intake of vitamin D.

**Conclusions:** Our results suggest that poor vitamin D status is common among adults in a Northern European country without food fortification with vitamin D. In addition, we demonstrated that low serum levels of 25(OH)D were associated with several lifestyle factors.

**Key Words:** Vitamin D, Epidemiology

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## 27/218. Nutrition and Healthy Lifestyle

### Folate and Vitamin B12 in relation to Diabetes

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**Introduction:** Recently diabetes has been associated with nutritional status of some micronutrients in epidemiological studies, for example vitamin D.

**Objectives:** The aim of this study was to evaluate potential associations between diabetes and markers of folate and vitamin B12 status among Danish adults.

**Method. Design:** A total of 6,405 persons from a general Danish population aged 30-60 years participated in a health examination in 1999-2001 and were included in this study. Serum levels of folate and vitamin B12 were measured and the MTHFR-C677T polymorphism, known to be associated with impaired status of folate and vitamin B12. The primary outcome was diabetes defined according to WHO diagnostic criteria based on an oral glucose tolerance test (OGTT) and a haemoglobin A1c (HbA1c) based definition of diabetes. Information on doctor diagnosed diabetes and life style factors were obtained by questionnaires.

**Results:** No significant associations were found between diabetes and the MTHFR-C677T polymorphism. The prevalence of diabetes, defined by both considered criteria, increased significantly with increasing serum levels of vitamin B12 ( $p=0.011$  and  $p=0.028$ , respectively). In contrast, the prevalence of diabetes defined by the HbA1c criteria decrease with increasing serum levels of folate ( $p=0.013$ ) whereas no significant associations were found with diabetes defined by WHO diagnostic criteria. However, all significant associations disappeared when known diabetics (self-reported doctor diagnosed diabetes) were excluded from the statistical analyses.

**Conclusions:** We found no significant associations between diabetes and the MTHFR-C677T polymorphism known as a genetic marker of impaired metabolism of certain B-vitamins. Associations between diabetes and serum levels of folate and vitamin B12 were inconsistent and no significant associations were seen when known diabetics were excluded from the statistical analyses. This might indicate that the results from analyses including the entire population were influenced by a different dietary pattern among known diabetics compared to diabetics not aware of their disorder.

**Key Words:** Folate, Vitamin B12, Diabetes, Epidemiology

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#### 27/227/Nutrition and Healthy Lifestyle

### Effect of 12-Hydroxyheptadecatrienoic acid on caco-2 cell growth

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**Introduction:** 12 (S)-hydroxyheptadeca-5Z, 8E, 10E-trienoic acid (12-HHT) was first identified as an enzymatic product of arachidonic acid metabolism by cyclooxygenase (1) but thromboxane A2 synthase also catalyzes the conversion of prostaglandin H2 to 12-HHT (2). This compound has been identified in intestine as a natural ligand for leukotriene B4 (LTB4) receptor-2 (BLT2), a G protein-coupled receptor that was originally identified as a low-affinity receptor for LTB4 (3). However, their functional role remains elusive

**Objectives:** The aim of this study was studied the role of 12-HHT intestinal epithelial cell growth using an adenocarcinoma derived cell line (Caco-2)

#### Method. Design:

**Results:** Our results show that 12-HHT (0.001-1  $\mu\text{M}$ ) induced cell growth and DNA synthesis in a concentration dependent manner in absence of growth factors in Caco-2 cell cultures. Interestingly, this effect was blocked by LY255283, a BLT2 antagonist but not by U75302, a specific BLT1 antagonist. Moreover, we observed that Caco-2 growth induced by 12-HHT was reverted by ketoprofen, data that suggest the implication of prostaglandins in this effect of 12-HHT on Caco-2 cell growth

**Conclusions:** Thus, we propose that 12-HHT could be involved in the intestinal epithelial cell growth through the induction of prostaglandin release, eicosanoids with proliferative action on these cells (4)

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**Key Words:** intestinal epithelial cell; proliferation; eicosanoid; prostaglandin

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#### 27/228. Nutrition and Healthy Lifestyle

### Effect of MUFAs and PUFAs on CACO-2 cell growth and Prostaglandin synthesis

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**Introduction:** Colorectal cancer etiology is complex, involving both genetic and environmental factors. However, 50-80% of cases of colorectal cancer are considered due to environmental factors, such as dietary habits (1). Despite high fat intake being associated with increased risk of cancer, there are some indications that different types of fat have different effects (1), effects that could be related with fatty acid composition of fat. Thus, it has been shown that MUFAs promote human colon growth (2) whereas n-3 and n-6 PUFAs have different effects due to their action on eicosanoid production (3), mediators involved in intestinal epithelial cell growth (4). However, few studies have assessed the effect of specific fatty acids on these events

**Objectives:** The aim of this study was contributed to clarify this point using an adenocarcinoma derived cell line (Caco-2)

#### Method. Design:

**Results:** Our results show that oleic and linoleic acids and eicosapentaenoic acid (10-100  $\mu\text{M}$ ), in minor form, were able to induce Caco-2 cell growth and DNA synthesis in absence of growth factors whereas docosahexaenoic acid induced Caco-2 proliferation at 10  $\mu\text{M}$  but induced Caco-2 apoptosis at 100  $\mu\text{M}$ . Moreover, Caco-2 apoptosis induced by docosahexaenoic acid was not reverted by antioxidants such as taurine, glutathione or trolox. Furthermore, we also observed that linoleic and eicosapentaenoic proliferative effects could be related with prostaglandin synthesis, eicosanoids that are involved in the control of Caco-2 cell growth (5)

**Conclusions:** Thus, MUFAs and PUFAs could be involved in the regulation of Caco-2 cell growth and apoptosis

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**Key Words:** oleic acid; linoleic acid; eicosapentaenoic acid; docosahexaenoic acid; cell proliferation

#### 27/231. Nutrition and Healthy Lifestyle

### Consumption of ready-to-eat (RTE) cereals and intake of macro and micronutrients in Chilean children

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**Introduction:** RTE cereals are easy to prepare, they are low in fat and are fortified with vitamins and minerals which have the potential to improve the diet quality of those consuming them.

**Objectives:** To assess the consumption of macro and micronutrients in Chilean children in relation to their intake of RTE cereals.

**Method. Design:** The sample consisted in 1,437 children aged 6-13 years attending public and private schools in Santiago, Chile. A 24-hour dietary recall was administered to each child by trained nutritionists using models of plates and cups. Diet was analyzed by the software Food Processor 7.9 to which Chilean preparations were added. For the purpose of groups comparison an ANOVA and Tukey's multiple comparison were used.

**Results:** Anthropometric characteristics of boys and girls were, respectively (mean  $\pm$  SD): age, 10,5  $\pm$  0.07 y and 10.4  $\pm$  0.08; weight, 39.3  $\pm$  0.4 kg and 39.4  $\pm$  0.4; height (142  $\pm$  1.0 cm) and IMC (19.2  $\pm$  0.1 kg. m<sup>2</sup>) were the same in both sexes. Overweight and obesity was present in 32% of boys and 28% of the girls. Those boys and girls which consumed RTE cereals showed a significantly greater intake of energy, proteins and carbohydrates, although the proportion of calories from fats decreased with the intake of cereals. As RTE cereal consumption increased there was an increase in the intake of calcium and zinc.

**Conclusions:** An increase in RTE cereals intake in schoolchildren improves the consumption profile of macro and micronutrients.

**Key Words:** Ready to eat cereal, nutrient intake, school children

#### 27/232. Nutrition and Healthy Lifestyle

### Nutritional status of Chilean children in relation to ready-to-eat (RTE) cereal consumption

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**Introduction:** The intake of RTE-cereal has been associated to reduced prevalence of obesity in some studies.

**Objectives:** To determine the nutritional status in school children in relation to their consumption of RTE cereal.

**Method. Design:** A sample consisting of 1,437 schoolchildren aged 6-13 years was studied. Anthropometric measurements included weight and height from which the body mass index (BMI) was obtained to determine their nutrition status using the CDC. NCHS 2000 tables. Cutoff points were: underweight, IMC  $p < 10$ ; normal, IMC  $p \geq 10$ -  $p < 85$ ; overweight, IMC  $p \geq 85$ - $p < 95$ ; obese, IMC  $p \geq 95$ . Three categories for RTE cereal consumption were established: 0 g, 1-30 g >30g. day. ANOVA and Tukey were used to compare groups.

**Results:** General characteristics of boys and girls, were, respectively (mean  $\pm$  SD): Age, 10,5  $\pm$  0.07 y and 10.4  $\pm$  0.08; weight, 39.3  $\pm$  0.4 kg and 39.4  $\pm$  0.4; height (142  $\pm$  1.0 cm and IMC (19.2  $\pm$  0.1 kg. m<sup>2</sup>) were the same in both sexes. Prevalence of obesity in boys was significantly less in those consuming RTE cereals than those who did not (16.1% v. s 4.0% consuming 0g and >30g respectively,  $p < 0.01$ ). The same occurred in girls (14.2 v. s 3.9% consuming 0g and > 30 g respectively,  $p < 0.001$ ). Prevalence of overweight was the same in boys and girls.

**Conclusions:** RTE cereal consumption in children is inversely related to the prevalence of obesity.

**Key Words:** Ready to eat cereals, nutritional status, school children

#### 27/234. Nutrition and Healthy Lifestyle

### Nutritional status of vitamin d in elderly women living on Rio de Janeiro ? Brazil

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**Introduction:** Vitamin D insufficiency is common in elderly populations and leads to secondary hyperparathyroidism, high bone turnover, bone loss and osteoporotic fractures. Different categories

have been proposed to classify vitamin D status: vitamin D deficiency (<50nmol. L) that leads to osteomalacia, with the ensuing histomorphometric changes; vitamin D insufficiency (50-80 nmol. L) that has an effect on calcium homeostasis, such as a diminution in calcium absorption and 1,25(OH)2D levels, leading to secondary hyperparathyroidism; and, vitamin D sufficiency with no effect on calcium homeostasis.

**Objectives:** To evaluate the nutritional status and plasma levels of 25-hydroxyvitamin D [25(OH)D3] in elderly women living on Rio de Janeiro (latitude south 22°:54:10S) – Brazil.

**Method. Design:** It was a transversal study evaluated on spring with ambulatory elderly women over 60 years of age.

**Results:** In a total, were evaluated 162 women with 69.1 ± 5.6 years old; 159 were Hispanics and 3 were Caucasians. The medium plasma level of 25(OH)D3 in all the group was 67.2 ± 19.5 nmol. L. In this group, 18.5% of women showed vitamin D deficiency and 58.6% showed insufficiency. However, when we analyzed per age group, the plasma level of 25(OH)D3 was 69.3 ± 21.0; 64.3 ± 18.5; 76.4 ± 17.3 nmol. L to 60-69, 70-79 and over 80 years old groups, respectively. In 60-69 years old group (95 women), 15.8% of the women showed vitamin D deficiency and 60% showed insufficiency; in 70-79 years old group (60 women), 25.0% of the women showed vitamin D deficiency and 56.6% showed vitamin D insufficiency; and, in over 80 years old group (7 women), only 57.1% of the women showed vitamin D insufficiency.

**Conclusions:** In this study was observed an elevated prevalence of vitamin D deficiency and insufficiency in elderly women living on Rio de Janeiro - Brazil.

**Key Words:** Vitamin D deficiency. insufficiency, elderly

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#### 27/239. Nutrition and Healthy Lifestyle

### **Distribution of food intake in Mexican bachelor's student by sex and by Body Mass Index**

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**Introduction:** During adolescence, important physiological changes occur and adequate nutrition is essential for optimal development.

**Objectives:** To determine the dietary patterns in male and female students of a public high school according to their Body Mass Index (BMI) in Hidalgo, Mexico.

**Method. Design:** From a probabilistic sample of 1020 subjects, we took a random sample of 101 students (females 51.5%, males

48.5% ) between 14 and 19 years (X = 15.89, DE = 1.07). We applied a Mexican reproducibly Food Frequency Questionnaire. For practical reasons the consumption frequency were grouped in four categories: "Never", "Low intake" (less than once a month, once a month, and 2-3 times a month), "Moderate intake" (once a week, 2 - 4 times a week and 5-6 times per week) and "High intake" (once per day, 2-3 times per day and 4-5 times per day). Foods were joined by groups according with Mexican Food System of Equivalents. Each subject was weighed and heighted to obtain their BMI.

**Results:** According to BMI, cereals reported the highest percentages in "Moderate intake" category (71.4% overweight, malnutrition 77.8%), followed by sugars (57.1% overweight, malnutrition 61.1%) and fruits (57.1% overweight, normal weight 40%). In "High intake" category the highest values were in: seafood (malnutrition 5.6%), legumes (malnutrition 5.6%, obesity 11.1%) and milk (5.6% malnutrition, 1.7% normal weight). Comparing by sex, the highest percentages were obtained in: cereals (women 48.1%, men 73.5%), milk (women 42.3%, men 67.3%), meats (women 7.7%, men 42.9%) and fats (women 17.3%, 30.6% men). Statistical differences were founded by BMI categories and by sex.

**Conclusions:** Men consume more foods; particularly those of animal origin due to the requirement of protein to gain muscle mass. Malnutrition men were those who ate more foods. We identified dietary patterns in Mexican bachelor's students obtaining comparable results by sex and BMI.

**Key Words:** Food intake, adolescents, dietary pattern, BMI, Mexico.

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#### 27/241. Nutrition and Healthy Lifestyle

### **Self-assessment and quality of life as well as depression symptoms occurrence among overweight and obese persons in comparison to persons of normal weight**

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#### **Introduction:**

**Objectives:** Aim of work: to examine and explain relationship between body image and self-assessment and general evaluation of quality of life and satisfaction with life as well as occurrence of depression symptoms among overweight and obese persons.

**Method. Design:** Total of 100 persons, divided into two equal groups: with normal weight and overweight and obese ones, underwent examination. To measure examined factors the following self-descriptive forms were used: Fitt's self-assessment scale, Beck Depression Inventory (BDI), Quality of Life and Satisfaction with Life Scale (SWLS, Deiner Scale).

**Results:** Based on obtained results it was found that overweight and obese persons in comparison with persons of normal weight were characterised by higher self-assessment regarding personal and social

aspects, and higher sense of quality of life related with personal, family and financial situation. It was proved that self-assessment level mainly affects depression, sense of quality of life and satisfaction with life. Body weight probably intensifies meaning of self-assessment. Moreover, results show that low self-assessment is accompanied by high level of depression, high self-esteem conditions higher sense of quality of life, while level of felt satisfaction with life is related to other aspects of self-assessment among persons of normal weight, that among overweight and obese ones.

**Conclusions:** Overweight and obese persons are characterized by higher self-assessment regarding areas not related to physical appearance in order to avoid negative noticing of him. herself what may cause decrease in self-confidence. Lack of significant differences in range of depression symptoms between persons indicating higher and proper BMI proves that appearance and weight don't affect self-assessment. Moreover, significant differences regarding general quality of life and satisfaction with life between examined groups don't occur. However, there are differences regarding particular parameters of quality of life. Overweight and obese persons highly estimate their quality of life especially related to personal, family and financial situation, and they are less concentrated on their physical appearance. In turn, persons of normal weight better assess their quality of life in respect of health, what may be caused by the fact that obesity brings many negative consequences, both health and social ones.

**Key Words:** Obesity, depression, life quality

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27/242. Nutrition and Healthy Lifestyle

### **Prevalence of metabolic syndrome and correlation with body measure in patients submitted to check-up.**

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**Introduction:** Metabolic syndrome (MS) is an entity associated with the increased incidence of diabetes and atherosclerotic complications.

**Objectives:** To study the prevalence of MS in two different international diagnostic criteria, and also to study the sensitivity and specificity of the findings of Body Mass Index (BMI), body fat measured by bioelectrical impedance and waist . hip ratio in a population of executives submitted to routine check-up, presenting a high socioeconomic level, in a private Brazilian hospital.

**Method. Design:** We studied 1445 adults (median age 43,5±7,9) who agreed to the term of free consent, in a period of 8 months. Anthropometric measurements were taken for diagnosis of MS according to the criteria of the International Diabetes Federation (IDF)

and National Cholesterol Education Program - Adult Treatment Panel III (NCEP-ATP III), BMI and waist . hip ratio, and fat measurements body by bioelectrical impedance (Bodystat Quadscan 4000), blood pressure, fasting glucose, triglycerides and lipid profile.

**Results:** The prevalence of MS was 23.4% by IDF and 18.7% by NCEP . ATP III. When evaluating the sensitivity and specificity by chi-square, we observed that the parameters of BMI and waist . hip ratio showed the best results with positive rating for MS. The measure of body fat showed high sensitivity (96.8%) but low specificity (40.5%), with negative predictive value of 97.6%.

**Conclusions:** Despite the prevalence and sensitivity being high for the three factors studied, we found that the specificity for measuring body fat is lower. This indicates that regardless of the classification criteria used for MS, the location of body fat (waist) and total weight are more accurate to indicate a correlation with metabolic changes than the measure of body fat.

**Key Words:** Metabolic Syndrome, Body Fat, Check-Up, Body Mass Index, Waist-Hip Ratio

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27/246. Nutrition and Healthy Lifestyle

### **Melanocortin-4 receptor gene Polymorphism RS17782313: association with childhood obesity and eating in absence of hunger**

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**Introduction:** MC4R (melanocortin-4 receptor) gene participates in energy homeostasis, mutations in its coding sequence are related to monogenic forms of obesity. A common genetic variant located 188kb downstream the MC4R gene (rs17782313; g.5641961T>C) has been consistently associated with increased body weight and fat mass through genome-wide association studies.

**Objectives:** The aim of this study was to assess the association of rs17782313 polymorphism with childhood obesity and eating behavior scores.

**Method. Design:** We conducted a case-control study in the city of Santiago (Chile) with a sample of 284 obese and 149 normal-weight children (6-12 years-old). Eating behavior scores were calculated using the Child Eating Behavior Questionnaire (CEBQ) adapted for Chilean families. The rs17782313 variant was genotyped using allelic discrimination Taqman assays. Five normal-weight carriers of

C-allele of MC4R rs17782313 were matched to five TT homozygous (BMI, age & gender) to assess the “eating in the absence of hunger” test. After a preload given until satiety, grams of sweet snacks consumed were measured.

**Results:** The frequency of the C allele at rs17782313 was higher in obese children, although the association did not achieve statistical significance (Odds ratio = 1.44; 95%CI: 0.94-2.21;  $p = 0.18$ ). When we tested the association between MC4R rs17782313-C allele and eating behavior, we found a significant statistical association with the score of satiety responsiveness subscale ( $P=0.04$ ). We did not find significant differences in other CEBQ subscales. In the eating in absence of hunger test, carriers of the C-allele showed a trend for an increased consumption of snacks compared to non-carriers (mean  $\pm$  standard error =  $74.24 \pm 30.56$  grams vs.  $24.3 \pm 22.8$  grams;  $p = 0.06$ ).

**Conclusions:** The MC4R rs17782313 polymorphism appears to contribute to childhood obesity in Chile and is possibly involved in eating behavior dimensions such as satiety responsiveness and eating in absence of hunger.

**Key Words:** Polymorphism, Melanocortin-4 receptor, obesity, eating behavior

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#### 27/248. Nutrition and Healthy Lifestyle

##### **Barriers to nutrition communication among pregnant women of multicultural origin**

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**Introduction:** A multicultural and social diverse population causes challenges for effective nutrition communication in primary health care. There is increasing evidence that risks for diet related diseases begin in fetal life and effective nutrition communication during pregnancy may have positive consequences for women's and children's future health.

**Objectives:** To investigate barriers to the understanding and implementation of dietary advice among pregnant women in antenatal care.

**Method. Design:** Qualitative, in-depth interviews among first-time pregnant and overweight women from different ethnical background residing in the area of Oslo, Norway, recruited through Mother and Child Health Centres. Women were followed up during pregnancy until after giving birth.

**Results:** Preliminary results from this ongoing study indicate that pregnancy increased nutrition awareness. Most of the study participants started to eat healthier during their pregnancy and were motivated to maintain these new habits. However, some women reported to receive little or no nutritional counseling regarding the prevention of diet-related diseases and overweight during antenatal care. Possible barriers in nutrition communication between health professionals and pregnant women might be different health beliefs, women's limited knowledge about diet, overweight and health, and lack of cultural

sensitive advice.

**Conclusions:** Findings demonstrate a need for both more general and culturally tailored nutritional advice during antenatal care.

**Key Words:** nutrition communication, culture sensitivity, dietary advice, antenatal care

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#### 27/249. Nutrition and Healthy Lifestyle

##### **Trends in the diet of Dutch young adults; Results from the Dutch food monitoring system**

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Nutrition. RIVM. Bilthoven. The Netherlands.

**Introduction:** To underpin nutrition policy, actual food consumption data is necessary.

**Objectives:** To monitor the recent trend in diet of Dutch young adults with emphasis on the consumption of vegetables and fruit and the fatty acid profile in the diet.

**Method. Design:** In 2003, among 750 Dutch young adults (aged 19-30), two computerized 24-hour dietary recall interviews were conducted on independent days by telephone. In 2007-2010 the Dutch national food consumption survey is conducted, in which again about 750 young adults participated.

**Results:** The study populations were representative with regard to age, level of education and region. In 2003 we concluded that the consumption of vegetables and fruit was grossly inadequate: Only 2% of the research population consumed 150 g vegetables daily and less than 10% of the population consumed the recommended 200 g of fruit per day. Over half the respondents consumed a diet containing less than 35 energy% fat. The recommendation to use a diet with less than 10 energy% saturated fatty acids was met by 11% of the men and 6% of the women. Almost 60% of the men and 28% of the women used a diet that contained less than 1 energy% from trans fatty acids. The final results from the recent survey will be available in summer 2011 and will be shown during the congress. Preliminary results show that the intake of fatty acid profile is improved, and the consumption of fruit and vegetables is decreased.

**Conclusions:** Even during 5 year a substantial change in dietary habits are observed indicating that frequently monitoring is essential for support of nutrition policy.

**Key Words:** 24-hour dietary recall, food consumption survey, young adults, trends

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## 27/250. Nutrition and Healthy Lifestyle

### Measuring salt consumption in the Netherlands

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Nutrition. RIVM. Bilthoven. The Netherlands.

**Introduction:** Salt intake is associated with a higher blood pressure and chronic diseases. Insight in the salt consumption and its sources can be used to support nutrition policy in order to improve public health.

**Objectives:** To get insight in the salt consumption in the Dutch population.

**Method. Design:** The salt intake will be determined by measuring sodium excretion in 24-hr urine samples of participants of the Doetinchem Study. In addition, dietary intake of Dutch subjects aged 7-69 years was obtained in a recent National Food Consumption Survey (2007-2010) with 24 hr recalls on two non-consecutive days. These data in combination with the Dutch food composition database were used to calculate sodium intake (excluding discretionary use) and its important sources.

**Results:** The quantity of salt added during and after cooking is difficult to assess in food consumption data. Different methodological approaches are necessary to establish the intake of salt. The final results will be shown during the congress. Based on previous and preliminary analyses, the intake is expected to be above the recommended maximum of 6 g. day. Main sources are expected to be the use of table salt, the consumption of salt by cereal products (bread), meat(products), and dairy products.

**Conclusions:** The salt intake is expected to be far above the recommendations. A population-broad salt reduction can only be achieved by substantial changes in the dietary habits, as well as product reformulation.

Key Words: 24-hour dietary recall, salt, sodium excretion, food monitoring system

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## 27/251. Nutrition and Healthy Lifestyle

### Protein-energy and mineral nutritional status of flight engineers and navigators flying in the Polish Air Forces

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**Introduction:** Significant prevalence of overweight and obesity among aircraft crews presents considerable increase of risk of such disorders as diabetes and circulatory system diseases, what causes

necessity to treat this problem as one of the main aims of metabolic diseases prophylaxis among members of this occupational group.

**Objectives:** The aim of the work was estimation of protein-mineral nutritional status of flight engineers and navigators, members of airplanes and helicopters crews, flying in the Polish Air Forces.

**Method. Design:** Total of 66 men, members of aircraft crews, underwent the examination. Based on body mass index – BMI, examined soldiers classified to the following groups: normal weight (BMI 18,5–24,9 kg. m<sup>2</sup>), overweight (BMI 25,0–29,9 kg. m<sup>2</sup>) and obese (BMI >30,0 kg. m<sup>2</sup>).

Examination of bone mineral density was done by the DEXA densitometric method.

**Results:** Average body height and body mass in examined group of engineers amounted to 177.2±7.8 cm and 38.4±7.5kg, while in a group of navigators the figures were 175.8±6,2 cm and 35.2±7.5 kg respectively. The BMI value in examined groups amounted to 27.1±3,5 kg. m<sup>2</sup> and 27,8±3,7 kg. m<sup>2</sup> respectively. Among examined engineers 44.9% were overweight and 24,1% were obese. In group of navigators 54.1% were overweight while 21.6% were obese.

Changes in bones mineralisation state typical for osteopenia were found among 31.0% of engineers and 8.1% navigators. The T-score value typical for osteoporosis was not found at all among examined subjects.

**Conclusions:** Overweight and obesity occurrence in over 70% of examined engineers and navigators flying in the Polish Air Forces testifies on unbalanced alimentation and requires taking intensive actions to propagate education on proper nutrition among military aircraft crews.

This work was supported by the Ministry of Science and Higher Education (Poland) – Grant OR 00000909.

Key Words: Polish Air Forces, nutrition, obesity,

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## 27/252. Nutrition and Healthy Lifestyle

### Health safety of dietary supplements in Montenegro

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**Introduction:** Contemporary dietary supplements are concentrated sources of vitamins, minerals and other substances with a nutritional physiological effect in the pharmaceutical forms which allow easy and individual dosage.

**Objectives:** The main goal of this paper was to assess the validity of these types of products designed for the market, based on the results of chemical and microbiological testing. Chemical analyzes were conducted in CETI and microbiological analyzes were conduc-

ted in PHI of Montenegro.

**Method. Design:** For all determination are used suitable standard methods.

**Results:** From January 2010-March 2011 we analyzed 138 samples, of which 32 samples were incorrect from the chemical aspect. Substance sibutramine was found in some slimming products, in which was also found increased amounts of arsenic. In the supplements for children was found increased content of benzoic acid and presence of some color. In one sample intended for erectile dysfunction was found increased contents of lead and cadmium. Low value content of some minerals in relation to declared values was found in effervescent tablets (Mg, Ca), syrups for children, products for athletes and in slimming products. Irregularities in declared were found in some multivitamins and children syrups. All microbiological analysis showed the correctness of the samples.

**Conclusions:** From analyzed samples there were 8.8% of unsafe. Improperly declared was 7.2%. The unsatisfactory quality and mismatched parameter values were also 7.2%. Special attention should be paid to the presence of sibutramine (substance which was used in some types of drugs) in slimming products which are by the popularity on the top. The presence of toxic metals is also a serious risk to human health, as well as the increased amount of preservatives and the presence of colors. Deviation of the contents of some minerals from the declared values undermines the quality of supplements and the desired effect, which make the product vague and useless.

**Key Words:** dietary supplement, quality, product, health

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#### 27/254. Nutrition and Healthy Lifestyle

### Randomized comparison of two types of multiple micronutrient supplements with recommended supplement in Iranian infants

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**Introduction:** Iron and zinc deficiencies affect a third of children in Iran, with vitamin A and D deficiencies in some regions. Sprinkles and Foodlets are used as intervention strategies elsewhere, but their relative efficacy not assessed where wheat is the staple food

**Objectives:** Compare efficacy of multiple micronutrient Sprinkles and Foodlets with current supplement (Drops, containing iron, vitamins A and D) on micronutrient status in Iranian infants aged 6-18 months

**Method. Design:** In a randomized-controlled trial, infants (n=362) were supplemented daily with Sprinkles (n=120), Foodlets

(n=121) or Drops (n=121) for 4 months. Micronutrient status was assessed at baseline and 4 months

**Results:** Anemia was significantly reduced in all groups, with Drops showing greater hemoglobin change. Serum ferritin increased in Drops and Sprinkles groups, but not with Foodlets. Sprinkles and Foodlets groups significantly increased mean serum zinc concentration. No significant differences were observed in mean serum 25(OH) D, serum retinol or growth

**Conclusions:** The different outcomes in the three groups were largely consistent with their micronutrient composition. The combination of multivitamins plus iron and zinc when added to wheat or rice-based complementary foods improved iron and zinc status. Combining iron and zinc in Sprinkles and Foodlets did not show negative effects on iron or zinc status. The trial identified trade-offs in combining multiple micronutrients into a single delivery mechanism, with no benefit from addition of vitamins A and D on nutritional status in this sample of infants.

**Key Words:** Sprinkles, Foodlets, Home Fortification, Multiple Micronutrient Supplement

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#### 27/258. Nutrition and Healthy Lifestyle

### Prevalence and selection of fortified foods in Serbia

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**Introduction:** As consumers' interest and knowledge of the role of nutrition in health and wellbeing grow, functional food market along with supplement market become one of the fastest growing, connecting food and pharmaceutical industry on the same task. Food fortification is one of the processes used in functional food production and it can be carried out as an obligatory or voluntary activity. In Serbia, adding iodide to salt is the only example of obligatory food fortification. While the use of supplements is widespread in Serbia and their availability is ubiquitous, no data on fortified foods is available. At the moment there is no adequate regulative concerning fortified foods.

**Objectives:** Objective of this study was to determine prevalence and selection of functional foods on Serbian market, as well as to investigate the possibility of exceeding the RDA values for vitamins and minerals with regular consumption of fortified foods.

**Method. Design:** The presence and selection of fortified foods were investigated in total of 12 megamarkets, 20 smaller food stores, and 8 pharmacies. Data on the type and quantity of added nutrients was collected using information given on food labels.

**Results:** On Serbian health product's market there is a relatively small number of fortified and functional foods and the consumption of these products in Serbian population is still not common. Total of cca 150 different products were identified on Serbian market. Milk products (25%), cereals (24%), fat spreads, and juices were four food categories most frequently fortified. Vitamins (>50%) and



probiotic&fiber combination (15%) were most frequently used for fortification purposes. It was noticed that phytochemicals and fish oils were seldom used for food fortification and no products with added phytosterols were found.

**Conclusions:** This investigation identified several problems concerning fortified foods on Serbian market, including lack of legislative, inadequate labeling and health claims.

**Key Words:** fortified food, market, Serbia

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27/259. Nutrition and Healthy Lifestyle

**Origanum virens endemic from Portugal: a novel antifungal activity with antioxidant capacity**

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**Introduction:** *Origanum virens* is widely used in Portuguese cuisine. Spices are common food adjuncts, which have been used as flavoring, seasoning, and coloring agents and sometimes as preservatives throughout the world for years. Many spices have been recognized to have medicinal properties and possess many beneficial effects on health, such as antioxidant activity, digestive stimulant action, anti-inflammatory, antimicrobial, hypolipidemic, anticarcinogenic potential. Although it is used as food condiment, it is also used in traditional medicine as antiseptic.

**Objectives:** An improved procedure for determination of the residual DPPH (1,1-diphenyl-2-picrylhydrazyl) free radical concentration was proposed taking into account the absorbance of both DPPH free radicals and DPPH nonradical stable form. The antifungal activity of *Origanum virens* essential oil on *Candida albicans* ATCC 10231 and physico-chemical characterization were evaluated.

**Method. Design:** The calculated residual DPPH free radical concentrations were compared with those obtained from a calibration curve and variation coefficients below 10 % were found. The essential oil were obtained from the aerial parts of the plant by hydro-distillation and minimal inhibitory concentration (MIC) as well as the minimal lethal concentration (MLC) were used in order to assay the antifungal activity against *Candida albicans*.

**Results:** MIC and MLC values were 0,005% and 0,040% respectively, ranging from 0,005% to 0,080% of essential oil. Concentrations, lower than MIC values strongly prevent fungal growing. It is difficult to attribute the activity of a complex mixture to particular constituents. The percentage decrease of DPPH standard solution was recorded with 65.0% for Portuguese *Origanum virens*.

**Conclusions:** This study supports the contention that traditional

medicines remain a valuable source in the potential discovery of natural product pharmaceuticals. Significant antioxidant activity showed by *Origanum virens* provide a scientific validation for the traditional use of these plants. Further work on isolation and identification of active compounds and its efficacy needs to be done.

**Key Words:** *Origanum virens*; antioxidant activity, antifungal activity, physico-chemical characterization

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27/260. Nutrition and Healthy Lifestyle

**Physicochemical characteristics and antioxidant activity of Baobab (*Adansonia digitata*) fruit. A traditional medical Angolan plant.**

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**Introduction:** A medicinal plant is any plant in which one or more of its organ contains substances that can be used for therapeutic purposes on which are precursors for the synthesis of useful drugs. In the recent years, in the attempt to counteract the oxidative stress damages, the strategy of implementing the diet with antioxidants, especially deriving from natural sources, is becoming more and more convincing. Several studies have been directed toward the evaluation of several naturally antioxidant properties of many naturally occurring botanicals and herbs, potentially useful as nutraceutical ingredients.

**Objectives:** The biochemical composition and nutritive value of the fruit of the baobab fruit (*Adansonia digitata*) were studied.

**Method. Design:** Proportions of the various components of the fruit (pulp and seeds) were examined, and the various physicochemical characteristics of the pulp and seed were analysed. The antioxidant activity was assessed by DPPH method.

**Results:** The pulp was characterized by a low water content (6,7%), high acidity level (1,5%), and high contents of total soluble solids (79,5 °Brix), ascorbic acid (600,7 mg 100 g<sup>-1</sup>) and total phenolics (504 mg 100 g<sup>-1</sup>). Seeds baobab fruit showed lower values, namely in total soluble solids (40,1 °Brix), ascorbic acid 295,6 mg 100 g<sup>-1</sup>) and total phenolics (145,3 mg 100 g<sup>-1</sup>). The antioxidant activity, with DPPH assay, revealed significant statistics (p < 0.05) between samples (pulp and seed), showing more antioxidant activity in pulp fruit, with 87,7% versus 50% obtained in seeds.

**Conclusions:** This current study reports on the phytochemical screening and antioxidant capacity of Baobab fruit which is known for its centenary use in traditional African medicine. This study was conducted as an initial step to elucidate the therapeutic, nutraceutical and cosmeceutical potential of these plant products until all the active components of these plants will be clearly established.

**Key Words:** Adansonia Digitata; Medical plant; Ascorbic acid; Total phenolics; Antioxidant Activity.

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**27/264.** Nutrition and Healthy Lifestyle

**Long-term diet modulation and behavioral life style intervention has a positive effect on body composition, C-reactive protein and rest energy expenditure in overweight women**

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Novosibirsk.

**Introduction:** C-reactive protein is one of the markers of persistent, low-grade inflammation and independent predictor of several chronic diseases and all-cause mortality. Last findings shown the influence of diet-modulation on biomarker of inflammation, body composition and the rest energy expenditure in obese persons. We assessed correlations between these factors and revealed the significance of healthy diet and life style on metabolism and weight-loss

**Objectives:** The intention of this study was to assess correlations between biomarkers of chronic inflammation, metabolism, body composition (percentage of fat) and determine the effects of long-term behavioral intervention diet-induced weight loss on these factors

**Method. Design:** Fifty six ( $> \text{or} = 42$  y), overweight [body mass index (in kg. m<sup>2</sup>)  $> \text{or} = 28$ ], women were assigned to behavioral weight loss treatment: healthy lifestyle control and diet-induced weight loss. The weight-loss intervention consisted of a weekly session with a registered dietitian to provide education, support for lowering energy intake and improve physical activity

**Results:** The diet-induced weight-loss intervention resulted in significantly greater reductions in concentration of C-reactive protein ( $P = 0.01$ ), decrease free-fat percentage compared with did no weight-loss treatment. Despite a significantly ( $P < 0.001$ ) greater loss of fat mass ( $-8.7 \pm -4.1$  kg) compared with fat-free mass ( $-2.8 \pm -2.2$  kg), energy expenditure at rest decreased by 9% following the intervention. Changes in C-reactive protein and free-fat percentage correlated with changes in body weight

**Conclusions:** These findings provide evidence that a dietary intervention designed to elicit weight loss and healthy life style reduces the concentration of inflammatory marker C-reactive protein and improve metabolism.

**Key Words:** metabolism, weight loss, healthy life style, C-reactive protein, body composition

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**27/267.** Nutrition and Healthy Lifestyle

**Traditional Food systems of indigenous peoples in Brazil: The Wari' Indians of Western Amazonia**

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**Introduction:** Globally, indigenous peoples are at greater health and nutritional risk than non-Indians, as well as their environment and traditional food resources.

**Objectives:** This study was conducted to document the indigenous food system of the Wari' Indians of Western Amazonia, Brazil, with number approximately 3.000 individuals. Until the early 1960', most of them lived independently of the Brazilian society.

**Method. Design:** The study describes traditional food items, sociocultural meanings and rules, acquisition, processing and storage techniques, distribution and food consumption, as well as the nutritional consequences of changing food practices. It was conducted by two researchers in long term fieldwork based on participant-observation, between 2007 and 2008. Both researchers spoke the native language.

**Results:** The Wari' demonstrate an impressive knowledge of their environment and natural resources, and use a wide range of animal and vegetable items, including at least 30 varieties of insects. We identified an extensive set of sociological rules and symbolic principles that guides their food practices and reflects their social dynamics and cosmology. Despite recent changes, traditional concepts also direct the course of the adoption of new foods and practices. At the same time, the Wari' are undergoing important socioeconomic changes. From the nutritional standpoint there are negative consequences, that includes a shift away from their traditional food system to a store-bought diet. It results in an increased consumption of industrialized foods, poor in micronutrients and high in fat and sugar content. The tension between tradition and change exemplifies both the particular vulnerability of indigenous peoples as well as the difficulty to address food and nutritional issues in practical terms.

**Conclusions:** The ongoing changes in indigenous traditional food systems is a key issue to understand their nutritional profiles. Recognizing and documenting traditional knowledge, values, and food practices should be seen as prerequisites for health and nutrition policies addressing indigenous peoples.

**Key Words:** South American Indians; Nutritional status; traditional food systems

**Methodological considerations on food and nutrition research among ethnic and populational minorities: the case of indigenous peoples in Brazil**

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**Introduction:** Despite the importance of the subject, the nutritional status and food consumption practices prevalent among Brazilian indigenous peoples have remained largely uninvestigated.

**Objectives:** This study examines the case of a Wari' community located in the Southwestern Amazon region. Taking this case study as a starting point, it discusses some features of the literature about food and nutrition among native peoples in Brazil, and argues in favor of the relevance of sociocultural aspects for the study of these issues.

**Method. Design:** During five months between 2007 and 2008 a fieldwork based in participant observation, as well as informal and semi-structured interviews was carried out by two researchers (a nutritionist and an anthropologist) in order to investigate the Wari' traditional food system. Both researchers spoke the native language.

**Results:** The study reveals that the Wari' have systematic rules and practices that regulate everyday activities directly or indirectly related to food procurement and consumption. In a number of ways these practices reveal their social organization, their concepts of physiology, and their relations with the environment. By the other side, their food practices and knowledge are frequently viewed in a strongly negative way by non-indigenous local people, who openly express their prejudice. This can have a negative impact on the transmission of elder's traditional knowledge about the wari' food system for the next generations, with a negative impact on the ongoing sociocultural change and consequently on their nutritional status. The literature about nutritional status of Brazilian Indians remains limited to the epidemiological perspective, and doesn't take into account sociocultural factors that can affect health and nutritional outcomes.

**Conclusions:** The study stresses the need to carry out more investigations that integrate epidemiological with anthropological perspectives in order to obtain a broader and more realistic picture of the factors that influence the nutritional status of the indigenous peoples of Brazil.

**Key Words:** South American Indians; Nutritional Anthropology; Indigenous food systems

**Liver lipid-lowering effects of Shiikuwasha (Citrus depressa HAYATA) pomace extracts in the rat**

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**Introduction:** Shiikuwasha (*Citrus depressa* HAYATA) is a kind of citrus cultivated in Okinawa, Japan, and used for juice production. On the other hand, in the process of juice production, large amounts of pomace residues are discarded. We have previously reported that dietary Shiikuwasha (*Citrus depressa* HAYATA) pomace freeze-dried powder (SP) reduces liver lipids, especially triglyceride and cholesterol in rats fed diets with and without cholesterol.

**Objectives:** As it is known that citrus contains many kinds of active components such as flavonoids, dietary fiber, and terpenes, which are regulating lipid metabolism favorably, we focus on finding an active component exhibiting lipid-lowering activity in SP.

**Method. Design:** In experiment I, SP was treated with n-hexane several times, and divided to two fractions, namely extracted (HE, 8% of SP) and non-extracted (RE, 92% of SP) fractions. Five week-old male Sprague-Dawley (SD) rats were fed the experimental diets, for 4 weeks, containing 3% SP, 0.24% HE, or 2.76% RE. In experiment II, nobiletin, tangeretin, heptamethoxyflavone (HMF), and a mixture of polymethoxyflavone (PMF) were isolated from orange. Five week-old male SD rats were fed the experimental diets, for 4 weeks, containing 3% SP, 0.015% nobiletin, 0.03% tangeretin, 0.03% HMF, or 0.03% PMF.

**Results:** In experiment I, dietary SP, HE, and RE had little effect on growth, tissue weights, and serum lipid parameters. However, liver triglyceride and cholesterol levels were decreased significantly by SP and RE, but not by HE. In experiment II, Dietary SP decreased liver triglyceride and cholesterol levels, while nobiletin, tangeretin, HMF and PMF had little effect on these lipid parameters.

**Conclusions:** Liver lipid-lowering effect of SP is in part attributed to RE, and these four flavonoids may not be responsible components for the observed reduction in the concentration of those lipids.

**Key Words:** Shiikuwasha, hexane extraction residue, liver triglyceride, liver cholesterol, flavonoids

### **Mechanism(s) of liver triglyceride-lowering action of dietary bitter melon (*Momordica charantia*) extracts in the rat**

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**Introduction:** Bitter melon (*Momordica charantia*: BM) is a widely cultivated plant for food and medicinal uses in Asian countries. In our previous studies, dietary BM freeze-dried powder and its methanol extract (MF) is capable of reducing the liver and/or serum lipids in rats and hamsters.

**Objectives:** We investigated mechanism(s) responsible for the observed reduction in the concentration of liver lipids, by using an *in vitro* liver slice and hepatocyte cultures to assess relative significance of lipid synthesis.

**Method. Design:** Methanol fraction (MF) was prepared, and fed to Male Sprague-Dawley rats at the level of 1%. After feeding for 14 days, half of the animals were subjected to liver slice experiment and the others to hepatocyte experiment. In the former experiment, livers were sliced (0.5 mm thickness) and incubated with [1-(2)-14C]sodium acetate, while in the latter hepatocytes were isolated by collagenase digestion method, and followed by incubation with either [1-(2)-14C]sodium acetate or [1-14C]oleic acid. Total lipids were extracted, separated into individual lipid fractions by TLC, and counted radioactivities derived from either [1-(2)-14C]sodium acetate or [1-14C]oleic acid.

**Results:** Dietary MF significantly decreased hepatic triglyceride and cholesterol by 54% and 32%, respectively. Effects on serum lipids were not apparent. In the former experiment, incorporation of [14C]acetate into liver slice triglyceride was 53% lower in the MF-fed rats as compared to the controls, and in the latter incorporation of [14C]acetate and [14C]oleic acid into hepatocyte triglyceride was 48% and 20% lower in the MF-fed rats as compared to the controls, respectively. Incorporation of [14C]acetate into cholesterol and cholesterol ester in both cases remained unchanged.

**Conclusions:** The triglyceride-lowering effect of MF feeding may in part be attributed to a decreased rate of TG synthesis in the liver, while the cholesterol-lowering effect is probably due to mechanism other than cholesterol synthesis.

**Key Words:** Bitter melon, methanol fraction, triglyceride, cholesterol, triglyceride synthesis

### **Dietary patterns of children aged 13-36 months in Poland**

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**Introduction:** Recommended dietary pattern for children is optimal and essential for their psychosomatic development.

**Objectives:** The aim of the study was to assess dietary patterns of children aged 13-36 months compared to nutritional recommendations.

**Method. Design:** The study was conducted in 2010 on a nationwide, representative sample of children (n=400; 222 boys, 178 girls) aged 13-36 months. Diets of children were assessed using a questionnaire with 3-day diet records. Dietary patterns were determined using k-mean cluster analysis (Quick Cluster). Clustering was performed based on daily food rations of children.

**Results:** Five clusters, groups were obtained, with various mean age and diets, consisting of 37 to 132 children. Diets of younger children - in the second year of life (cluster II, IV) and older children - in the third year of life (cluster I, III, V) varied in terms of composition. Diets of younger children contained significantly more foods for particular nutritional uses, including formula, baby cereal, porridge, fruit purees and juices. Younger children of less educated parents, living mainly in urban areas (cluster II), ate significantly more meat, juices, sugar, sweets than children of university-educated parents (cluster IV). Diets of older children were rich in dairy and carbohydrates, the latter coming mainly from juices, fruit, potatoes, vegetables, bread, sugar, sweets. Sugar, sweets consumption was the largest in clusters with the highest percentage of overweight children (cluster I-42.9g; cluster III-31.3g; cluster V-41.0g). Nutritional recommendations were not fully followed in any of the five clusters.

**Conclusions:** Environmental factors (parents' education, place of living) affect dietary patterns of children aged 13-36 months.

Dietary patterns of children in the 2nd and 3rd year of life varied significantly in terms of composition and nutritional value.

**Key Words:** dietary patterns, toddlers, nutrition

### **Associations of Carotenoids with Coronary Heart Disease Risks in Scottish Middle-aged Males and Females.**

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**Introduction:** Coronary heart disease (CHD) is one of the major causes of death in Scotland, where CHD death rate is among the highest in Europe. Scottish people consume more high-fat-foods and less vegetables rich in strong antioxidants carotenoids (Cs). Because oxidative stress is involved in the pathophysiology of lifestyle-related diseases such as diabetes and cardiovascular diseases, their blood Cs were examined in relation to CHD risks.

**Objectives:** This study was conducted to observe the associations of CHD risks with blood Cs in high risk Scottish population as a part of WHO-coordinated CARDIAC Study.

**Method/Design:** Study volunteers were recruited in spring 2001 in the islands of Lewis and Harris in the Western Isles, in the north western part of Scotland. Health survey was conducted in 300 Scottish males and females aged 45-59. As CHD risks, body mass index (BMI: weight (kg). height(m)<sup>2</sup>), blood pressure (BP), blood lipid profiles etc. were measured. Total Cs (TCs) including lutein, beta-cryptoxanthin, alpha-carotene, beta-carotene and lycopene in the blood were assayed for analyzing correlations between blood TCs and CHD risks. Study design for the secondary utilization of blood samples to analyze TCs in relation to CVD risks without any personal information was ethically approved by Mukogawa Women's University.

**Results:** Systolic and diastolic BP ( $\pm$ SD) were  $131.3 \pm 17.6$  and  $80.4 \pm 10.5$  mmHg, and total serum cholesterol (T-CHO) was  $234.7 \pm 42.7$  mg. dl, indicating the average was in the range of hypercholesterolemia. Blood TCs were very low,  $0.18 \pm 0.13$   $\mu$ g. mL in average, and were significantly low in obesity (BMI  $>30$  kg. m<sup>2</sup>) and hypertension (systolic  $>$  BP160 mmHg) respectively. Blood TCs were significantly inversely associated with CVD risks such as BMI ( $P<0.001$ ), systolic BP ( $P<0.05$ ), diastolic BP ( $P<0.05$ ), pulse rate ( $P<0.05$ ) and atherogenic index (non-HDL-CHO/HDL-CHO ratios) ( $P<0.05$ ), while they were significantly positively related with T-CHO ( $P<0.05$ ) and HDL-CHO ( $P<0.001$ ).

**Conclusions:** Blood TCs were very low and significantly associated with CHD risks in Scottish middle-aged male and female. Daily intake of foods that are rich in Cs such as vegetables may contribute to CHD risk reduction in high-risk Scottish population.

**Key Words:** Coronary Heart Disease, Carotenoid, Vegetable, WHO CARDIAC Study, Hypertension

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**Introduction:** Physical activity and diet play an important role in well-being, health and agility of human.

**Objectives:** The aim of the study was to assess physical activity and eating habits of Polish Tatra's mountain tourists in comparison to their nutritional status measured as Body Mass Index (BMI).

**Method. Design:** The study comprised 97 adult tourists [59 women (W) and 38 men (M)] aged 17-53 years (26.99+ . -8.08 years) hiking in Tatra mountains in the 2010 summer time. They were questioned about their eating habits, frequency and effort of physical activity and BMI. Information about place of residence, education and job were collected too. The questionnaires were filled in mountain shelters during their rest time. The comparison between gender groups were done using nonparametric tests at the level of  $p<0.05$ .

**Results:** Tourists declared using 10 point scale (0 no at all to 10 as qualify sport) their physical activity as 5.88+ . -1.83 (M: 6.68+ . -1.97, W: 5.36+ . -1.54;  $p=0.0005$ ). the average frequency of hiking was similar for both groups - 2.49+ . -1.97 (between once a month to several times a month).

BMI differed between groups ( $p=0.0086$ ). 8.47% of women were underweight (below 18.5kg. m<sup>2</sup> while more men than women were overweight or obese (M: 28.95%, W: 11.86%). There were no observed differences in the average number of daily eating meals (3.54+ . -1.06; 2-6 meals) drinking of liquids - they drank more frequently non-gaseous water (85%; 1.4+ . -0.6L) and tea (64%; 0.4+ . -0.3L), snacking (100%). Tourists ate first and second breakfast, 10% avoid lunch and 8% supper. Women ate more fruits in mountains (M: 84%; W: 97%;  $p=0.0311$ ). The cereals and dry type of foods were consumed most frequently.

**Conclusions:** Eating habits of tourists differs from dietary guidelines. Tourists hiking in mountains eat little vegetable and fruits. Even the higher of average physical activity did not protect of overweight and obesity because of improper eating habits.

**Key Words:** physical activity, eating habits, mountain tourism

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## 27/276. Nutrition and Healthy Lifestyle

### Hiking in Tatra mountains and eating habits of Polish tourists

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## 27/277. Nutrition and Healthy Lifestyle

### Montenegrin spring mineral waters as sources of oligoelements sodium, calcium, magnesium and potassium in nutrition

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**Introduction:** Vital processes in the body, among the rest, conditioned by intake of mineral substances. Mineral matter from the natural spring and natural mineral waters may serve as a good way to supplement nutrition to improve the mineral status of organism. Oligoelements as sodium, calcium, magnesium and potassium entering in the composition of the cells liquids in which beside component role

have the role of gradients and the role of bio-catalysts by regulating vital functions.

**Objectives:** The aim of this paper was to determine the content of Na, Ca, Mg and K in natural spring waters ("Aqua Monta", "Aqua Bianca", "Gorska" and "Suza") by origin from four Montenegrin sources and as well their potential contribution in daily need in nutrition.

**Method/Design:** During the study were analyzed 25 samples of the water taken from the market. To determine the content of these elements AAS techniques and complexometry was used.

**Results:** Sodium take part in the acid-base balance, osmotic pressure and structure of enzymes in organisms. Sodium content in the tested samples was 0.37-6.16 mg/l (0.02-0.31%RDA). Calcium participates in skeletal development, has an impact on blood coagulation and stability of the muscular system. The analyzed samples contained 22.5-37.2 mg/l of calcium (2.8-4.7%RDA). Magnesium enters into the bones composition and participates in various enzymatic processes in the cell. Magnesium content in the samples ranged 0.52-3.20 mg/l (0.14-0.85%RDA). Potassium is found exclusively in cells. In smaller quantities it has the intercellular space. Potassium plays an important function in the body. Potassium contents in tested samples ranged 0.10-0.20 mg/l, which makes a very small share in RDA.

**Conclusions:** Based on the results of this study we can conclude that the data fall into the low mineral water. Based on according found values water from these four sources cannot serve as an important source of sodium, calcium, magnesium and potassium.

**Key Words:** water, oligoelements, nutrition

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#### 27/279. Nutrition and Healthy Lifestyle

### **Blood expression patterns of retinoic and fatty acids receptors are associated with cognition in elderly**

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**Introduction:** Alterations in retinoid and fatty acids signalling pathways are involved in age-associated cognitive disorders in animals. We have observed a hypoexpression of retinoic acid receptors (RARg) in human peripheral blood mononuclear cells (PBMC) of older subjects compared to a younger group.

**Objectives:** The aim was to investigate the association between blood expression of retinoic acid and fatty acids receptors (RAR, RXR and Peroxisome Proliferator-Activator Receptor, PPAR) and cognitive performances in older persons.

**Method. Design:** The study sample consisted of 87 subjects (mean age 79.7y) from the COGINUT (ANR-06-PNRA-005) subpro-

ject of the Three-City study. The gene expression of RARa, RARg, RXRa, RXRb and PPARg in human PBMC was quantified by real-time PCR. Cognitive performances were assessed on three neuropsychological tests: Mini-Mental State Examination (MMSE), Isaacs Set Test (IST) and Free and Cued Selective Reminding Test (FCSRT). Cross-sectional analyses were performed by multi-linear regression adjusted for age, sex, education and apolipoproteinE-e4 genotype.

**Results:** Strong positive correlations between RXRa and RARa or PPARg and negative correlations between RARg and RARa or RXRa have been highlighted. Older subjects with high RARg levels (i.e. over the median) and with low levels of RXRa, RARa and PPARg (i.e. below the median) exhibited significantly higher mean performances in IST (47.5 vs. 38.3, P=0.003) and FCSRT (28.6 vs. 23.4, P=0.02) than subjects with low RARg and high RXRa, RARa and PPARg levels. In fully adjusted models, the association between the nuclear receptors expression pattern and FCSRT performances was no more significant. No association was highlighted between this pattern of nuclear receptors expression and MMSE performances.

**Conclusions:** We observed that a specific pattern of retinoid and fatty acid nuclear receptors blood expression is associated with low cognitive performances in human. Further research is needed to determine the relevance of this pattern as indicator of vulnerability to cognitive disorders.

**Key Words:** Retinoid, fatty acids, nuclear receptor, cognitive performances, human

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#### 27/283. Nutrition and Healthy Lifestyle

### **Lifestyle and eating habits of frequent out-of-home eaters among French adults**

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**Introduction:** Since early 1990s', eating-out prevalence have increased in parallel with obesity prevalence and is considered as a component of unhealthy eating habits in many developed countries.

**Objectives:** We studied whether being a frequent out-of-home (OH) eater was associated with specific lifestyle and eating habits in France.

**Method. Design:** Data from the second French cross-sectional food consumption survey (INCA2), performed in 2006-07, were used. Dietary intakes were collected by a 7-day food record, in which eating location of main meals was reported. 2452 adults aged 18-79 years were classified according to the rate of meals eaten out of their home during the survey week. Frequent OH eaters were defined by at least 25% of OH main meals, non OH eaters by no OH main meal and moderate OH eaters by the intermediate class. Fast-food and staff canteen eaters were also identified by at least one main meal eaten at fast-food outlets or staff canteen, respectively. Eating habits, physical activity and sedentarity level were assessed by questionnaires and

participants' height and weight were measured. Lifestyle and eating habits of OH eaters were investigated by multivariate-adjusted ordinal logistic regressions, after adjustment on socio-economic and demographic variables.

**Results:** During the survey week, 34.5% (CI95%: [32.2-36.9]) of adults aged 18-79 years were frequent OH eaters, 38.0% (CI95%: [35.6-40.2]) were moderate OH eaters and 27.5% (CI95%: [25.1-29.9]) were non-OH eaters. Frequent OH eating was associated with lower sedentarity level, although no association with physical activity was found. Frequent OH eaters were also food and beverage vending machines users. Among OH eaters, fast-food eaters showed irregular meal pattern and were not interested in dietary issues whereas prevalence of obesity was lower among staff canteen eaters.

**Conclusions:** In France, eating out is not necessarily related to unhealthier eating or lifestyle habits, except at fast-foods outlets.

**Key Words:** Eating out, Lifestyle habits, Eating habits, France, Adults

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### 27/285. Nutrition and Healthy Lifestyle

#### **Demographic and socio-economic characteristics of frequent out-of-home eaters among French adults**

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**Introduction:** Prevalence of eating-out is increasing in European countries and has been related to unhealthier food and nutritional intakes.

**Objectives:** Our objective was to assess the prevalence of frequent out-of-home (OH) eaters among French adults and to describe their demographic and socio-economic characteristics.

**Method. Design:** Data from the second French cross-sectional food consumption survey (INCA2), performed in 2006-07, were used. Dietary intake were recorded by a 7-day food record. For the main meals, participants indicated the eating location. 2452 adults aged 18-79 years were classified according to the rate of meals eaten out of their home during the survey week. Frequent OH eaters were defined by at least 25% of OH main meals, non OH eaters by no OH main meal and the moderate OH eaters by the intermediate class. Data on socio-economic and demographic characteristics were collected by questionnaire. Socio-economic and demographic characteristics of OH eaters were investigated by multivariate-adjusted ordinal logistic regressions.

**Results:** During the survey week, 34.5% (CI95%: [32.2-36.9]) of adults aged 18-79 years were frequent OH eaters, 38.0% (CI95%: [35.6-40.2]) were moderate OH eaters and 27.5% (CI95%: [25.1-29.9]) were non-OH eaters. Eating out was more prevalent among men, young adults (18-34 years), people living alone and childless people. Being a frequent OH eater was also positively associated with the educational level and the household's wealth index. Moreover, the

odds of being a frequent OH eater was lower among inactive people (retired, housewives, unemployed). Finally, frequent OH eaters were less common in the western regions and in urban areas with 2000-to-100000 inhabitants.

**Conclusions:** Eating out prevalence in France is intermediate between lower level in Mediterranean countries and higher level in Northern European countries. The correlates identified were similar to those observed in other countries: mostly young childless working men with high educational level.

**Key Words:** Eating out, Socio-economic, France, Adults

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### 27/288. Nutrition and Healthy Lifestyle

#### **Eating patterns and knowledge on dietary recommendations among South Ostrobothnians in Finland, the TERVAS Project**

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**Introduction:** Obesity, type 2 diabetes, cardiovascular disease and other lifestyle related diseases are especially common in South Ostrobothnia compared with the other parts of Finland. Further, local dietary habits differ from national dietary recommendations. This study is part of research project Healthier food choices – tailored models for eating and exercise (TERVAS).

**Objectives:** The aim of this study is to produce new knowledge of the lifestyle and dietary habits in South Ostrobothnia district in Finland. Later, in advanced part of TERVAS study tailored models for lifestyle and nutrition counseling will be built.

**Method. Design:** 4000 adults, selected at random from the Finnish Population Register, aged 18 to 65 years and living within Southern Ostrobothnia district received a lifestyle questionnaire in spring 2009. 1708 (42.7 %) of them responded (61 % females, mean age 46 y).

**Results:** According to self reported height and weight, 50 % of women and 66 % of men were overweight (BMI  $\geq$  25kg. m<sup>2</sup>). Ostrobothnians had, on average, 5 eating occasions per day. Women had breakfast more often than men (p<0.001). Participants in the youngest age group (18 – 24 y) skipped breakfast more often than those in the older age groups (25 – 44 y, 45 – 65y). Women included more vegetables, berries and fruit in their diet than men (p<0.001) but the consumption of vegetables is far from recommendations. Only 2 % of men and 5 % of women ate vegetables according to the Finnish Nutrition Recommendations (400 grams. day). Women had better knowledge on dietary recommendations compared with men (p<0.001).

**Conclusions:** Women have generally better and healthier dietary habits compared with men in South Ostrobothnia. Their knowledge of dietary recommendations is also better. The consumption of vege-

tables, fruits and berries is higher among women but in general very low in both sexes and different age groups throughout Ostrobothnia.

**Key Words:** Questionnaire, Eating Patterns, Dietary Habits, Nutrition Knowledge

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## 27/289. Nutrition and Healthy Lifestyle

### Association between school lunch attendance and food intakes of French children

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**Introduction:** In many industrialized countries, school nutrition policies have been defined as an appropriate way to promote healthier dietary habits. In France, a recent law provided to define compulsory food-based dietary guidelines on school lunch composition.

**Objectives:** We investigated the relationship between the weekly number of school lunches eaten and the daily food and nutritional intakes in a sample of French children aged 3-17 years old.

**Method. Design:** Data from the second French cross-sectional food consumption survey (INCA2), performed in 2006-07, were used. Food-group intakes were assessed with a 7-day food record. Eating location was recorded for main meals. 1068 schoolchildren, attending school during the survey week, were included and classified according to their school level (pre and elementary . lower and upper secondary schools). Relationships between the number of lunches eaten at school canteen over the survey week and dietary intakes were investigated using multivariate linear and logistic regressions adjusted on socio-economic and demographic variables previously identified as associated with school lunch attendance.

**Results:** School lunch attendance frequency was associated with a greater food diversity of pre- and elementary schoolchildren and to fewer unhealthy food choices in secondary school students. At both school levels, it was related to higher odds of eating fresh fruits, mashed or cooked fruits and dairy products and a lower amount of fats. In pre- and elementary schoolchildren, it was also associated to a higher consumption of fatty and sweet processed foods. In secondary school children, it was associated with a lower odds of eating sandwiches and hamburgers and a smaller amount of soft drinks.

**Conclusions:** Attending a school canteen is associated with different daily food intakes in French children. The forthcoming regulation on school meals composition is therefore likely to contribute to further improve overall dietary intakes of children and adolescents.

**Key Words:** School lunch, dietary intakes, France, children

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## 27/293. Nutrition and Healthy Lifestyle

### The study of polymorphisms in genes of fatty acid metabolism in non-obese women of polycystic ovary syndrome in Taiwan

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**Introduction:** The aim of the study was to elucidate the association of fatty acids metabolism genotypes between lipid profile and fatty acids profile in non-obese women with polycystic ovary syndrome.

**Objectives:** The objective of this study was to elucidate the association of PLA2 and COX-2 genotype between lipid profile and fatty acids profile in non-obese (BMI<24) women with polycystic ovary syndrome (PCOS).

**Method/Design:** This study was recruited 40 age- and BMI-matched Taiwanese women with PCOS and 40 healthy women, respectively. The diagnosis of PCOS was based on the Rotterdam conference criteria in 2003, two out of three criteria required, which are as follows: (A) polycystic ovarian morphology; (B) oligo- and/or anovulation; and (C) clinical and/or biochemical signs of hyperandrogenism. Participants who have other pathology of irregular menses or hyperandrogen were excluded. Anthropometric measurements and biochemical markers were analyzed. Two single nucleotide polymorphisms (SNPs) of lipid-linked metabolism genes (PLA2 and COX-2) were detected by SNaPshot.

**Results:** In non-obese women with PCOS, we found serum total testosterone, androstenedione, dehydroepiandrosterone sulfate, free androgen index, cholesterol and low density lipoprotein-cholesterol were significantly higher than healthy women. The SHBG level was significant lower in non-obese women with PCOS than healthy women. There were significant higher level PUFAs in plasma and lower level PUFAs in red blood cell of PCOS patients, respectively. The genotype of SNPs of PLA2 (rs10798059) and COX-2 (rs4648308) were no significant difference between non-obese women with PCOS and healthy women.

**Conclusions:** The genetic variation of PLA2 and COX-2 may not be a risk factor in non-obese women with PCOS. Lack of the relationship between PLA2 genotype and fatty acids composition in plasma and red blood cells was found. However, fatty acids composition was different between red blood cell and plasma statistically.

**Key Words:** polycystic ovary syndrome, hyperandrogenemia, fatty acids composition, PLA2, COX-2



### Fatty acids in serum and diet? A canonical correlation analysis among toddlers

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**Introduction:** Fatty acid concentrations in blood are biomarkers of dietary fat intake, but methodological studies among children are scarce. The large number of fatty acids and their complex interrelationships pose a special challenge in research on fatty acids.

**Objectives:** Our target was to assess the interrelationships between the total fatty acid profiles in diet and serum of young children.

**Method. Design:** The study subjects were healthy control children from the birth cohort of the Type 1 Diabetes Prediction and Prevention (DIPP) Study. A 3-day food record and a frozen serum sample were available from 135 children at the age of 1 year, from 133 at 2 years, and from 92 at 3 years. The relationship between dietary and serum fatty acid profiles were analyzed using canonical correlation analysis of 19 fatty acids.

**Results:** The consumption of fatty milk correlated positively with serum fatty acids pentadecanoic acid, palmitic acid and conjugated linoleic acid at all ages. Correlations between dietary and serum eicosapentaenoic and. or docosahexaenoic acid were observed at 2 and 3 years of age. Serum linoleic acid was positively associated with the consumption of infant formula at the age of 1 year, and with the consumption of vegetable margarine at 2 and 3 years.

**Conclusions:** The results show a good correspondence between dietary fat and serum fatty acid profile. This may indicate a high quality of the 3-day food records kept by parents and daycare personnel for the children. A nonfasting, unfractionated serum sample also proved to be suitable for total fatty acid analyses. The correlation between intake of milk fat and serum proportion of conjugated linoleic acid is a novel finding.

**Key Words:** Child; Fatty acids; Food; Infant; Serum;

### Screen time and availability of European children (2 to 10 years old): the IDEFICS study

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**Introduction:** Increased use of personal electronic technology (PET) is associated with adverse health outcomes.

**Objectives:** To describe patterns of PET in children from 8 European countries (Italy, Estonia, Cyprus, Belgium, Sweden, Germany, Hungary and Spain).

**Method. Design:** Data obtained from children participating in the cross-sectional IDEFICS study (n=15.330). Parental reported total hours of TV. DVD. video viewing, computer. console use during weekdays and weekend days, and number of media devices available in child's personal space assessed via a questionnaire. Screen time (ST) was defined as the total number of hours spent using electronic technology in two age groups (pre- and primary school). The cut-offs for ST was based on the media time recommendations of the American Academy of Pediatrics (<2 and ≥2hours. day).

**Results:** In boys, Cypriots, had the highest reported TV viewing time (59%) during weekend days, and Swedish had the lowest (22%). Older Estonian had the highest computer use during weekend days (23%) and Spanish the lowest (0.8%). Highest total ST was observed in older Estonian during weekdays (64%) and weekend days (86%), and the lowest in young Spanish during weekend days (5.1%).

In girls, Cypriots, had the highest reported TV viewing time (56%) during weekend days and Swedish had the lowest (2.4%). The same trend was observed for computer use where during weekend days. Estonian had the highest use of computer (6%) and Swedish the lowest (0.0%). ST was the highest in older Estonian during week (42%) and weekend days (68%) and the lowest in older Spanish (1.1%) during weekend days.

Media devices availability was uncommon (total; 58% in males and 63% in females), the highest availability was observed in older Italian boys (81%) and girls (76%).

**Conclusions:** Findings indicated that a high proportion of children did not meet the media time recommendations. ST and availability of media devices showed strong age-, sex- and country-specific differences.

**Key Words:** sedentary behaviour, children, TV viewing, screen time

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**27/301. Nutrition and Healthy Lifestyle**  
**Nutritional intake and iron blood status in first trimester of pregnancy**

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**Introduction:** Iron deficiency and iron deficiency anaemia are major nutritional problems throughout the world. The incidence of anaemia is especially high during pregnancy due to an increase in iron needs. Nutrition during pregnancy should ensure iron intake of even 27 mg. day.

**Objectives:** The objective was to examine nutritional intake of iron and specific nutrients that affect iron absorption (vitamin C, calcium, etc.), as well as the iron blood status of women at the first trimester of pregnancy.

**Method. Design:** 161 pregnant women, 17 to 42 years (average 28.1), at the first trimester completed 24-hour recall and a short lifestyle questionnaire. Their weight and height were measured at the gynaecologist's office, and BMI was calculated. Blood samples were collected and analysed in medical-biochemical laboratory for iron status.

**Results:** Obtained results have shown that average energy intake was 2232 kcal, iron 12.6 mg, animal proteins 43 g, vitamin C 166 mg, fibres 24 g, phytic acid 269 mg, and calcium 828 mg. Only 7.5% of participating pregnant females have sufficient nutritional iron intake ( $\geq 27$  mg. day), 3.7% have intake of 18 to 27 mg. day, while even 88.8% have iron intake of below 18 mg. day. Blood iron status revealed that 15.5% of the participating pregnant women have low haemoglobin values (below 119 g. L), and 14.9% have low serum iron (below 8.0  $\mu$ mol. L) at the beginning of their pregnancy.

**Conclusions:** Iron deficiency anaemia is abundant by smaller percentage of the pregnant women at the first trimester, but the nutritional intake of iron is way below recommendations placing them at high risk of anaemia due to iron deficiency in later stages of pregnancy which has adverse impacts on pregnancy outcome.

**Key Words:** Pregnancy, Anaemia, Nutritional Iron Intake

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**27/305. Nutrition and Healthy Lifestyle**  
**Associations of Carotenoids with Coronary Heart Disease Risks in Scottish Middle-aged Males and Females.**

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**Introduction:** Coronary heart disease (CHD) is one of the major causes of death in Scotland, where CHD death rate is among the highest in Europe. Scottish people consume more high-fat-foods and less vegetables rich in strong antioxidants carotenoids (Cs). Because oxidative stress is involved in the pathophysiology of lifestyle-related diseases such as diabetes and cardiovascular diseases, their blood Cs were examined in relation to CHD risks.

**Objectives:** This study was conducted to observe the associations of CHD risks with blood Cs in high risk Scottish population as a part of WHO-coordinated CARDIAC Study.

**Method/Design:** Study volunteers were recruited in spring 2001 in the islands of Lewis and Harris in the Western Isles, in the north western part of Scotland. Health survey was conducted in 300 Scottish males and females aged 45-59. As CHD risks, body mass index (BMI: weight (kg). height(m)<sup>2</sup>), blood pressure (BP), blood lipid profiles etc. were measured. Total Cs (TCs) including lutein, beta-cryptoxanthin, alpha-carotene, beta-carotene and lycopene in the blood were assayed for analyzing correlations between blood TCs and CHD risks. Study design for the secondary utilization of blood samples to analyze TCs in relation to CVD risks without any personal information was ethically approved by Mukogawa Women's University.

**Results:** Systolic and diastolic BP ( $\pm$ SD) were  $131.3 \pm 17.6$  and  $80.4 \pm 10.5$  mmHg, and total serum cholesterol (T-CHO) was  $234.7 \pm 42.7$  mg. dl, indicating the average was in the range of hypercholesterolemia. Blood TCs were very low,  $0.18 \pm 0.13$   $\mu$ g. mL in average, and were significantly low in obesity (BMI  $>30$  kg. m<sup>2</sup>) and hypertension (systolic  $>BP160$  mmHg) respectively. Blood TCs were significantly inversely associated with CVD risks such as BMI ( $P<0.001$ ), systolic BP ( $P<0.05$ ), diastolic BP ( $P<0.05$ ), pulse rate ( $P<0.05$ ) and atherogenic index (non-HDL-CHO/HDL-CHO ratios) ( $P<0.05$ ), while they were significantly positively related with T-CHO ( $P<0.05$ ) and HDL-CHO ( $P<0.001$ ).

**Conclusions:** Blood TCs were very low and significantly associated with CHD risks in Scottish middle-aged male and female. Daily intake of foods that are rich in Cs such as vegetables may contribute to CHD risk reduction in high-risk Scottish population.

**Key Words:** Coronary Heart Disease, Carotenoid, Vegetable, WHO CARDIAC Study, Hypertention

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**27/306. Nutrition and Healthy Lifestyle**  
**Content of dietary fibre and nutritional quality of meals from public canteens**

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**Introduction:** The health of working population is of great economical importance. A part of healthy lifestyle is also healthy

nutrition, which may not be overlooked during the time of work. In 2008 Slovenian Ministry of Health launched Guidelines for healthy nutrition of workers.

**Objectives:** Lunch-break time and funds for the meal are often limited, therefore public canteens are a convenient option for having a warm meal. Usually different menus are offered among which one does not contain any meat. The objectives were determination of the dietary fibre content and nutritional quality of meals from public canteens.

**Method/Design:** In two public canteens twenty warm meals were sampled, half of them contained meat while the other half were without it. The vegetarian and the meat containing meals, respectively, from both canteens were prepared following the same recipes. The nutritional quality of meals was evaluated by physicochemical analyses (contents of protein, fat, fibre, ash and water) and calculations (contents of carbohydrate and energy values). Enzyme-gravimetric method was used for determination of soluble, insoluble and total dietary fibre.

**Results:** The variability of energy, nutrients and dietary fibres among the meals analysed was great and recipe depending. However, regarding the type of meal, vegetarian or meat containing, respectively, the meals differed significantly in the average content of soluble fibre and available carbohydrates, which were higher in the vegetarian meals, while meals with meat contained significantly more protein. Interestingly, the energy value of the meat containing (1396-2483 kJ) and the vegetarian (1395-3515 kJ) on average hardly met the recommended 25% of daily energy intake. On the contrary the dietary fibre content of the meals was sufficient.

**Conclusions:** Considering the nutritional values the meals were appropriate for predominantly sedentary adults. However, workers should bear in mind such a meal is not also a replacement for breakfast or dinner.

**Key Words:** vegetarian meals, meat containing meals, dietary fibre content, public canteen

**Introduction:** The Spanish Ministry of Environment, Rural and Marine Affairs (MARM)'s Food Consumption Panel represents the most reliable source to evaluate the food consumption patterns in Spain.

**Objectives:** The aim of this study was to assess population food availability per capita per day (pc/d) and to evaluate dietary intake and the changes between years 2000 and 2008.

**Method/Design:** The sample consists of consumption and distribution data, obtained from the "Food Consumption Panel" between 2000 and 2008. The study was carried out in households (8000), catering trade (1500) and institutions (300). The data allow us to calculate the quality of the diet.

**Results:** In 2008 the average menu in grams consumed was made up by milk and derivatives (349 pc/d), vegetables and greens (327 pc/d), fruit (305 pc/d), cereals and derivatives (218 pc/d), meat and meat products (179 pc/d), fish (103 pc/d), oil and fat (47.2 pc/d) and eggs (31.1 pc/d). There was also a high consumption of non-alcoholic beverages (446 pc/d) and alcoholic beverages (247 pc/d). In consequence, milk and derivatives, eggs, fish, meats and derivatives and oils, sweets and charcuterie consumption was higher than recommendations, whereas cereals and derivatives, vegetables and greens, including potatoes, and legumes consumption was below the dietary goals.

No dramatic changes are seen from year 2000 to 2008, although there was an increase for fish (88.9 pc/d) and non-alcoholic beverages (384 pc/d) and a decrease for milk and derivatives (416 pc/d), eggs (36.6 pc/d) and alcoholic beverages (259 pc/d). When compared to the first available data in 1960's, large differences are observed for most of the food groups.

**Conclusions:** Food consumption patterns in Spain has been almost constant in recent years, but have markedly changed in the last fifty years, differing at present from the traditional and healthy Mediterranean Diet.

**Key Words:** Food Consumption Survey; food availability; dietary intake.

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## 27/312. Nutrition and Healthy Lifestyle

### Evaluation of food consumption and dietary patterns in Spain (2000-2008)

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## 27/315. Nutrition and Healthy Lifestyle

### Pre-competition hydration status and body weight regulation in olympic combat sports athletes

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**Introduction:** In competitive combat sports, a weight classification system is used to establish equality regarding strength and body mass. Despite potential negative implications concerning health and performance, the majority of athletes practice rapid weight loss prior to the official weigh-in. This short term weight reduction is achieved through a combination of caloric restriction, fluid deprivation and sweating-induced weight loss. After weigh-in, athletes strive for maximal regain by food and fluid intake. However, full recovery in

terms of fluid homeostasis might not be possible to reach.

**Objectives:** To analyse the association between body weight change and hydration status at competition in combat sports.

**Method/Design:** The analysis included 31 taekwondo and wrestling athletes (weigh-in evening before competition, i.e. <24h before match) and 32 boxers and judo athletes, (weigh-in at the morning of competition day, i.e. <12h before match). Mean (SD) age was 21,3 (4) years and 32% was female. Bodyweight (BW) was measured twice; first at the official weigh-in and again 30 min prior to the first match. Urine specific gravity (USG), a hydration status marker, was measured from a first morning urine sample collected at competition day. USG>1.030 was considered as serious dehydration. Association between weight change and serious dehydration was analysed in a logistic regression model adjusted for morning/evening weigh-in and gender.

**Results:** Weight change up to 7.5% of initial BW was observed. Mean (SD) weight change was 4,4% (2,8). In total, 48% were classified as seriously dehydrated. The risk of serious dehydration increased by 68% for each percentage weight change of initial body weight (OR 1,68; 95% CL 1,2-2,4).

**Conclusions:** The present results indicate that Olympic combat sports athletes practice weight regulation to such an extent that it could have implications regarding health and performance.

**Key Words:** Hydration, body weight, weight loss, sports nutrition, fluid.

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#### 27/316. Nutrition and Healthy Lifestyle

### Bone mass in relation to weight status in adolescence. The helena Study

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**Introduction:** While the association of lean mass (LM) with bone mass is well understood, the association of fat mass (FM) with bone mass IS controversial.

**Objectives:** To study the differences in bone mass by weight status in adolescents, after controlling for relevant confounders, such as physical activity (PA), calcium intake and LM.

**Method/Design:** A total of 330 adolescents (167 males, 12.5-17.5 years) from the HELENA cross-sectional study (2006-07) were included. The inclusion criteria were: complete data on dual energy X-ray absorptiometry (DXA) (bone, fat and lean masses), height, objective PA, calcium intake and sexual maturation. In order to analyze the role of body composition in the association bone mass-weight status, one-way analysis of covariance (ANCOVA) was performed. The categorized variable of BMI was entered as a fixed factor, bone mass

variables were entered as dependent variables and, in addition to the basic confounders (i.e. height, calcium intake and sexual maturation); the average PA and LM were gradually entered as confounders.

**Results:** Overweight/obese boys (n=42) had higher BMC at the whole body than their non-overweight peers (n=125). Additional adjustment for PA showed slightly higher differences between weight status groups. However, when adjusting for LM, the association between weight status and most of bone variables (both BMC and BMD) was inverted (p<0.05). Overweight/obese girls (n=30) had higher BMC and BMD than their non-overweight peers (n=133) in most of the regions analyzed. Additional adjustment for PA resulted in slightly higher differences between weight status groups, while adjusting for LM, inverted the associations between weight status and BMC (p<0.05) and eliminated the association with BMD (p>0.1).

**Conclusions:** Adolescents with higher levels of adiposity have greater bone mass, but this is not the result of FM per se, but of their higher LM.

**Key Words:** bone health, soft tissues, adolescents, BMI.

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#### 27/320. Nutrition and Healthy Lifestyle

### The content of fat and its quality in sandwiches from the faculty vending machines

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**Introduction:** Students in Slovenia have subsidized meals in the frame of various restaurants, canteens and bistros in the cities with the educational institutions. However most of the faculties do not comprise a student canteen, where students could have a warm meal, but poses only vending machines. Moreover, several faculties are dislocated; therefore students' daily nutrition relies mostly on the offer of vending machines.

**Objectives:** The content of fat and fatty acids composition in different sandwiches from vending machines were determined.

**Method/Design:** Sandwiches were sampled from vending machines at Biotechnical faculty. Sandwiches differed in the type of bread as well as the filling. The fat content was determined by gravimetric method after using acid hydrolysis and petrol-ether extraction, while gas chromatography-mass spectrometry was applied for the fatty acids analysis.

**Results:** Sandwiches contained from 17.4–33.9 g of fat. The energy from fat was 32.3–50.3% of total energy, which ranged from 1987 to 2696 kJ per sandwich. Ratios of saturated, monounsaturated and polyunsaturated ratios depended on the filling of sandwich. The tuna sandwich contained the highest proportion of polyunsaturated fatty acids (52.6%) and was well discriminated also by the means of linear discriminant analysis. The energy value of sandwiches is strongly correlated with the content of fat and with some fatty acids (C20:0; C18:1,cis-7), while for shorter chain fatty acids (C6:0; C8:0; C10:0; C11:0; C14:0; C14:1,trans-9; C14:1,cis-9 and 15:0) strong negative correlation with the total energy was observed.

**Conclusions:** Total fat content and energy values of sandwiches were comparable with some other food products sold by street vendors and popular among young population (pizza slice, hamburger) that were analysed parallelly. The students should take account of low water content and relatively high energy density of the sandwiches, and therefore paying attention for appropriate hydration and foods high in dietary fibre and other nutrients but fat.

**Key Words:** sandwiches, fat content, fatty acids composition, energy value

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### 27/322. Nutrition and Healthy Lifestyle

#### Food et nutrient intakes of food insecure people in France

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**Introduction:** Food insecurity was defined as the inability to afford enough and adequate food for an active and healthy life.

**Objectives:** The USDA Food Sufficiency Indicator was used to assess the prevalence of food insecurity in France.

**Method/Design:** Adults from the national dietary survey INCA2 (N = 1591) who declared that, for financial reasons, in their household, they usually but not always had enough of the kinds of food they want to eat, or that they had sometimes or often not enough to eat were classified as living in a "food insecure" (FI) household. They were compared to the rest of the sample (adults living in a food secure (FS) household), stratified in four income levels (FS1 to FS4). The nutritional quality of diets was assessed by the mean adequacy ratio (MAR) for 16 nutrients.

**Results:** In 2006-7, 12% of adults lived in a FI household in France. Both FI and FS1 individuals did not eat much fruit, vegetables and fish compared to FS individuals with higher incomes (FS2, FS3 and FS4). However, FI individuals ate even less fruit and vegetables and less fish than FS1 individuals. Both FI and FS1 individuals had a high consumption of cheap food sources of calories. However within these cheap foods, FS1 individuals preferentially consumed refined cereals, whereas FI individuals were characterised by a high consumption of sweet products. Among the five population categories studied, FI individuals had the diets with the lowest MAR and the highest energy density (even after adjustment for age, sex and energy intake).

**Conclusions:** Nutrition education programmes and actions aimed at promoting healthy eating should target mainly food-insecure and low-income populations in France. However, such actions should not be implemented through food aid organizations alone, because they do not reach the 12% of food-insecure adults in France.

**Key Words:** Poverty ; Diet; Food insecurity; nutritional quality; Nutritional policies

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### 27/323. Nutrition and Healthy Lifestyle

#### Maternal dietary patterns during pregnancy and associated nutrient intakes

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**Introduction:** Pregnancy is the most important stage of a women's life cycle where nutrition is essential for an optimum pregnancy outcome. Dietary pattern analysis is becoming a popular method of determining habitual dietary patterns during pregnancy. Cluster analysis is one technique that can be used to identify clusters or groups of subjects with similar dietary characteristics.

**Objectives:** The aim of this study was to examine the dietary patterns among pregnant women using cluster analysis and to explore their relationship with maternal nutrient intakes.

**Method/Design:** Two hundred and fifteen pregnant women were recruited from the antenatal clinic at the National Maternity Hospital, Dublin, Ireland. All participants completed a 3 day food diary during each trimester of pregnancy. Dietary data were entered into NetWISP version 3.0 (Tinuviel software, Llanfechell, Anglesey, UK) and analysed using k-means cluster analysis in PASW statistics version 18.0 (SPSS Inc., Chicago, IL, USA). One way ANOVA test was used to compare nutrient intakes between clusters.

**Results:** Two major dietary patterns were identified when all 3 trimesters of pregnancy were combined: 'healthy' and 'western'. Women consuming a 'healthy' pattern were significantly older in age and had lower BMI ( $p < 0.001$ ). Energy intake was similar in both clusters. Women consuming a 'healthy' pattern had significantly greater intakes of vitamin C, folate, iron and calcium and significantly lower intakes of fat and saturated fat as a percentage of total energy ( $p < 0.001$ ).

**Conclusions:** Healthy dietary patterns in pregnancy are associated with better nutrient intakes. Dietary pattern analysis which captures total dietary intake may be superior to other methods of nutritional assessment and could contribute to the development of healthy eating guidelines for pregnancy.

**Key Words:** Pregnancy, Diet.

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## 27/327. Nutrition and Healthy Lifestyle

### **Soft drink consumption and incidence of the metabolic syndrome: the SUN Project**

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**Introduction:** Little is known about the long-term effects of soft drink consumption on the risk of metabolic syndrome (MS), especially outside USA where other dietary patterns are followed.

**Objectives:** The objective was to assess the long-term relationship between changes in soft drink consumption and the risk of MS in the SUN Project after 6-year follow-up.

**Method/Design:** The SUN Project is an ongoing, dynamic, prospective cohort of Spanish university graduates. For the present analysis we considered 11682 participants recruited up to March 2004 to warrant a minimum follow-up of 6 years. Of these, 9924 were retained in the cohort for at least 6 years. After excluding participants with extreme caloric intake or with prevalent MS, the effective sample size was 8643.

Baseline soft drink consumption excluding diet soft drinks was collected at baseline using a 136-item food frequency questionnaire previously validated. Follow-up soft drink consumption was assessed at 6 years. The MS was defined according to the International Diabetes Federation criteria.

The association between changes in soft drink consumption and MS was assessed with non-conditional logistic regression models adjusted for potential confounders.

**Results:** We observed 627 incident cases of MS. Participants who increased their soft drink consumption during follow-up the most (5th quintile) had a significantly higher risk of developing MS than those who decreased their soft drink consumption (1st quintile) (adjusted odds ratio: 1.60, 95% confidence interval: 1.16-2.20; p for trend: 0.01).

**Conclusions:** Increases in soft drink consumption were significantly associated with a higher risk of developing MS after 6-year follow-up in the SUN Project.

**Key Words:** Sugar-sweetened beverages; metabolic syndrome; cohort, prospective, epidemiology

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**Introduction:** Nutrition plays an essential role in the development of diseases such as cardiovascular disorders, obesity or cancer. Strong evidence demonstrates that nutrients modulate gene expression determining the balance between health and disease. Targeted studies conducted to promote health by nutrition must consider genetic differences in order to establish diet formulations or administering nutritional compounds for genetically classified population which will result in a more efficient prevention or mitigation of these diseases.

**Objectives:** Constitution of the Cantoblanco Platform of Food and Nutritional Genomics(GENYAL) as a new high level tool for the analysis of gene-diet interactions.

**Method/Design:** Phenotypic stratification is based on anthropometric measurements and diet and lifestyle questionnaires. A bioinformatic application for databasing in accordance with the data protection act and the law in Biomedical Research has been developed. Genotypic stratification is based on the analysis of gene variants within pathways involved in nutrients metabolism and disease. SNPs selection is developed by potential functional effect and genetic mapping. 7900HT Fast Real-Time PCR System and Taqman Openarray Genotyping Platform is used for genetic analysis.

**Results:** The Cantoblanco Platform of Food and Nutritional Genomics(GENYAL) is mainly constituted by a DNA Biobank, a clinical and genetic database and a technological platform on nutritional genomics. The GENYAL project has been presented in two stages:

-Genotypic and phenotypic characterization of GENYAL population, including population recruitment and observational studies of genotype-phenotype association.

-Dietary intervention studies in population cohorts according to their genetic characteristics. Dietary intervention studies in specific cohorts is offered to research groups and companies, opening the possibility to develop controlled clinical trials with different ingredients or nutrients minimizing clinical differences due to genetic components.

**Conclusions:** The Cantoblanco Platform of Food and Nutritional Genomics constitutes a new high scientific level tool to further understand the benefit and damage of determined nutrients or ingredients in human health.

**Key Words:** Nutritional, Genomics, Platform.

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## 27/332. Nutrition and Healthy Lifestyle

### **The GENYAL Project: Establishment of a Nutritional Genomic Platform for the study of gene-diet interactions**

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## 27/340. Nutrition and Healthy Lifestyle

### **Nutritional Genomics: identification of a genetic-signature for the analysis of metabolic alterations on nutritional-related diseases**

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**Introduction:** Dietary prevention or mitigation of chronic diseases such as cancer, obesity or cardiovascular disorders may benefit strongly from the knowledge of the human genome and the application of nutritional genomics. A common event for these diseases is the alteration of the lipid metabolism and closely-related signaling pathways, pointing at the relevance of the study of the metabolic status in these patients. In addition, it is well-known the influence of nutrients in lipid metabolism, suggesting an essential role for nutrient-gene interactions in this area

**Objectives:** Development of a genomic signature for determining the metabolic profile of patients with nutritional-related diseases focused on the identification of new nutritional markers for these patients.

**Method/Design:** Genes that codify for enzymes of the lipid metabolism with the final aim of stratifying the population based on a metabolic-related gene expression signature have been studied. Metabolic pathways, enzymes, gene variants and probes which will provide a proper global view of the metabolic status has been identified. 7900HT Fast Real-Time PCR System and Taqman Openarray Genotyping Platform is used for relative quantification of gene expression, genotyping and allelic discrimination of different populations.

**Results:** 87 genes encoding for key enzymes of metabolic pathways and their corresponding interconnections have been selected to constitute the Metabolic Gene Expression Profile. This metabolic-related gene expression signature includes genes involved in the absorption and transport of nutrients, lipid catabolism, biosynthesis and beta-oxidation of fatty acids, ketogenesis, phospholipid metabolism, biosynthesis of bile acids and peroxisomal lipid metabolism. A first set of samples of colon cancer patients have been analyzed for their metabolic status.

**Conclusions:** This study will provide the genetic basis for understanding the lipid metabolism alterations with relevance for the development or/and progression of nutritional-related diseases, and therefore might contribute to the prevention, mitigation or improvement of the management of patients with these diseases.

**Key Words:** Gene Signature, Lipid Metabolism, Nutritional-Related Diseases

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### 27/342. Nutrition and Healthy Lifestyle **Weight management through a mobile telephone intervention**

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**Introduction:** National obesity guidance stipulates weight management interventions should provide ongoing support (NICE, 2006). Weight management interventions can be extended using mo-

bile telephone technology to deliver support in real time, real world settings (Heron, 2010).

**Objectives:** This study aimed to determine whether an SMS text message based intervention helped participants maintain or lose weight following completion of a weight loss programme.

**Method/Design:** In this controlled study, overweight (Body Mass Index [BMI] > 30kg/m<sup>2</sup> or > 28 kg/m<sup>2</sup> with co-morbidities) adults that completed a weight management programme participated in an additional 12-week SMS text message based intervention ('LEAP Beep'). Participants were allocated goals for steps, fruit, vegetable and breakfast consumption. Participants regularly 'texted' their progress and received practitioner feedback. Pre and post intervention body mass, waist circumference, BMI, quality of life (QOL), anxiety and depression measurements were compared retrospectively to a control group offered weight checks only.

**Results:** Compared to the control group (n=17), the intervention groups' (n=17) body mass, waist circumference and BMI reduced significantly (p=0.006; p=0.0005; p=0.03). QOL and depression scores improved insignificantly (p=0.134; p=0.228). No difference was found between group anxiety scores. Intervention attendance at follow up improved significantly (p=0.0005).

**Conclusions:** 'LEAP Beep' promoted weight, waist circumference and BMI losses as well as improved QOL parameters and attendance. SMS text messaging is a cheap, portable, convenient and innovative medium facilitating goal setting, self monitoring and information exchange. Further improvements to automation whilst maintaining individual support are necessary to ease practitioner burden. SMS text messaging could offer reduced cost dietetic input, opens up possibilities for practitioner to patient support and yields positive weight outcomes following initial weight loss

**Key Words:** Obesity; Mobile telephone; Self monitoring; Weight maintenance; Quality of life

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### 27/353. Nutrition and Healthy Lifestyle **Response of serum 25-Hydroxyvitamin D concentrations to Vitamin D supplementation during lactation**

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**Introduction:** Pregnancy, lactation and early childhood are life stages when the risk of low vitamin D status is high and the knowledge basis for nutritional requirement of vitamin D is weak.

**Objectives:** The aim was to investigate vitamin D requirements during lactation.

**Method/Design:** A randomised placebo-controlled double-blind 12-wk intervention was conducted in lactating women (n=135) across 3 intervention groups using 20µg/d of vitamin D<sub>3</sub>, with/without

500mg calcium, or placebo. Serum 25-hydroxyvitamin D (s25(OH) D) concentrations were measured by ELISA at baseline (BL) and endpoint (EP) and in umbilical cord blood. Vitamin D metabolites were quantified in expressed breast milk at 4 time points using HPLC. Dietary intakes, antenatal supplement use, anthropometric data, socio-demographic, and habitual sunshine exposure were collected.

**Results:** 100 completed the protocol and 90 were more than 80% compliant. Mean(SD) 25(OH)D levels were 49.6(24)nmol/L at BL and there were no differences across three groups. 21 and 63% had a s25(OH)D level below the thresholds for vitamin D deficiency and sufficiency of 30 and 50nmol/L, respectively. Mean(SD) cord 25(OH) D levels were 33.9(15)nmol/L (n=81). On average, cord s25(OH)D concentrations were 78% of maternal levels and there was a linear relationship between them (R<sup>2</sup> 0.7; P <0.001). The intervention considerably increased s25(OH)D levels in the treatment groups by ~30nmol/L and there was no difference at EP between women who received vitamin D only and those who received D + calcium. At EP, none of the women who received vitamin D had a s25(OH)D value <30nmol/L and 96% were above 50nmol/L.

**Conclusions:** Supplementation with 20µg/d vitamin D3 to achieve a total intake of ~25µg/d considerably increased s25(OH)D concentrations in lactating women and kept 96% above the desirable threshold of 50nmol/L. The current DRI of 15µg/d is inadequate to achieve a target s25(OH)D of 50nmol/L in 97.5% of lactating women in Ireland.

**Key Words:** Vitamin D, Cord, Lactation, 25-Hydroxyvitamin D

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### 27/354. Nutrition and Healthy Lifestyle

#### **Diet and behavioral problems in Norwegian adolescents**

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**Introduction:** There has long been a discussion about dietary factors and adolescents' behaviour. Given the recent trends of poor nutritional habits in adolescents we wanted to examine the link between meal pattern, food intake and behavioural problems in Norwegian adolescents.

**Objectives:** The aim was to investigate the cross sectional relation between diet and self reported behavioral problems in adolescents in the Southern part of Norway.

**Method/Design:** In total 482 9th and 10th grade students out of 625 eligible from four different secondary schools in 3 different communities in Vest-Agder County, Norway, participated, giving a participation rate of 77. The students filled in a questionnaire with food frequency questions of selected healthy and unhealthy food items, questions of meal frequency and four questions regarding behavioral problems (range 1-5). A sum score of these questions were made (range 4-20) with a high number indicating more difficulties. This sum score was dichotomized into those not having (score: 4-11) and those having behavioral problems (score: 12-20).

**Results:** Both having breakfast and having lunch regularly were significantly associated with decreased odds of behavioral problems

(OR: 0.32 (0.27-0.85), p<0.001 and OR: 0.55 (0.32-0.95), p=0.04, respectively). Having a high intake of unhealthy foods as sugar sweetened soft drinks (OR: 2.55 (1.11-5.86), p=0.03) and sweets (OR: 2.66 (1.48-4.77), p=0.01) were significantly associated with increased odds of behavioral problems. While having a high intake of fruits was associated with decreased odds of behavioral problems in Norwegian adolescents (OR: 0.38 (0.16-0.92), p=0.03). All ORs are adjusted for sex.

**Conclusions:** This study shows that having an optimal diet and not skipping meals are associated with decreased odds of behavioral problems in Norwegian adolescents. Improving the dietary intake and meal pattern of Norwegian adolescents is important. The cross sectional design of this study limits the results of the study.

**Key Words:** adolescents, behavioral problems, diet, meal pattern

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### 27/359. Nutrition and Healthy Lifestyle

#### **Estimation of Dietary Exposure to Inorganic Arsenic among the Korean population**

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**Introduction:** Inorganic arsenic is a well-known hazard ranked Group1 in International Agency for Research on Cancer. Although dietary intake is major source of non-occupational exposure, studies to estimate overall dietary exposure to inorganic arsenic are insufficient.

**Objectives:** This study aims to build an inorganic arsenic DB for common foods and estimate the dietary exposure among the Korean population.

**Method/Design:** Food items for the DB were listed based on frequency and amount of consumption and arsenic contents from commonly consumed foods during 1st to 4th KNHANES (Korea National Health and Nutrition Examination Survey). For the arsenic DB construction, 24 foods were analyzed with ICP-MS, 129 adapted from the values on literature reviewed, 39 imputed from similar foods, and 115 converted from different forms of the same foods. Dietary intake was estimated by multiplying individual consumption amount calculated in KNHANES I-IV by inorganic arsenic content of each food.

**Results:** The DB includes 307 foods which covers 39.8% of food items and contributes to 96.0% of food consumption among Koreans. Average daily intake of inorganic arsenic was 9.813µg, 0.191µg/



kg•bw/day (8.89% of PTWI(Provisional Tolerable Weekly Intake)). 94.6% of subjects had intake less than 25% of PTWI. 0.15% of male and 0.24% of female consumed more than PTWI. High consumers above 95th percentile had larger total intake; 3.7 times higher in fish and shellfish & seaweed. Among food groups, inorganic arsenic intake was attributed to fish and shellfish (59.6%), grain (17.9%), seaweed (11.7%), and vegetables (6.2%).

**Conclusions:** This DB would be useful in identifying high risk group of inorganic arsenic exposure in environmental epidemiology studies or monitoring, whose results can be applied to developing policy or intervention program for controlling exposures. (Acknowledgements: This work was supported by the Brain Korea 21 Project in 2011 and National Institute of Environmental Research.)

**Key Words:** inorganic arsenic DB, dietary exposure

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### 27/360. Nutrition and Healthy Lifestyle

#### **Adherence to a Mediterranean dietary pattern in healthy pregnant women of the Canary Islands**

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**Introduction:** Nutritional status during pregnancy affects outcomes for both mother and infant. Pregnant women must consume enough calories and nutrients to provide sustenance for both themselves and the developing fetus. Adequate nutrition during pregnancy is important for the development of the placenta, for a healthy delivery and for future lactation.

**Objectives:** To describe the adherence to a Mediterranean diet during pregnancy.

**Method/Design:** Cross-sectional study based on 103 women aged 18-40 years, who gave birth at the University Hospital Materno-Infantil of Gran Canaria. Food consumption and macro and micronutrient intake were estimated using a food frequency questionnaire used in the Canary Island Nutrition Survey (ENCA). The total Mediterranean-diet score ranged from 0 (minimal adherence to the traditional Mediterranean diet) to 8 (maximal adherence). Ethanol consumption was not considered to build the pattern. The score was divided into three levels: low (0-3), medium (4-5), high (6-8). Appropriate institutional ethics committee clearance and participants' informed consent were obtained.

**Results:** The average age for women in the study was 29 ± 4.4 years (mean ± SD), and the average of weeks of gestation 40 ± 1.3 weeks. The average increase in weight during pregnancy was 13.1kg. A low index of adherence (0-3) was found for 34.0% of the sample, 49.5% had intermediate values (4-5) and 16.5% a high index of adherence to the traditional Mediterranean diet (6-8). A significant number of pregnant women did not reach the 50% of the recommendations for

iron, folate and vitamin D intake (36.9, 26.2 and 38.8% respectively).

**Conclusions:** Dietary advice for improving the adherence to the traditional Mediterranean diet during pregnancy and the supplementation of mainly iron and folate are necessary.

**Key Words:** Pregnant women. Mediterranean dietary pattern. Pregnancy. Nutrition

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### 27/362. Nutrition and Healthy Lifestyle

#### **Socio-economic status and food consumption frequencies in European children: IDEFICS Study**

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**Introduction:** Increasing rates of overweight and obesity prevalence in European children have been associated to food consumption, with socio-economic indicators of wealth involved as mediators.

**Objectives:** To examine the effect of socio-economic status (SES), defined by parentally reported education and occupation, on the frequency of consumption of foods assessed by a food frequency questionnaire.

**Method/Design:** Participants were 14.426 children (49.1% boys) aged 2 to 9 years, from 8 European countries (Belgium, Cyprus, Estonia, Germany, Hungary, Italy, Spain, Sweden), participating in the IDEFICS (Identification and prevention of Dietary –and lifestyle-induced health Effects In Children and infantS) study. ANCOVA adjusted models were applied to detect differences on food frequency consumption by SES categories (high, medium and low). Adjusted logistic regression models for fruit, vegetable, water and soft drinks

consumption by SES categories (high as reference) were also conducted.

**Results:** Mean Food consumption frequencies were significantly different between low, medium and high SES categories. Low SES was significantly related to lower consumption of fruits, vegetables and water compared to higher SES in the whole sample. Specifically, participants in the low SES group were 40%, 30% and 27% less likely to have high consumption frequencies of vegetables, fruits and water respectively, and they were 2 times more likely to have a high consumption frequency of sugared drinks than participants in the high SES group. Observed trends were similar for individual-country analysis.

**Conclusions:** The low SES group was related with lower consumption frequencies of fruits, vegetables and water, and higher consumption frequencies of sugared drinks, compared with the higher SES group. These differences should be considered in the application of food related intervention programs, in order to enhance their effectiveness.

**Key Words:** Socio-Economic Status, Children, Food Consumption, Obesity, Idefics

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### 27/363. Nutrition and Healthy Lifestyle

#### **Effect of maternal educational attainment on clusters of energy balance related behaviors in pre-adolescents**

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**Introduction:** Understanding the etiology of overweight and obesity requires the study of behavioral and environmental factors influencing the energy balance. Parental education is a significant influencing factor of children's energy balance related behaviors (EBRB).

**Objectives:** To examine the relationship between parental education and clusters of EBRB defined by weekly consumption of soft drinks, physical activity (sports and transport) and screen time (computer use, TV watching and electronic games).

**Method/Design:** Participants included 970 Spanish children (47% boys) aged 10-12 years, participating in the ENERGY (European Energy balance Research to prevent excessive weight Gain among Youth) cross-sectional study. EBRB and parental education data were obtained via self-reported questionnaires. Cluster analysis was used to generate EBRB profiles. Differences of clustering by gender and parental education were assessed via Chi-square test.

**Results:** The cluster solution classified the sample in five profiles: 1) very active group (N=188), 2) relatively low screen time, physical activity and soft drinks pattern (N=391), 3) combined high physically active-high screen time group (N=147), 4) sedentary group (N=153) and 5) very high soft drink consumers group (N=79). Paternal educa-

tion level did not show any significant relation to cluster classification nor in boys ( $p=0.051$ ) neither in girls ( $p=0.172$ ). Maternal education level was statistically different by cluster classification in boys ( $p=0.003$ ), but not in girls ( $p=0.409$ ). Clusters 4 and 5 were represented mostly by participants with low maternal educational level unlike cluster 1 which was represented mainly by participants with high maternal education level.

**Conclusions:** Boys with low maternal education level were more likely to present unhealthier clustering of EBRB and subsequently assumed to be at higher risk of developing overweight and obesity. These differences should be taken into consideration for the development of public health promotion strategies in children.

**Key Words:** Children, Cluster Analysis, Behaviors, Obesity, Energy

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### 27/367. Nutrition and Healthy Lifestyle

#### **Prevalence and characteristics of dietary underreporting in Spanish adolescents**

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**Introduction:** A number of studies have shown that underreporting (UR) is a major problem in dietary surveys of children and adolescents. Therefore, dietary data should be interpreted with caution. This topic and its relationships with related factors has been scarcely studied, especially during adolescence.

**Objectives:** To assess the proportion of underreporting in Spanish adolescents, and investigate associated covariates.

**Method/Design:** We have studied a total of 784 adolescents (361 boys and 423 girls) aged 13 to 18 years, from the cities of Zaragoza, Murcia and Madrid (Spain) participating in the AVENA Study. Food intake was assessed using a 7-day dietary record. Socio-economic status, sedentary behaviour, weight perception and food habits were collected by questionnaires. Weight and height were also measured. Goldberg's method was used to assess underreporting. We established two cut-off points corresponding to EI/BMR values of 1.35 (cut-off 1) and 1.1 (cut-off 2).

**Results:** The proportions of UR were 60 % with cut-off 1, and 38 % with cut-off 2. Proportion of UR was similar in boys and girls. In both genders, differences in underreporting proportions between overweight and non-overweight adolescents were statistically significant ( $p < 0.05$ ), with cut-off 1 and cut-off 2. The proportions of UR were similar in subjects with moderate and high sedentary behaviours (time watching TV, time in front of a computer in weekdays and weekend days) and in subjects with low level of sedentary behaviours. UR

was also associated ( $p < 0.05$ ) with the perception of being overweight and following a current restrictive diet.

**Conclusions:** Underreporting was similar in both genders. Overweight adolescents showed higher underreporting proportions than non-overweight ones. UR was similar in all sedentary behaviours levels, but higher in adolescents with an overweight self perception and with a restrictive diet.

**Key Words:** Adolescence, Nutrition, Obesity, Validity, Underreporting

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#### 27/372. Nutrition and Healthy Lifestyle

### Relationship between intake of fatty fish and cognitive function in an intervention study among inmates

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**Introduction:** Diets rich in omega-3 fatty acids are considered beneficial for supporting cognitive processes in humans. Recent research has also strengthened the relationship between vitamin D and cognitive function. Seafood provides a number of nutrients and especially fatty fish is rich in marine omega-3 fatty acids such as eicosapentaenoic acid (EPA, 20:5n-3), docosapentaenoic acid (DPA, 22:5n-3) and docosahexaenoic acid (DHA, 22:6n-3) and vitamin D. Measuring cognitive processes during dietary intervention studies might provide useful information about nutritional impact on cognitive processes.

**Objectives:** To investigate the impact of increased marine omega-3 and vitamin D intakes by eating fatty fish for six months on cognitive function.

**Method/Design:** Inclusion criteria were healthy male adults (18-60 yrs) with  $IQ \geq 75$  living at Sand Ridge Secure Treatment Center. 94 eligible participants were randomized into either fish or control group for six month. Three times a week the fish group was served fatty fish for dinner whereas the control group was served a non-seafood alternative to their habitual dinner. Cognition was measured by standardized tasks at the same time as the physiological measures, heart rate variability and heart rate, were recorded. Fatty acid composition, vitamin D metabolites, lipid profile and thyroid hormones were determined in the blood samples. Double portions of the diet were collected from six different weeks to determine levels of fat, carbohydrate, protein, vitamins and minerals.

**Results:** The level of marine omega-3 in erythrocytes increased significantly from 5.4% to 9.3% in the fish group, whereas the level in the control group was unchanged (5.7% and 5.6%). The level of vitamin D measured as 25-hydroxy vitamin D was significantly higher in the fish group ( $71 \pm 40$  nmol/L) in comparison with the control group ( $55 \pm 42$  nmol/L) at the end of the intervention.

**Conclusions:** Results regarding cognition are in progress and

will be discussed.

**Key Words:** intervention, fatty fish, omega-3 fatty acids, vitamin D, cognition

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#### 27/375. Nutrition and Healthy Lifestyle

### Associations of sociodemographic and behavioural factors with folate and vitamin B12 intakes in European adolescents

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**Introduction:** Folate and vitamin B12 deficiencies increase global morbidity affecting all age groups, including adolescence.

**Objectives:** To describe folate and vitamin B12 intakes in European adolescents, and to determine associations with sociodemographic and behavioural factors known to have an influence on recommendation compliance (age, BMI (Body Mass Index), supplement use, tanner stage, family wealth and PA (physical activity)).

**Method/Design:** 2,316 adolescents (46 % males) were drawn from the HELENA (Healthy Lifestyle in Europe by Nutrition in Adolescence) cross-sectional study. Corrected medians of daily folate and vitamin B12 intakes were estimated from two non-consecutive 24h-recalls. The EAR (Estimated Average Recommendations) values were used to define prevalence of inadequate intakes. Independent sample t-test and ANOVA were used to examine differences between log-transformed dietary intakes and independent factors.

**Results:** Median folate and B12 intakes were 200  $\mu\text{g}$  and 5.8  $\mu\text{g}$  for males, and 170  $\mu\text{g}$  and 4.2  $\mu\text{g}$  for females ( $p = 0.0001$ ). 3 % and 91 % of males and 2 % and 98 % of females had adequate intakes for folate and B12, respectively ( $p < 0.0001$ ) between sexes for both micronutrients). Intakes of folate and vitamin B12, for males and females, respectively, were significantly different across BMI-categories ( $p = 0.0001$  and  $p = 0.007$  for males, and  $p = 0.001$  for both vitamins in females), and PA-levels ( $p = 0.014$  and  $p = 0.034$  respectively) in males,

being higher for those subjects who had lower BMI and better levels of PA. Intakes of B12 were significantly different for both sexes by family wealth (males:  $p=0.006$ ; females:  $p=0.045$ ) and by tanner stage only in males ( $p=0.002$ ). No associations were observed for age and supplement use.

**Conclusions:** High prevalence of inadequate folate intakes but not B12 was observed in this sample of European adolescents. Among the independent factors, only BMI was significantly associated for both sexes and vitamins.

**Key Words:** adolescents, Europe, folate, vitamin B12, Helena

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### 27/377. Nutrition and Healthy Lifestyle

#### Energy intake validation in children: comparison of repeated 24-hour recalls with doubly labeled water measurements

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**Introduction:** One way to evaluate validity of assessment instruments is by comparing reported energy intake (EI) against total energy expenditure (TEE) measured with the doubly labeled water (DLW) method, considered as the "gold-standard". Little is known about the validity of dietary intake data reported by parents describing their children's diets.

**Objectives:** To evaluate accuracy of proxy-reported EI assessed by two repeated 24-hour dietary recalls, by comparison to reference measurements of TEE obtained by the DLW technique in children.

**Method/Design:** A validation study was undertaken in a convenience sample from October 2008 until July 2009. A total of 46 children aged 4-10 years from Belgium, Sweden and Spain were included in this study with an over-sampling of overweight/obese children in the Swedish centre. Whole and subgroup (sex, study centre, age and weight status) differences between EI and TEE were tested using T-test. Agreement between EI and TEE was analysed using Bland-Altman Plots and regression analysis. Adapted Goldberg cut-offs were applied to assess the prevalence of under-reporting.

**Results:** Good agreement between TEE and EI was observed at group level especially when excluding overweight/obese children.

Individual values were found to be biased towards higher or lower values, but in general under-reporting was more common than over-reporting and most pronounced in the overweight/obese children. Subgroup differences between EI and TEE were observed in males ( $-260\pm554$  kcal/day,  $p=0.03$ ), in the overweight/obese group ( $-455\pm469$  kcal/day,  $p<0.001$ ), and in Swedish children ( $-788\pm261$  kcal/day,  $p<0.0001$ ), although this can likely be explained by their weight status. Under-reporting was observed in 22% of the study subjects.

**Conclusions:** Two proxy-reported 24-hour recalls are valid for assessment of EI at group but not at individual level. These results demonstrate that obesity-related dietary underreporting bias is not limited to self-reported data, but extends to information about children's diets as reported by their parents.

**Key Words:** doubly labelled water, 24-hour dietary recall, energy intake, validation, children

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### 27/379. Nutrition and Healthy Lifestyle

#### Evaluation of antioxidative activity of $\gamma$ -irradiation sanitized dried plants

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**Introduction:** Ray-irradiation has been recognized as safe technique to sanitize dried edible plants, but could modify their antioxidant capabilities. Different antioxidant (AO) methods, however, revealed significant variations in AO activities in comparative studies.

**Objectives:** Electrochemical techniques offer direct determination of the total AO activity without usage of nonphysiological reactive species. Efficient procedure, without special pretreatments of analyzed samples, was applied in a novel polarographic AO assay, hydrogen peroxide polarography (HPP), and validated in correlation with two standard photometric AO techniques.

**Method/Design:** A novel HPP assay, based on direct current polarography, has been used to measure hydrogen peroxide consumption in redox reaction with AO, present in water-ethanolic extracts of herbs and mushroom,  $\gamma$ -irradiated with 10 or 30 kGy (doses ensuring complete disinfection) and compared to two standard AO assays: DPPH (1,1-diphenyl-2-picrylhydrazyl) radical-scavenging assay and inhibition of lipid peroxidation (TBA assay), as well as with total phenolic content.

**Results:** Dried herbs (clove, sage, basil, ginger, black pepper and anise) and a mushroom (*Boletus edulis*) were  $\gamma$ -irradiated with 10 or 30 kGy. AO activities in 80% ethanolic extracts remained the same in all irradiated and unirradiated samples, as measured by all three

AO assays (DPPH, TBA and HPP) (with exception of basil, where the AO activity decreased after irradiation). Contents of total phenolic compounds were, also, unchanged after irradiation, with exception of basil, where phenolic content decreased. The strict correlation of total phenolic content and DPPH radical-scavenging assay was observed in both irradiated ( $r^2=0.9928$ ) and unirradiated ( $r^2=0.9738$ ) samples of all spices and mushroom.

**Conclusions:** Two standard AO assays, DPPH and TBA, as well as a recently developed HPP assay have been applied to determine AO activity changes in ethanolic extracts of dried plants exposed to

Irradiation. A direct correlation of AO activity in DPPH and phenolic content assay was found.

**Key Words:** irradiation, electrochemical, antioxidant

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### 27/388. Nutrition and Healthy Lifestyle

#### **Antioxidant and Antiproliferative activity of betalains from Egyptian and Kestrel beetroot pomace extracts**

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**Introduction:** The beetroot pomace, waste product generated primarily during juice processing is also promising source of bioactive antioxidants (polyphenolic compounds, carotenoids, betalains, vitamins, minerals) which could be used as additives for functional foods.

**Objectives:** The purpose of the present study was to examine betalain composition of beetroot pomace (two cultivars) and to identify some betalains by HPLC analysis. Antioxidant activity of different beetroot pomace extracts against stable 2,2-diphenyl-1-picrylhydrazyl (DPPH) and reactive hydroxyl ( $\bullet\text{OH}$ ) radicals were evaluated. The in vitro antiproliferative activity of extracts was detected on HeLa (cervix epitheloid carcinoma) and MRC-5 (fetal lung) cell lines.

**Method/Design:** Two samples of beetroot pomace (Egyptian and Kestrel) were extracted with 50% ethanol containing 0.5% acetic acid. Total content of betacyanins and betaxanthins after solid-phase extraction were determined spectrophotometrically. HPLC analysis were utilised for the separation and identification of some betalains. The scavenging activity on DPPH and  $\bullet\text{OH}$  radicals were determined by electron spin resonance (ESR) spectroscopy. Cell growth effects were determined in HeLa and MRC-5 cell lines, using SRB assay.

**Results:** The Egyptian pomace extract had the higher total content of betacyanins (117.96 mg/g) and betaxanthins (72.66 mg/g) than Kestrel pomace extract (betacyanins 62.75 mg/g, betaxanthins 46.59 mg/g). The presence of betacyanins (betanin and isobetanin) and vulgaxanthins (vulgaxanthin-I and vulgaxanthin-II) were identified by HPLC. The IC50DPPH values were 0.341 mg/ml (Egyptian) and 0.364 mg/ml (Kestrel) and IC50OH were 0.064 mg/ml (Egyptian) and 0.076 mg/ml (Kestrel). Beetroot pomace extracts showed antiproliferative effects depending on cell line and extract dose. IC50HeLa values were 0.697 mg/ml (Egyptian) and 0.666 mg/ml (Kestrel) and IC50MRC-5 were 0.370 mg/ml (Egyptian) and 0.394 mg/ml (Kestrel).

ferative effects depending on cell line and extract dose. IC50HeLa values were 0.697 mg/ml (Egyptian) and 0.666 mg/ml (Kestrel) and IC50MRC-5 were 0.370 mg/ml (Egyptian) and 0.394 mg/ml (Kestrel).

**Conclusions:** These results indicated that betalain rich extracts of beetroot pomace have strong antioxidant and antiproliferative activities and have potential as a value-added ingredient for functional foods.

**Key Words:** beetroot, betalains, HPLC, ESR

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### 27/389. Nutrition and Healthy Lifestyle

#### **Fatty acid composition of marine and freshwater fishes using GC/MS chromatography**

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**Introduction:** Fish is a good source of protein and polyunsaturated fatty acids, like as omega-3 and omega-6 fatty acids. These essential acids play a key role in many metabolic processes.

**Objectives:** This study investigated the fatty acid profiles of tree Bulgarian Black Sea fish species bluefish (*Pomatomus saltatrix*), horse mackerel (*Trachurus mediterraneus*) and shad (*Alosa pontica*) and tree freshwater fish species rainbow trout (*Oncorhynchus mykiss*), common carp (*Cyprinus carpio*) and catfish (*Silurus glanis*).

**Method/Design:** Analysis of fatty acid methyl esters were performed using gas chromatography system with MS detection.

**Results:** Total lipid content of all fish samples ranged from 4.20 (carp) to 15.54 (g/100g wet weight) for bluefish. Saturated, monounsaturated and polyunsaturated fatty acids (PUFA) were determined.

The seawater species had a higher content of saturated fatty acids than freshwater fishes. Palmitic acid (C 16:0) was the most abundant saturated fatty acid in all species ranging from 14% to 31%.

The freshwater fishes had a higher content (about 71%) of unsaturated fatty acids than seawater species (about 56%). From monounsaturated the dominant fatty acid were oleic acid (C18:1) and palmitoleic (C16:1). These fish species contained reasonable amounts of essential PUFA such as omega-3: eicosapentaenoic acid (EPA, 20:5n-3), docosahexaenoic (DHA, 22:6n-3), and omega-6 - arachidonic acids (AA, 20:4n-6). The Black sea fish species contained the highest amounts of omega-3 PUFA (from 14% to 21%) whereas freshwater fishes contain the highest level of omega-6 PUFA (from 10% to 22%).

**Conclusions:** These fishes contained appreciable levels of omega-3 and omega-6 PUFA suggesting that these fish could be used as a source of healthy diet for humans. An omega-6.omega-3 ratios was determined in all fish species and ranging from 0.5 to 4.30.

Fatty acid composition did not present wide variations due to preparation, indicating that cooking methods used did not interfere in fatty acid composition.

**Key Words:** Keywords: Fatty Acids, Black Sea Fish, Freshwater Fish, Gc-Ms

### Family and child characteristics and their associations with the diet of Finnish preschoolers

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**Introduction:** Social class differences in diet and health are seen at all ages throughout life. Risk factors for several chronic diseases, including unhealthy diet, are clustered in the lower socioeconomic groups. The main known shortcomings in the diet of Finnish children are low consumption of vegetables, fruits, fish and vegetable oil-based fats, high consumption of foods containing sucrose and poor quality of drinks.

**Objectives:** To modify Healthy Eating Index for the diet of Finnish children and to describe sociodemographic characteristics of the family and the child associated with the quality of the diet among Finnish preschool children.

**Method/Design:** Cross-sectional samples of healthy children participating in the Type 1 Diabetes Prediction and Prevention (DIPP) birth cohort study in Finland, recruited in 1998–2003. Three-day food records from 455 1-year-, 471 3-year-, and 713 6-year-olds were kept between the years 2003 and 2005.

**Results:** RESULTS: The quality of the diet of preschool children was assessed with the Healthy Eating Index that was developed specifically on the grounds of known shortcomings in the diet of Finnish children. Associations between sociodemographic characteristics and the Healthy Eating Index, and between Healthy Eating Index points and nutrient intake was assessed. High maternal age, high parental education, small family size and residence in Southern Finland were associated with a healthier diet in the child.

**Conclusions:** The research evidence builds the base for well targeted dietary counselling within the health care system.

**Key Words:** children, sociodemographic characteristics, healthy eating index

### Pre- and post- natal factors associated with childhood overweight and obesity in the Greco Study

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**Introduction:** The pre- and post- natal environment could play a role in the risk for overweight/obesity in Greek pre- adolescents.

**Objectives:** Our objective is to investigate whether this environment should be a target for health promotion programmes.

**Method/Design:** A representative sample of 4786 students, 10-12 years old (10.9±0.75 years old, 49.3% males), was selected from 117 primary schools. Children and their parents completed a detailed questionnaire regarding dietary and lifestyle characteristics. Data from 2093 children (44.9% males) are used, in which information about body weight and height, as well as parents' questionnaire, were available. Multivariate logistic regression models were used to assess the research hypothesis.

**Results:** Results revealed that mother's weight and smoking habits before pregnancy were positively associated with likelihood of preadolescent overweight/obesity (OR=1.05, 95%CI: 1.04-1.06; OR=1.99, 95%CI: 1.25-3.16), while age of mother before pregnancy was negatively associated (OR=0.96, 95%CI: 0.94-0.98). Furthermore, results revealed that a 5kg increase in mother's body weight, increases the odds of being an overweight/obese child 45% (95%CI: 1.04-2.30). In addition, mother's educational status in terms of school years was found to be negatively associated with the odds of having a 5kg increase in body weight (OR=0.96, 95%CI: 0.93-0.99), while for every one hour increase in TV viewing, the likelihood of having a 5kg increase in body weight was 7% (95%CI: 1.03-1.10).

**Conclusions:** Preadolescent obesity is associated with pre-pregnancy weight and smoking habits, age of mother at conception and weight increase of mother after birth.

**Key Words:** Childhood Obesity, Weight Change

**Body composition change after re-education in portioning food servings among obese boys and girls**

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**Introduction:** Food servings sizes are getting bigger and bigger, which helps to increase obesity.

**Objectives:** To evaluate the effect of food servings portioning on changing body composition among obese adolescents according to gender.

**Method/Design:** It is a randomized clinical trial in which obese adolescents were divided into two groups using different nutritional approaches. All adolescents underwent an anthropometric evaluation and a body composition analysis by bioelectric impedance and by deuterium dilution. Group A adolescents were submitted to a nutritional intervention aiming to improve the quality of their diet and the portioning of food servings sizes. Group B adolescents received the same intervention except for the directions on portioning food serving sizes—a direction which was given during their last consultation.

**Results:** Thirteen female adolescents and fourteen male adolescents in Group A and eight female adolescents and eighteen male adolescents in Group B were evaluated. Relative to Group A, girls reduced their daily intake of complex carbohydrates ( $p < 0, 01$ ) and boys reduced their daily intake of complex carbohydrates ( $p < 0, 01$ ) and fat ( $p < 0, 01$ ). As for Group B, girls did not show any difference in daily food intake for any food group, while boys reduced complex carbohydrates ( $p < 0,01$ ) and fruits ( $p < 0,01$ ). We did not find any significant difference in anthropometric and body composition data on both genders for either group. It was not possible to observe any significant differences relative to anthropometrics, body composition, or sizes of daily portions of food groups consumed when the effects of the nutritional interventions for Group A and Group B, divided by gender, were compared.

**Conclusions:** Eating behavior re-education based on portioning food servings does not significantly allow for changes in body composition when compared to qualitative re-education alone, both for boys and girls.

**Key Words,** Re-Education, Portioning Servings, Obesity, Adolescents.

**Weight loss maintenance on *ad libitum* diets: 1-year results of the Diogenes dietary intervention study**

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**Introduction:** DIOGENES investigated the effect of dietary protein and glycemic index (GI) on weight loss maintenance in 8 centres across Europe for 6 months.

**Objectives:** This study reports the 1-year results in 2 of the centres that extended the intervention to 1 year.

**Method/Design:** After an 8-week low calorie diet (LCD) (body weight (BW) loss  $11 \pm 3 \%$ ), 257 adults (BW  $88.9 \pm 14.0$  kg, BMI  $29.9 \pm 4.1$  kg/m<sup>2</sup>, age  $42 \pm 5$  y) were randomised to 5 *ad libitum* diets for 12 months: high protein (P)/low GI (HP/LGI), high P/high GI (HP/HGI), low P/low GI (LP/LGI), low P/high GI (LP/HGI) and a control diet. During the first 6 months foods were provided for free through a shop system, during the whole 12-month period subjects received guidance by a dietician. BW changes were analysed by mixed model (intention-to-treat) and adjusted for BMI at randomization, gender, age, family structure, LCD-induced weight loss and centre.

**Results:** 140 subjects completed the 12-month trial (= 54 %). The number of dropouts was lowest in the HP/LGI group. The BW increase (mean (95% CI)) was 5.8 (3.6 to 8.1) kg in the HP group, 4.3 (2.0 to 6.6) kg in the LP group, 3.8 (1.9 to 5.7) kg in the LGI group, 2.3 (-0.3 to 4.8) kg in the HGI group and 3.5 (2.0 to 5.0) kg in the control group. Intention-to-treat analysis in all 257 subjects showed a significant difference in BW change between the HP and LP groups ( $P < 0.01$ ) and no significant difference between the HGI and LGI groups ( $P = 0.9$ ). No interaction between the protein and GI was found.

**Conclusions:** A higher protein content of the diet improved weight loss maintenance over 12 months, dietary glycemic index did not modify this effect.

**Key Words:** weight maintenance, dietary protein, glycemic index.

### Determinants of physical development of 9-10 years old children in Lithuania

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**Introduction:** Birth time, birth weight, nutrition in infancy are recognized to be of great importance for human development.

**Objectives:** To evaluate the determinants of growth of 9 and 10 years old children.

**Method/Design:** This study is a part of WHO European Childhood Obesity Surveillance Initiative (COSI) performed in Lithuania. Cross-sectional study of a national representative sample of first-formers (2008) and prospective cohort study (2010) was performed. Anthropometrical measurements of first (n = 4937) and third grade (n = 4844) children were conducted. Parents of first – formers completed the questionnaires (n = 4447).

**Results:** In 2010 the prevalence of insufficient, normal weight, overweight (OW) and obesity (OB) among 9 and 10 years old children was 10.2%/11.7 %; 71.8 %/72.9 %; 13.2 %/12.6 %; 4.9 %/2.9 %. The percentage of obese girls in the age group of nine was 1.3 times more, if compared with the age group of ten. Seven and eight years old children who were born pre-term 1.5 times more often were thin, if compared with children who were born in time. Differences in physical development among children who were born in time and pre-term disappeared in the age of 9 and 10 years old. High birth weight children (> 4.5 kg) significantly more often were overweight or obese, if compared with low birth weight children (31.3 and 7.9 % accordingly). Significant differences were found among breastfed and non-breastfed children: these children were OW or OB more often. 31.7 % of children whose appetite was evaluated as “good” were OW or OB. 24.5 % of children whose appetite evaluated as “bad” were of insufficient weight. These children who never ate breakfast 1.4 times more often were OW or OB.

**Conclusions:** Correlations among physical development of children and birth weight, breast-feeding and nutrition habits were established.

**Key Words:** children, physical development, birthweight, breast-feeding

### Blood pressure and postprandial hemodynamic changes on a high protein versus high carbohydrate diet

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**Introduction:** Diet composition may affect blood pressure (BP). We investigated the role of dietary protein.

**Objectives:** To examine the effects of a high protein (HP) versus high carbohydrate (HC) diet on BP and postprandial hemodynamic changes.

**Method/Design:** A randomized double-blind parallel study in 94 untreated overweight subjects with mildly elevated BP. After a 2-week run-in period on a standardized diet subjects were allocated to a HP or a HC diet for 4 weeks. Diets contained a mixed protein supplement (HP) or maltodextrin supplement (HC). BP was measured before and after 4 weeks of supplement use. Postprandial hemodynamic responses over a whole day were determined in a subgroup (n=53) on day 1 and day 28. Differences in BP and postprandial responses between diets were analyzed by ANCOVA.

**Results:** After 4 weeks, office systolic BP (SBP) and diastolic BP (DBP) were lower in the HP group than in the HC group (-4.9 mm Hg, p = 0.005 and -2.7 mm Hg, p = 0.045). Also daytime ambulatory SBP tended to be lower (p = 0.06). On day 1, postprandial mean arterial pressure (MAP) and total peripheral resistance (TPR) were lower in the HC than in the HP group (MAP: -3.5 mm Hg, p = 0.01, TPR: -1.1 mm Hg/(mL/min), p = 0.06), whereas cardiac output (CO) response did not differ. In contrast, after 4 weeks no differences were found in MAP response, whereas CO response was higher in the HC than in the HP group.

**Conclusions:** An increase in dietary protein content in exchange for carbohydrates lowers blood pressure in overweight subjects with mild blood pressure elevation. The acute postprandial blood pressure fall after HC meals was larger than after HP meals. This difference had disappeared after 4 weeks. The cause of these postprandial changes and its relationship with BP regulation remain to be established.

**Key Words:** Protein – Carbohydrate – Blood pressure – Postprandial response



### Critical postnatal window for programming kidney by protein intake: the EU chop project

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**Introduction:** Protein intake during the first months of life affects kidney size and function in healthy infants.

**Objectives:** To assess the critical postnatal window in which protein intake may affect kidney size in healthy infants.

**Method/Design:** This multicentre European clinical trial (EU Childhood Obesity Project) examined 601 healthy 6-month-old formula-fed infants randomly assigned within the first 8 weeks of life (median 14 days) to receive an infant formula with higher or lower protein content. Protein intake (g/day) was assessed monthly by 3-day food diaries. Infant's length (cm) and kidney volume (cm<sup>3</sup>) (by ultrasonography) were measured at 6 months.

**Results:** Linear regression models showed a significant effect of protein intake on kidney volume during the first 6 months (adjusting by infant's length) [effect of protein at 1month:  $\beta=0.424$  (95%CI=0.147, 0.617),  $p<0.001$ ; 2months:  $\beta=0.424$  (95%CI=0.238, 0.610),  $p<0.001$ ; 3months:  $\beta=0.470$  (95%CI=0.300, 0.640),  $p<0.001$ ; 4months:  $\beta=0.408$  (95%CI=0.242, 0.575),  $p<0.001$ ; 5months:  $\beta=0.244$  (95%CI=0.122, 0.365),  $p<0.001$ ; 6months:  $\beta=0.243$  (95%CI=0.122, 0.365),  $p<0.001$ ]. The effect of each gram of protein consumed during the first 4 months on kidney volume at 6 months was stronger than such effect of protein intake at 5 or 6 months. We detected a marked decrease in the effect of protein on kidney size at 3 and 4 months as compared to protein at 5 and 6 months (T-tests for regression models 3m vs. 5m,  $p=0.017$ ; 3m vs. 6m,  $p=0.016$ ; 4m vs. 5m,  $p=0.059$ ; 4m vs. 6m,  $p=0.058$ ).

**Conclusions:** Higher protein intakes during the first 3 to 4 months of life possibly have a major effect on kidney hyperplasia than protein intake in the subsequent months, these 4 first months of life being a critical window for programming later kidney health.

**Key Words:** Protein, programming, infant, kidney

### Lower consumption of soft drinks among children with parents who limit tv-commercials

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**Introduction:** Children's increased consumption of soft drinks is a public health problem as excessive intake has been associated with an increased risk of childhood obesity, diabetes type two and dental caries. Previous studies have found positive associations between TV-viewing, including watching commercials, and consuming foods high in sugar.

**Objectives:** The aim of this study is to examine the association between children's TV use (exposure to commercials and time spent viewing TV) and their consumption of soft drinks, taking parental norms into account.

**Method/Design:** Data gathered 2007-2008 from the Swedish sample (n=1765) in the European IDEFICS study ("Identification and Prevention of Dietary and Lifestyle-induced Health Effects in Children and Infants") was used. Focus was on variables measuring children's (2-9 years old) and parents' soft drink consumption, children's TV-viewing and exposure to commercial TV, and parents' attitudes towards soft drink consumption and exposure to commercial TV. Logistic regression was used to calculate odds ratios.

**Results:** Children of parents who did not or only partly limit their children's exposure to commercials were at more than double the risk (OR: 2.1, CI: 1.6-2.8) to consume soft drinks at least weekly, compared to children of parents who intended to strictly limit the exposure. Furthermore, we found that the association between TV-viewing (viewing time as well as exposure to commercial TV) and soft drink consumption was independent of parental norms regarding soft drinks (role models and attitudes).

**Conclusions:** The results indicate that in order to decrease children's soft drink consumption, parents' intentions to limit children's exposure to TV-commercials are important. The results provide strong arguments for the need to target parents with health promotion strategies including focus on TV and commercials.

**Key Words:** Children, television viewing, TV-commercials, soft drinks, parental norms

**Mission x: Train like an astronaut. A one-year pilot project experience in Spain**

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**Introduction:** Childhood overweight and obesity have become a global health problem. Therefore, it is essential to educate children in a healthy lifestyle in order to create solid habits that last until adult life. Mission X has a unique concept of introducing the astronaut as a role model for children in relationship to healthy eating, fitness, self-control and effort, in a fun context.

**Objectives:** The aim of Mission X pilot project was to evaluate the viability of the project in Spanish schools.

**Method/Design:** Twelve lessons related to physical activity and fitness, and six related to science have been created by NASA and ESA together with other institutions based on astronaut training. The program was presented like a competition for 8 to 12 year olds within the academic curricula. PE teachers were in charge of the program at schools. With the aim of evaluating the effectiveness of the pilot project, two different surveys have been developed to be filled in by the participating teachers and local partners.

**Results:** During the academic year 2010-2011, a pilot phase of the program has been performed in 9 countries (Spain, Italy, France, The Netherlands, Austria, United Kingdom, Germany, Colombia and the USA) with nearly 4000 children. In Spain, the program has been managed in 10 primary schools from four different regions. Teacher-training was performed in order to harmonize between countries. Interaction between schools has been possible via the web page, blog and facebook. Motivational level among the children has been very high. Nutrition-related lessons like hydration, strong bones, balanced eating and low fat were successfully performed

**Conclusions:** The use of multimedia and social networks had a positive impact on children and their teachers. A world-wide project like this is feasible with some adaptation to the characteristics of the educational system of each participating country.

**Key Words:** health promotion, healthy life style, school program, nutrition, physical activity,

**Iodine status of pregnant women in a population changing from high to lower fish consumption**

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**Introduction:** Dietary surveys in Iceland have shown that fish and milk consumption has decreased considerably during the last decades, and especially among young women, with possible consequences for the iodine status in the population. Iodized table salt is not commonly used in Iceland.

**Objectives:** To assess the iodine status and dietary pattern of pregnant women in a population changing from a high to lower consumption of milk and fish.

**Method/Design:** Cross-sectional observational study. Subjects were randomly selected pregnant women (19-43 years-old, n=162). A validated Food Frequency Questionnaire (FFQ) was used to evaluate food consumption. Intake was compared to food-based dietary guidelines for milk and dairy products (2 portions/day) and fish (at least 2 times/week). Urine samples were collected for measuring urinary iodine (U-I) and creatinine (Cr) and blood samples for measuring serum thyroid-stimulating hormone (TSH).

**Results:** Supplements were estimated to provide 33% of the total dietary iodine, milk and dairy products provided 31% and fish 18%. About 40% of the pregnant women consumed fish twice a week or more and around 70% reached recommendations of two portions of milk and dairy products per day. The median U-I concentration was 180µg/l and the median U-I/Cr ratio 173µg I/g Cr. Higher intake of milk and dairy products was associated with increased iodine excretion. Neither fish intake nor use of supplements, were associated with iodine status.

**Conclusions:** Iodine status was within the optimal range (150-249 µg/day) defined by the World Health Organization. Milk and dairy products are important sources of iodine in the population studied.

**Key Words:** Iodine, Pregnancy, Nutrition Status, Dietary Intake

### Effect of early protein intake on later cardiac function: the EU chop project.

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**Introduction:** Nutritional factors early in life, such as protein intake, may programme functions and structures in adulthood. Both over nutrition and malnutrition can modulate cardiac mass and function, but little is known about the effect of protein intakes within the normal range.

**Objectives:** Our aim is to determine the effects of protein intake during the first 12 months of life on cardiac mass and function at 24 months.

**Method/Design:** The study is part of the EU Childhood Obesity Project (EU-CHOP) (QLK1-2001-00389). Two-hundred one Spanish infants, who were randomized at birth to a higher (HP) or lower (LP) protein content formula feeding during the first year of life, were followed until 24 months. Echocardiography (cardiac mass, ejection fraction (EF) and shortening fraction (SF)) was available at 24 months in 97 children (HP=50, LP=47). Protein intake was assessed until 24 months by 3-day food diaries. Anthropometry was assessed at recruitment and at 2y.

**Results:** HP group showed higher EF and SF than LP group (EF (%): 69.09±5.12 vs. 37.70±4.12, p<0.05 and SF (%): 66.69±4.89 vs. 35.79±3.76, p<0.05). No significant differences were observed in cardiac mass (g) between formula groups (29.54±5.57 vs. 29.13±4.25 in HP and LP respectively). Type of formula modulated EF and SF at 2y, even when current anthropometry was included in the regression model. Daily protein intakes over the first 6 months showed significant correlations with both EF and SF at 2y and the strength of these correlations was progressively decreasing (EF: r= 0.406, p<0.001; r= 0.342, p< 0.01; r= 0.272, p<0.01; r= 0.221, p<0.05 and SF: r= 0.407, p<0.001; r= 0.344, p< 0.01; r= 0.278, p<0.01; r= 0.231, p<0.05 for months 1, 2, 3 and 6 respectively).

**Conclusions:** Protein intake during the first 6 months of life is directly associated with cardiac function at 2y, suggesting an early programming mechanism.

**Key Words:** protein intake, early programming, cardiac function, cardiac mass.

### Relationship between body image and physical activity: the Sun Project

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**Introduction:** The mental-health benefits of physical activity are well known. However, little is known about the effect of physical activity on the perception of body shape.

**Objectives:** The objective was to assess the relationship between physical activity and body shape perception in the SUN Project.

**Method/Design:** In this study, we included 19,497 Spanish graduates who answered questions about body shape (60.4% women, mean age: 38 years). To assess physical activity, a validated questionnaire was administered at the baseline; data of body shape perception was collected from a nine-figure validated scheme. We classified participants in two groups depending on whether their perception of body shape was consistent or not with their body mass index (BMI).

The association between physical activity and consistency between the perception of body shape and BMI was assessed with non-conditional logistic regression models to adjust for potential confounders.

**Results:** We observed that participants with higher levels of physical activity (5th quintile) had a more realistic perception of their body image after adjusting for age, sex, BMI, and smoking status (adjusted odds ratio for misperception: 0.77, 95% confidence interval: 0.71-0.85; p for trend: < 0.001) taking the lowest quintile of physical activity as the reference category.

**Conclusions:** Having a physically active life was significantly associated with a more realistic perception of body shape in the SUN Project.

**Key Words:** Physical activity, body image, body mass index, cohort.

### Nutritional status and anaemia prevalence in two communities in the northern and upper east regions of Ghana

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**Introduction:** Nutrition plays an important role in the health and welfare of children and women in Ghana. Poor nutrition results in morbidity, mortality, poor education, and fewer opportunities for

economic development.

**Objectives:** The study assessed nutritional status and anaemia prevalence among children 6 to 59 months and their caregivers from Northern (Bongni) and Upper East (Kongwania) regions of Ghana.

**Method/Design:** Anthropometric data (weight, height/length) and age were collected for 196 mother-child pairs using structured questionnaire. Blood haemoglobin concentration was determined using the HemoCue photometer. Data were analyzed using SPSS version 15. The new WHO Anthro program was used to determine baseline prevalence of stunting, wasting, and underweight among children. BMI was calculated for mothers. Using WHO cut-offs, haemoglobin concentrations were categorized into anaemic, severely anaemic or normal.

**Results:** In Bongni (n=90), 42.2% of the children were stunted, 5.6% wasted and 16.7% underweight. In Kongwania (n=106), 12.4% of children were stunted, 6.7% wasted and 16.2% underweight. About 87% of children in Bongni and 81.1% in Kongwania were anaemic, while 8% and 4% respectively were severely anaemic. About 20% of caregivers in Bongni and 16% in Kongwania were classified thin, overweight or obese. About 52% of caregivers in Bongni, and 56% in Kongwania were anaemic.

**Conclusions:** Stunting, wasting and underweight prevalence are high in both communities. Anaemia prevalence among children and their caregivers was also high.

**Key Words:** stunting, wasting, underweight, anaemia, prevalence

questionnaire developed and validated in the target population. Socio-economic status (SES) and educational level assessed by questionnaire. Television watching classified as ordinal (0=less than 3 h/d; 1=equal or more than 3 h/d); playing video/computer games (0=less than 2 h/d; 1=equal or more than 2 h/d). Independent relationships were assessed by odds-ratios (OR) using logistic regression.

**Results:** Prevalence of overweight and overfat were respectively 23.3%[20.3-26.7] (M: 18.8%[15.7-22.4]; F: 27.3%[22.7-32.4]; p=0.003) and 19.8%[17.2-22.7] (M: 19.4%[15.8-23.5]; F: 20.1%[16.5-24.4]). Daily watching TV habit was widespread in both gender (M: 77%; F: 74%) but boys used videogames or computer more than girls. Mean (se) time spent in watching television (min/d) was 74.8(1.6) [M: 75.4(2.5); F: 74.2(2.2)] and computer games using was 33.2(1.4) [M: 42.7(2.3); F: 24.8(1.7); p<0.001]. After adjusting for age, gender, level education and SES, overweight and overfat were positively associated with time spent in television viewing (OR=3.3[1.6-7.0, p=0.002]; OR=3.1[1.4-6.7; p=0.006, respectively]) and videogames or computer using (OR=2.9[1.5-5.7], P=0.03; OR=2.2[1.1-4.7, P=0.035, respectively). Associations were also observed with age (OR=1.7[1.2-2.3], p=0.001 for overweight; OR=1.6[1.1-2.3], p=0.008 for overfat) and high SES (OR=1.8[1.2-2.6], p=0.003 for overweight).

**Conclusions:** This finding suggests that the habit of watching television and using videogames/computer is a risk factor of overweight and adiposity development among Tunisian adolescents, and supports workable recommendations that include behavioral and societal approaches.

**Key Words:** Tunisia, adolescents, overweight, television, computer games.

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## 27/436. Nutrition and Healthy Lifestyle

### Television viewing, computer games usage, and body composition in adolescents: the Obe-Maghreb study

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**Introduction:** North African countries are facing rapid increases in overweight and obesity among children and adolescents.

**Objectives:** To analyze the effect of sedentary behavior on the risk of overweight and adiposity among Tunisian adolescents.

**Method/Design:** Cross-sectional survey (2009) in the Great Tunis, based on a multistage stratified random cluster sample: 1254 Tunisian adolescents (M=583, F=671), aged 10-19 y. Overweight: BMI=weight/height<sup>2</sup> >1 SD (WHO, 2007); overfat (body fat percentage measured by BIA: M>20%, F>30%). Time spent in television watching, videogames and computer usage assessed by a frequency

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## 27/440. Nutrition and Healthy Lifestyle

### Awareness of dietary recommendations among adolescents

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**Introduction:** During adolescence, young people take responsibility for their own eating habits, health attitudes and behaviours and create lifelong lasting habits so it is essential that they adopt healthy habits according to dietary recommendations. Knowledge is one of the factors necessary for changing dietary habits, and with insight in knowledge is possible to get clear picture about areas upon which we must act.

**Objectives:** The aim of this work was to question dietary recommendation awareness and dietary habits in adolescents.

**Method/Design:** Modified General Nutrition Knowledge Questionnaire was self-administered during school time. Sample included high school students, mean age 17.9 years.

**Results:** 77.3% of participants were familiar with general dietary recommendations. Still, with the recommendations regarding consumption of more fibres and less meat and meat product 68.4% and

25.6% of adolescents were familiar. The specific recommendations, such as consumption of five servings of fruits and vegetable knew only 8.5% adolescents. Frequency of fruits consumption was very low; 13.9% of boys and 19.5% of girls consumed fruits three or more times per day. 28.2% of boys and 47.8% of girls consumed vegetables two or more times per day. Main source of information about food and nutrition were television (75.2%) and Internet (50.0%). Although half of the participating adolescents claimed to read the declaration, it serves as a source of information for 22.2% of them.

**Conclusions:** Although general recommendations regarding increase or decrease of certain food groups were familiar to majority of the participating adolescents, specific recommendations were not known. Television and Internet as major and very influential sources of information should be intensified by competent experts to influence nutrition knowledge and decrease of non-communicable diseases.

**Key Words:** Dietary Knowledge, Eating Habits, Adolescents

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#### 27/445. Nutrition and Healthy Lifestyle

### Body weight in pregnancy: a major issue for maternal and fetal outcomes

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**Introduction:** The prevalence of maternal overweight and obesity is rising similar to the prevalence in the general population. Maternal obesity affects significantly maternal and fetal outcomes. Body weight in prepregnancy has been associated with increased maternal mortality, pre-eclampsia, type 2 diabetes, and cardiovascular diseases in the mother as well as perinatal mortality, macrosomia and congenital malformation in fetus and infant.

**Objectives:** To examine whether in utero exposure to maternal overweight and obesity is related to maternal and fetal outcomes.

**Method/Design:** 1500 Austrian pregnant women (2nd and 3rd trimester) were enrolled in a survey done with a quantitative questionnaire. Body mass index based on measured data, birth weight and some health indicators were assessed.

**Results:** Body mass index was  $23.3 \pm 4.5$  kg/m<sup>2</sup> on average. One third of the investigated childbearing women were overweight or obese. Body weight increased according to the recommendations of the Institute of Medicine (2010) by  $11.6 \pm 5.3$  kg in overweight and  $9.1 \pm 5.4$  kg in obese pregnant women. Ten percent of all participants reported to suffer from gestational diabetes, within overweight and obese women 19.0% and 20.4% were affected, respectively. Every fourth interviewee mentioned spontaneous abortion during previous pregnancies. The measured mean birth weight of newborn was  $3386 \pm 539$  g, overweight and obese mothers gave birth to babies with a significant higher birth weight compared to normal weight women. Birth weight of these women was within the normal range.

**Conclusions:** Among the adverse outcomes associated with maternal prepregnancy overweight and obesity is developing gestational diabetes, and spontaneous abortion, as well as delivering an infant

with a high birth weight.

**Key Words:** pregnancy, maternal and fetal outcomes, BMI, birth weight

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#### 27/446. Nutrition and Healthy Lifestyle

### Resting energy expenditure in morbidly obese patients

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**Introduction:** It is well known that energy balance increases with larger body size. In obesity energy expenditure is lower than energy intake, leading the excess energy to be stored as fat. Alterations in substrate oxidation may prevent weight loss and promotes fat storage, maintaining a negative energy balance. Many methods are available to estimate total energy expenditure, but they all have limitations. Indirect calorimetry (IC) measures energy balance comparing the amount of heat loss over a period of time, from oxygen consumption (VO<sub>2</sub>) and carbon dioxide production (VCO<sub>2</sub>)

**Objectives:** The main aim of this study was to measure resting energy expenditure (REE) in morbidly obese patients by IC.

**Method/Design:** We studied morbidly obese (BMI >40 kg/m<sup>2</sup>) patients and non-obese (BMI <23.0 kg/m<sup>2</sup>) healthy volunteers, from which age, height, weight and BMI were recorded. Obese patients were divided into two groups: "clinically healthy" (CH) obese, and "not clinically healthy" (NH) obese who had a previous diagnosis of other disease, namely hypertension, metabolic syndrome or even diabetes.

Body composition was determined by electric bioimpedance. REE was measured over 15 min with the subjects lying on a bed, without falling asleep. REE was averaged to 1 min.

**Results:** REE was significantly higher in CH and NH obese subjects. When analyzed by body segment, REE in fat-free mass were similar in both obese groups compared to controls, whereas REE from fat mass, was significantly reduced in CH and NH obese patients.

**Conclusions:** These results show that the lower oxidative capacity of fat might be, at least in part, one of the main factors in failing to lose weight in morbid obesity.

**Key Words:** obesity, resting energy expenditure, indirect calorimetry, body composition

### Selenium intake of adolescent girls and selenium status in whole blood

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**Introduction:** Significant changes have been reported in dietary habits and food availability in Iceland that would be expected to compromise selenium intake and status, especially among young people. These include dramatic decreases in the consumption of fish and milk, as well as in selenium content of imported wheat.

**Objectives:** The aim of this study was to assess selenium in diet and whole blood of adolescent girls, as well as define the most important foods contributing to selenium intake and status.

**Method/Design:** Subjects were 96 randomly selected girls aged 16-20 years who answered a validated Food Frequency Questionnaire linked to the National Nutrition Database for dietary assessment. The Nutrition Database was updated in 2009, the year of this study, with respect to a number of nutrients including selenium. Total selenium intake and intake from each food group was calculated in micrograms per day, as well as percentage contribution of each food group to selenium intake. Blood samples were collected for measurement of whole blood selenium.

**Results:** Mean dietary selenium was 51µg/day (SD 25; range 20-135) while Nordic Nutrition Recommendations are 40µg/day for women. Milk/dairy products excluding cheese contributed 27% (SD 14) of total dietary selenium, fish 18% (SD 12), and cereal products 13% (SD 6). Fish and cereal products were the only food groups significantly correlated with selenium in blood ( $r=0.318$ ;  $P=0.002$  and  $r=0.215$ ;  $P=0.036$ , respectively) while no correlation was found with milk or dairy in spite of their larger contribution to selenium intake. Mean whole blood selenium was 117µg/l (SD 12; range 90-208), no girl had levels below 85µg/l and nearly 90% were above 100µg/l.

**Conclusions:** Selenium intake and status of adolescent girls seem acceptable in Iceland in spite of recent decreases in fish and milk intake. Judging from associations between intake and blood levels, fish and cereals may be the most important contributors to blood selenium.

**Key Words:** Selenium, Diet, Micronutrient Status, Adolescent Girls

### Seasonal differences in the diet of adolescent girls in Zambezia province, Mozambique

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**Introduction:** Zambezia province in Mozambique is characterized by poverty and frequent periods of food insecurity. Diets are heavily based on starchy staples of maize, cassava and rice. A diet poor in energy and essential nutrients may place adolescent girls in a nutritionally vulnerable position.

**Objectives:** The objective was to study seasonal differences in the diet of adolescent girls in Zambezia during two seasons.

**Method/Design:** Data for the ZANE project (Estudo do Estado Nutricional e da Dieta em Raparigas Adolescentes na Zambézia) was collected in January-February, often referred to as the "hungry season" and in May-June, the harvest season. A total of 552 girls were recruited from Quelimane city and two districts using a cluster sampling approach. We present results from a sub-sample ( $n=84$ ) of 14 to 18-year-old girls who were interviewed four times (twice per season) using the 24 recall method with food photographs of local foods in portion size estimation. Anthropometric measurements were taken in January-February. Dietary intakes were calculated with NutriSurvey using a database compiled for the project.

**Results:** The average energy intake was low (5.4 MJ, SD 1.6) and did not differ between the seasons. All girls in this sub-sample had a BMI-for-age in the normal range and thus the low energy intakes suggest underreporting. In January-February, the proportions of energy from protein (10 E%) and fat (18 E%) were lower compared to those in May-June (11 E% and 22 E% respectively, paired t-tests,  $p<0,01$ ), and the proportion from carbohydrates higher, accordingly. These results reflect changes in the food consumption patterns from the first to the second season.

**Conclusions:** Compared with the situation in January-February, the proportions of energy-yielding nutrients were more favourable during May-June. The results stress the importance of taking seasonal variation into account when studying diets in low-income countries.

**Key Words:** dietary intake, adolescent girl, season, Mozambique, Africa

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27/459. Nutrition and Healthy Lifestyle

### Organization of catering for elementary school age children in Kaunas schools

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**Introduction:** Nutrition habits, inadequate nutrition, ability and possibility to choose the products and meals are associated with physical development, acceleration, obesity, digestive disorders and cardiovascular diseases in later life. It is important to promote healthy nutrition in children.

**Objectives:** To evaluate the opinion of parents of elementary school aged children about the organization of catering in Kaunas schools.

**Method/Design:** Cross-sectional study of parents, whose children attended I-IV grades in two types (elementary and secondary) of schools, was performed in Kaunas (Lithuania). Parents (n=1217) filled the questionnaires about the organization of nutrition at schools, they evaluated the quality of meals and service, possibility to choose etc.

**Results:** Almost half (54.4%) of children eat at school and one third (32.9%), girls significantly more often than boys, bring meals from home (p<0.001). Most children (75.2 %) have breakfast at home. At school usually I – IV grade children eat after the 3rd lesson (76 %), meals are served on tables (76.2 %). In elementary schools children are served significantly quicker as compared with secondary schools (21.3 and 7.9 % accordingly). Every tenth child does not have enough time to eat during the brake. Half of parents (49.7 %) think that school meals are of average quality, one third (34.6 %) – good, every tenth (9.5%) think that food quality is unsatisfactory. From meals offered at school canteen girls significantly often if compared with boys choose soup, vegetable salads and fruits. It was established that the satisfaction with food quality and taste lowered as the child grew older. 45.6 % of parents stated that healthy life style is promoted at school, in elementary schools significantly more often than in secondary schools.

**Conclusions:** Almost half of elementary school children eat at school canteen. Only one third of parents think that quality of meals is good.

**Key Words:** Elementary school, children, nutrition, catering.

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27/460. Nutrition and Healthy Lifestyle

### Quality evaluation of school feeding in public pre-school in Brazil

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**Introduction:** The school is a privileged space for promoting health and plays a key role in shaping values, habits and lifestyles, including the food.

**Objectives:** The research aimed to determine whether school feeding is supplying the daily nutritional and caloric needs of preschool children, aged 4-6 years, in a public school of Brazil, according to the National School Feeding Programme (PNAE) from the Brazilian government, as well as evaluating the waste acceptance and the menu offered at school

**Method/Design:** To assess the quality of food served in school received a questionnaire to parents and for children, a test of sensory analysis for evaluation of preparations on the menu.

**Results:** The results showed that the power is appropriate partially with respect to nutritional value, and the acceptance of feeding the children gave an average of 48.96%, and inadequate.

**Conclusions:** It was concluded that the results are directly related to the fact that most children (70%) having lunch at home before going to school, creating an imbalance in the type and time of the menus offered. It was found that there is no standardization in the portioning of preparations for children, which leads to increased food production and waste of financial resources of the program.

**Key Words:** school feeding, pre-school education and nutrition, nutrition education

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27/466. Nutrition and Healthy Lifestyle

### The effect on growth of using cows' milk as the main drink for infants

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**Introduction:** Ongoing debate continues regarding the effect of early nutrition on subsequent obesity and associated health risks. Cows' milk is not recommended as a main drink for infants under one year and is associated with poor iron status.

**Objectives:** We aimed to examine the effect on growth of feeding cows' milk as the main drink at 8 months in an observational study following children from birth to 7 years

**Method/Design:** Pregnant women were recruited in 1992 in a proscribed area of South-west England by the Avon Longitudinal Stu-

dy of Parents & Children (ALSPAC). Their children were followed by parental completion questionnaires and visits to research clinics where standardised measures of weight and length/height were taken at 4, 8 & 12 months and then every 6 months to age 5 and then at age 7 years. Diet records were kept by the parents at 8 & 18 months. These were analysed for food & nutrient intakes.

**Results:** At 8 months 1178 children were studied, reducing to 873 by 3.5 years. Up to 13% were having cows' milk as their main drink at 8 months and half of these (47%) were having more than 600g per day (CMhigh). Compared to breastfed (BF) children (13% at 8 months) CMhigh were heavier from 8 months to 5 years and taller from 8 months to 3.5 years. There was no difference in the mean BMI between the groups. CMhigh had higher dietary intakes of energy, protein & fat and lower carbohydrate than BF at 8 months with higher fat intake persisting to 18 months.

**Conclusions:** Feeding large volumes of cows' milk to 8 month old infants resulted in increased growth in the first 5 years of life.

**Key Words:** Complementary feeding, weight, height, children

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### 27/467. Nutrition and Healthy Lifestyle

#### **Association of plasma lutein and zeaxanthin with consumption of green vegetables and yellow foods: the Pimavosa Study**

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**Introduction:** Lutein and zeaxanthin (LZ) accumulate in the retina, where they may protect against age-related macular degeneration, possibly through blue light absorption and antioxidant properties.

**Objectives:** We studied the association of plasma LZ concentrations with consumption of green vegetables and yellow foods.

**Method/Design:** The PIMAVOSA study includes 99 healthy volunteers aged 20 to 60 years. Plasma LZ were determined from fasting blood samples, by reversed phase HPLC. Food consumption was determined from a short food frequency questionnaire, including 24 food items, selected because of their high content in LZ. Consumption of green vegetables was the sum of 8 food items (spinach, green pea, green salad...). Consumption of yellow foods was the sum of 5 food items (eggs, orange/clementine/tangerine, orange juice/clementine juice...). Subjects were divided in three groups: low consumers (less than 7 servings/week), medium consumers (7 to less than 14 servings/week), high consumers (14 servings/week or more). Plasma LZ were compared according to the three groups using analysis of variance.

**Results:** By comparison with low consumers of green vegetables, medium and high consumers had 14 % and 34 % higher plasma lutein (153.4 and 180 microg/l versus 134 microg/l, respectively, p=0.03),

while plasma zeaxanthin was not different (40.6 microg/l and 46.5 microg/l versus 39.0 microg/l, respectively, p=0.47). By contrast, by comparison with low consumption of yellow foods, medium and high consumption of yellow foods was associated with 34 % and 41 % higher plasma zeaxanthin, (43.3 and 45.5 microg/l versus 32.3 microg/l, respectively, p=0.02), and also tended to be associated with higher plasma lutein, but this association did not reach statistical significance (160.9 microg/l and 155.8 microg/l versus 132.7, respectively, p=0.15).

**Conclusions:** Both green vegetables and yellow foods may be important for eye health, because of their high content of lutein (mainly for green vegetables) and zeaxanthin (mainly for yellow foods).

**Key Words:** carotenoids, food consumption, blood concentration, epidemiology

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### 27/469. Nutrition and Healthy Lifestyle

#### **Influence of birth weight on physical performance in stunting and overweight children**

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**Introduction:** Several studies has been associated the lower birth weight with reduced physical performance in childhood, but in stunting and overweight children is unknown this relation.

**Objectives:** To evaluate in Mexican school children the relationship among birth weight, nutritional status and physical fitness controlling the effect of relevant confounder.

**Method/Design:** In a representative sample of 600 children from Hidalgo, Mexico, enrolled in public and private schools in 2010. At 9 ± 2 y (48% girls), we evaluated physical performance (PhP) with six-minute walk test (6MWT), weight and height. We obtained birth weight (BW) and maternal age. Stunting (ST) was defined <-2 Z height for age (HAZ), no-stunting (N-ST) ≥-2 HAZ, overweight (OW) >1 Z BMI for age (BAZ) and no-overweight (N-OW) ≤ 1 to ≥ -2 BAZ.

**Results:** BW categories were: 14% 1000 to 2500 g (BW1), 28% >2500 to 3000 g (BW2), 55% >3000 to 4000 g (BW3) and 38% >4000 g (BW4). In overall the 6MWT was 481 ± 80 m and birth weight 314 ± 588 g, with differences by nutritional status. BW explained 17% (R<sup>2</sup>) of variability in PhP. Adjusted models for PhP by all BW categories and nutritional status showed lower PhP in stunted infants [303 ± 69 m BW1, 300 ± 71 m BW2, 301 ± 72 m BW3, 331 ± 95 m BW4 (p>0.05)]. Non-stunted and overweight children in all categories showed higher PhP [N-ST: 372 ± 21 m BW1, 375 ± 20 m BW2, 376 ± 19 m BW3, 420 ± 28 m BW4 (p<0.02); OW: 384 ± 28 m BW1, 378



± 24 BW2, 388 ± 23 BW3, 447 ± 41 BW4 (p<0.02)](Figure 1).

**Conclusions:** This study provides evidence that the chronic nutritional deficits as reflected by stunted growth eliminate the protective effect of high birth weight on physical performance at school age.

**Key Words:** birth weight, physical performance, school children, stunting, overweight

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## 27/470. Nutrition and Healthy Lifestyle

### Peripheral blood T cell populations are altered in morbidly obese patients.

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**Introduction:** immunologically-mediated diseases like asthma. Like any inflammatory state, the chronic, low-grade inflammation associated with obesity should be subject to the control mechanisms that normally curb overactive immune responses. These mechanisms encompass a number of cell types, which can operate through cell-cell contact or through a diversity of soluble mediators. Our studies have focused on the role of regulatory T cells (Tregs) on the inflammation observed in obese patients. Tregs are a specialized subset of T cells that play an important role in maintaining immune homeostasis, are characterized by the CD4+ and CD25+ phenotype, and express the forkhead family transcription factor FoxP3.

**Objectives:** We determined the percentage of Tregs in peripheral blood in morbidly obese patients (BMI ≥ 40.0 kg/m<sup>2</sup>) and compare them to those in healthy non-obese (BMI < 23.0 kg/m<sup>2</sup>) volunteers. Obese patients were divided into two groups: “clinically healthy” (CH) obese, and “not clinically healthy” (NH) obese, who had a previous diagnosis of other disease, namely hypertension, metabolic syndrome or even diabetes

**Method/Design:** The percentage of Tregs(CD4+/FoxP3+) as well as T helper (Th)1 (CD4+/IFNγ+) and Th2 (CD4+/TNFα+) was analyzed by flow cytometry. The level of transcription of the FOXP3 gene was determined by “real time polymerase-chain reaction” (RT-PCR).

**Results:** Percentage of CD4+/FoxP3+ Tregs was increased in both CH and NH obese patients, compared to controls. Percentage of Th1 and Th2 cells were similar in CH obese patients and non-obese controls. In the NH obese group, Th1 and Th2 were severely compared to both CH obese and controls. The level of transcription of FOXP3 was also increased.

**Conclusions:** Despite the increase in the percentage of circulating Tregs and in the levels of FoxP3 mRNA, this did not result in the reduction of the inflammation process.

**Key Words:** T cells, Tregs, morbid obesity, inflammation

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## 27/471. Nutrition and Healthy Lifestyle

### Factors associated with fruit and vegetable eating in young children in four European countries

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**Introduction:** Children in many European countries do not eat enough fruit and vegetables. The HabEat project has been set up to compare different infant feeding practices in four European cohorts in different countries.

**Objectives:** To investigate the relationship between infant feeding practices and later fruit and vegetable eating in young children.

**Method/Design:** Longitudinal birth cohorts with data on infant feeding from UK – ALSPAC 9000 children followed at 2, 3 & 4 years, France (Fr) – EDEN 2000 children followed 2 & 3 years, Greece(Gr) – EUROPREVALL 1000 children followed at 3 years and Portugal(Po) – GENERATION XXI 900 children at 4 years. In all cohorts food frequency questionnaires completed by parents were used to assess fruit and vegetable intake. Breastfeeding duration and education levels of mothers were collected by questionnaire. Fruit intake did not include fruit juice and was dichotomised at >1 versus 1 or less per day. Vegetable intake did not include legumes or potatoes and was dichotomised in the same way. Analyses were adjusted for child’s age, maternal smoking, maternal education level and age of introduction of solids.

**Results:** Fruit intake was fairly similar in the 4 countries; vegetable intake was lowest in Gr and highest in Po. Children were eating less than the total recommended level in 3 of the countries. Breast feeding rates were fairly similar in UK, Fr and Gr with a much longer duration in Po. Breast feeding duration was independently, positively associated with both fruit and vegetable eating in UK and Fr but not in Gr and Po.

**Conclusions:** Breastfeeding is associated with better intake of other recommended foods throughout early childhood in some but not all European countries this may enhance the health benefits of breastfeeding

**Key Words:** Breastfeeding, birth cohorts, healthy diet, infant feeding

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## 27/476. Nutrition and Healthy Lifestyle

### Acute effects of walnuts on postprandial phenols, tocopherols, catechins, antioxidant capacity and oxidized LDL

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**Introduction:** In vitro studies rank walnuts (*Juglans regia*) among the highest plant foods in antioxidant capacity but whether phenols and other bioactive constituents of walnuts are bioaccessible to humans and physiologically relevant remains to be determined.

**Objectives:** The aim of the present study was to investigate the effect of walnut consumption on postprandial antioxidant status and the bioavailability of phenols, tocopherols and catechins.

**Method/Design:** Following consumption of a low phenolic diet for 2 days and overnight fasting, 16 healthy men and women consumed a walnut meal or a control meal of refined ingredients in a randomized cross-over design and a minimum of a one week washout period. Blood samples were collected at baseline and at intervals up to 24h post ingestion and analyzed for total phenols, tocopherols, catechins, oxygen radical absorbance capacity (ORAC), ferric reducing antioxidant power (FRAP) and oxidized LDL.

**Results:** Compared to control, the 5h area under the curve (AUC) following the walnut meal was greater for total phenols ( $p<0.05$ ), hydrophilic- and lipophilic-ORAC ( $p<0.05$ ;  $p<0.001$  respectively). Compared to fasting concentrations, a 23.6% reduction in plasma oxidized LDL at 1h ( $p<0.05$ ), and increases of 24.9% for FRAP at 2h ( $p<0.05$ ), of 97.0% for gamma-tocopherol at 8h ( $p<0.001$ ) and over 4000% for epicatechin gallate at 1h ( $p<0.05$ ) were noted following the walnut meal.

**Conclusions:** Postprandial concentrations of bioactive constituents are absorbable following walnut consumption and contribute to postprandial antioxidant defenses.

**Key Words:** walnuts, postprandial, antioxidant, oxidized LDL, catechin

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## 27/478. Nutrition and Healthy Lifestyle

### Prevalence and characteristics of subjects with normal weight obesity in Finland

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**Introduction:** A syndrome called normal weight obesity (NWO) has recently been identified. NWO is characterized as excessive body fat associated with a normal body mass index ( $BMI<25$  kg/m<sup>2</sup>).

**Objectives:** We assessed the prevalence and characteristics of NWO in the Finnish population.

**Method/Design:** The study population consisted of 6300 men and women, aged 25 to 74 years, who participated in the National FINRISK 2007 Survey, and who were invited to a more detailed examination on obesity in the spring 2007. The participation rate was 85% for the second examination that included, e.g., measured height, weight and body fat%. The participants filled in questionnaires on background variables, medical history, diet and physical activity (final  $n=4793$ ). The multivariate models were adjusted for age, education, physical activity, smoking and alcohol consumption.

NWO was defined as  $BMI<25$  kg/m<sup>2</sup> linked with different cut-points of body fat by genders, for men ( $>20\%$ ) and women ( $>30\%$ ).

**Results:** The prevalence of normal weight participants ( $BMI<25$  kg/m<sup>2</sup>), in general, was 28% for men and 41% for women. Of those, 33% of men and 44% of women were NWO (among all participants: 9% and 18%, respectively). The prevalence of NWO increased with age and sedentary lifestyle. There were more NWOs among ex-smokers and among the men who perceived their health poor. No associations were found by education groups or alcohol consumption. In the NWO women, the physical activity was lower compared with lean or overweight women, whereas the physical activity in the NWO men was intermediate between lean and overweight men. Furthermore, the anthropometric measures of the NWO participants were between those for lean and overweight participants in both genders.

**Conclusions:** From the public health perspective, specific screening of NWO by health care might be necessary in order to implement obesity prevention. Especially, low level of physical activity and previous smoking were related to NWO.

**Key Words:** body mass index, obesity, physical activity, smoking, survey

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## 27/480. Nutrition and Healthy Lifestyle

### Nutrition and bone health in menopausal Spanish women

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**Introduction:** Women in menopause experience changes in their lifestyle that may affect their nutritional status influencing their bone health.

**Objectives:** We aimed to know and evaluate the dietary intake of a group of menopausal women to determine their influence on bone mineral density (BMD).

**Method/Design:** The present pilot study comprised 100 Women from the South of Spain aged 45-65 years. Bone mineral density determined by Ultrasound Densitometry (CUBA Clinical™, Sunlight Omnisense™). We carried out an assessment of nutritional status, based on recommended daily intakes for Spanish population through food survey consisted of a reminder of 48h.

**Results:** The energy profile shows that the diet of women studied is hyperproteic (19%), hypoglucidic (47%) and slightly hyperlipidic (37%) although in a high percentage of the women studied the quality of fat intake is adequate. In all cases, cover the DRIs for vitamins and minerals except vitamin D, which only covers 83% of the DRIs. Vitamin E is covered in 94% of the DRIs. In the case of zinc intake covers only 48% of intakes recomendadas. BMD values were obtained by means of T-score  $-1.28 \pm 1.02$  which would put our women, according to WHO, within the range of osteopenia.

**Conclusions:** In general, there is a good fit to the patterns of a healthy diet, having found no deficiencies in nutrient intake except for Zn and Vitamins D and E. Despite these results our women do not have good bone health and found in osteopenia.

**Key Words:** women, menopausal, bone mineral density, Spanish, nutrition.

and used to identify subjects who were overweight/over-fat or obese. The data was analysed using spss 17.0 To compare the prevalence of overweight and obesity and bmi body fat percentage between groups.

**Results:** one-hundred percent of participants reported eating breakfast on most school days, leaving only two independent groups according to transport status. Primary school children who used non-active methods of transport to school were significantly heavier ( $30.5 \pm 6.49$  Kg) than those who actively commuted to school ( $26.3 \pm 5.37$  Kg;  $p = 0.002$ ). The prevalence of overweight ( $p = 0.022$ ) And over-fat ( $p = 0.003$ ) Were significantly greater among year 4 children who used non-active transport methods to school (15.4%), Compared to those who actively commuted to school (0%). Mean bmi ( $p = 0.004$ ) And body fat percentage ( $p = 0.008$ ) Were significantly greater among year 4 children who used non-active transport methods to school ( $17.0 \pm 1.37$  Kg/m<sup>2</sup> and  $20.6 \pm 3.48$  %), Compared to those who used active transport methods to school ( $14.6 \pm 0.70$  Kg/m<sup>2</sup> and  $14.7 \pm 3.11$ ).

**Conclusions:** active transport to school is appears to be protective against overweight and obesity among children in year 4. The effects of active transport to school on bmi and body fat percentage among the whole sample and among other sample subsets are unclear and further research is required to clarify these relationships.

**Key words:** children, overweight, over-fat, obesity, active transport

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#### 27/484. Nutrition and Healthy Lifestyle

### Effects of breakfast and transport to school on BMI and body fat composition in children and adolescents

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**Introduction:** there is concern about growing levels of childhood obesity throughout europe.

**Objectives:** the purpose of this study was to investigate the effects of breakfast habits and transport method to school on body mass index (bmi) and body fat percentage in children and adolescents living in exeter.

**Method/design:** twenty-three males and 34 females with a mean age of  $9.3 \pm 2.5$  Years were recruited from a local primary and secondary school. Questionnaires were used to sort participants into four independent groups - active/breakfast eaters, non-active/breakfast eaters, active/breakfast skippers and non-active/breakfast skippers. Measures of height, weight, bmi and body fat percentage were taken

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#### 27/487. Nutrition and Healthy Lifestyle

### Coronary heart disease knowledge and health behaviour in student nurses

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**Introduction:** Coronary heart disease (CHD), occurs as a result of several risk factors with 75% attributable to lifestyle choices. Accordingly, CHD prevention focuses on the three factors; smoking, physical activity/exercise and diet/weight management. Student nurses, potential advocates for such initiatives, could effectively help make an impact on CHD through the use of health education/promotion but research has determined substantial knowledge gaps and that nurses do not practice what they preach

**Objectives:** To evaluate CHD knowledge and the health behaviour (HB) of student nurses by identifying whether they have sufficient knowledge, whether they practice HBs, whether there is a relationship between the student nurses' CHD knowledge and HB and whether the age or gender of the student nurse affects CHD knowledge and HB.

**Method/Design:** Third year student nurses from English completed an online CHD Knowledge and Health Behaviour Questionnaire (CHDKHBQ). CHD knowledge and HB scores were generated (0-16 and 10-29, respectively) and subsequently categorised as poor, average and good.

**Results:** 54 third year student nurses from five Universities took part in the study. The CHD knowledge of the third year student nurses was classified as good (mean = 13) and the HB of the third

year student nurses was found to be average (mean = 19). There was no significant relationship ( $p=0.44$ ) between the student nurses' CHD knowledge and HB reported. No age-related differences were established between students and their CHD knowledge ( $p=0.21$ ) and HB ( $p=0.71$ ). No CHD knowledge and gender differences occurred ( $p=0.51$ ) but there was significant gender differences in relation to HB ( $p=0.04$ ).

**Conclusions:** UK student nurses possess a sufficient level of CHD knowledge to provide health education/promotion about CHD prevention however, they do not fully practice these HBs

**Key Words:** Student nurses, CHD, knowledge

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### 27/488. Nutrition and Healthy Lifestyle **Glucose metabolism in morbidly obese patients**

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**Introduction:** Obesity has increased worldwide and is accompanied by chronic, low-grade inflammation of adipose tissue, which promotes insulin resistance and type-2 diabetes. Before full diabetes is established, glucose metabolism must be preceded by insulin resistance, which is characterized by both hyperinsulinemia and normal glucose levels. The homeostasis model assessment (HOMA) has been proposed to assess insulin resistance and secretion, using fasting glucose and insulin concentrations. A HOMA value  $\geq 2.5$  is considered to be associated with insulin resistance. The factor(s) responsible for the establishment of full diabetes are not yet known.

**Objectives:** We studied morbidly obese patients (BMI  $\geq 40.0$  Kg/m<sup>2</sup>) in which fasting serum levels of glucose and insulin were quantified to calculate HOMA and compared to healthy non-obese (IMC < 23.0 Kg/m<sup>2</sup>) volunteers.

**Method/Design:** Obese patients were divided into two groups: "clinically healthy" (CH) obese, and "not clinically healthy" (NH) obese who had a previous diagnosis of other disease, namely hypertension, metabolic syndrome or even diabetes.

**Results:** Serum levels of glucose (in mg/dL), insulin (in uU/mL) and HOMA for the control group (n=47) were (average  $\pm$  SD) 78.4 $\pm$ 7.1, 9.5 $\pm$ 3.8 and 1.8 $\pm$ 0.8, respectively. The values for the CH obese group (n=20) were 87.2 $\pm$ 5.7, 24.6 $\pm$ 10.1 and 5.3 $\pm$ 2.2, whereas those for the the NH obese groups (n=13) were 102.3 $\pm$ 12.6, 21.7 $\pm$ 15.0 and 5.5 $\pm$ 4.0, respectively.

Despite being morbidly obese, all of the CH obese patients had fasting serum levels of glucose below 100 mg/dL, but accompanied by hyperinsulinemia and resistance to insulin. NH obese patients began to show alterations in glucose metabolism with serum levels above

100 mg/dL, despite similar concentrations of insulin and HOMA than those found in the CH obese group.

**Conclusions:** Our results suggest that morbid obesity alone is not the only factor that contribute to alterations in glucose metabolism, but may preclude the development of diabetes.

**Key Words:** glucose, insulin, diabetes, HOMA, morbid obesity

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### 27/491. Nutrition and Healthy Lifestyle **Practical guide, addressed to parents, for an active, healthy lifestyle in childhood and adolescence.**

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**Introduction:** An adequate parent's knowledge on child behaviour including physical activity and sports plays a very important role on children and adolescents' health. Risk factors for chronic diseases appear during this period of life. Parents and guardians need specific educational materials that provide up-to-date educational messages.

**Objectives:** The purpose of this work was to develop such kind of material.

**Method/Design:** The development of a guide for parents and guardians, that complements the healthy lifestyle pyramid© for children and adolescents, with the purpose of making available the keys for healthy growth to parents.

**Results:** The guide includes 4 chapters. It describes the four faces and the base of the healthy lifestyle pyramid for children and adolescents related to dietary habits, hydration, physical activity, games, sport and rest and the acquisition of daily and life-long habits related to hygiene and health, organizing their daily schedule. The progression for a healthy growth needs to find new ways to motivate and encourage children to be physically active and to follow a varied diet according to their age. It is important to form healthy habits at young ages, to consolidate and maintain them in adolescence and adulthood.

**Conclusions:** The guide is specifically developed for parents and guardians according to current scientific knowledge and evidence-based data and includes clear concepts. It is our responsibility as adults to encourage the forthcoming generation to acquire healthy habits. This guide aims to contribute to this learning process towards adulthood.

**Key Words:** Guide, lifestyle, nutrition, parents, physical activity.

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27/492. Nutrition and Healthy Lifestyle

**Relation between physical activity level and weight status among children. THAO-Salud Infantil Programme.**

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**Introduction:** Physical activity is one of the factors to consider when talking about energy balance. Many studies associate physical activity with a better health status, but only few directly evaluate association between physical activity and prevalence of obesity and overweight.

**Objectives:** Correlate an objective measurement of energy expenditure due to physical activity with different anthropometric parameters related to weight status, in a group of children.

**Method/Design:** 54 school-children, from 11 to 12 years of age, from Programa Thao-Salud Infantil (2009-2010) in Villanueva de la Cañada (Madrid, Spain), were studied, 28 girls and 26 boys. Kids wore accelerometers (GT3X Actigraph) during a complete week but sleeping and having a shower. The output of these devices was expressed as "Activity Counts".

Anthropometric parameters (weight, height, and waist circumference) were measured following a standardize methodology, and waist to height ratio and body mass index were calculated. Correlation between "activity counts" and waist circumference, body mass index and waist to height ratio, was evaluated using the Pearson Coefficient.

**Results:** The Pearson coefficient doesn't show significant correlation between activity counts and any anthropometric variables ( $p>0.05$ ; Counts-WC  $r=0.17$ , Counts-BMI  $r=0.11$ , Counts-WHtR  $r=0.10$ ).

**Conclusions:** The lack of significant results could be due to the fact that weight status is conditioned not only by the physical activity level, but also by other life style factors like dietary intake.

**Key Words:** Children, Obesity, Acelerometers, Waist circumference, BMI

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27/495. Nutrition and Healthy Lifestyle

**Behaviour of successful weight loss maintainers**

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**Introduction:** Weight loss is achievable through the adoption of any of a range of strategies. However, the greater challenge lies with

weight loss maintenance.

**Objectives:** The aim of this exploratory study was to determine if there were any significant differences in the behaviours of weight loss maintainers and weight loss re-gainers within a local population in the North West of England.

**Method/Design:** Thirty eight patients, 26 female and 12 male, with an average age of 55 years, who had been attending a weight management service for at least one year, agreed to participate in this study. Participants attended a 30 minute interview with a dietitian where they were asked questions regarding their diet, activity levels and television viewing. Based on their current weight, participants were assigned to either the weight loss maintainer group or weight loss re-gainer group.

**Results:** Of the 38 participants, 21 were weight loss maintainers with 17 being weight loss re-gainers. Independent t-test and Mann Whitney U tests were conducted. No significant differences were found between the two groups in relation to the behaviours being examined or in baseline characteristics. There was a difference in the frequency of monitoring food intake with 57% of weight loss maintainers monitoring their food intake on a daily basis whereas 53% of weight loss re-gainers reported that they never monitored their food intake. Weight loss maintainers commented that the most important factor in maintaining their weight loss was portion control.

**Conclusions:** There were no significant differences found in the behaviours of weight loss maintainers and weight loss re-gainers in this study population. Portion control and regular monitoring of food intake were reported as the most beneficial behaviours for long term weight maintenance.

**Key Words:** Obesity, weight maintenance

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27/496. Nutrition and Healthy Lifestyle

**Dietary pattern of rural indigenous population in northern Argentina.**

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**Introduction:** The rural population from the North-western region of Argentina is characterized by a dietary pattern that includes the persistence of ancestral habits, use of typical regional ingredients and food availability according to their socio-economic status.

**Objectives:** To make a qualitative analysis of the family diet by means of questionnaires and observation of food preparation at home.

**Method/Design:** The studied population included families assisted at the Hospital of Maimará, in the Quebrada de Humahuaca, Jujuy, Argentina. The techniques used were interviews in the institutional framework of family and community and reports of the observations made at homes.

**Results:** Most of the families had three meals a day, breakfast, lunch and an evening light meal. When dinner was mentioned, it usually consisted only of a vegetable soup. The inclusion of mid-morning or mid-afternoon snacks was remarkable and consisted mainly of fruits, among them peach, orange, banana, apple, and mandarin orange.

Breakfast and the evening light meal included "mate" infusion (*Ilex paraguariensis*), or less frequently tea (with sugar added in significant quantities) and bread; some families also consumed fat-rich maize rolls. In no case milk was mentioned as part of the infusions.

Lunch is generally the main daily meal. The most common preparations were the following: several soups with vegetables, rice, noodles or "frangollo" (dehulled white maize milled in a mortar), preparations with noodles, spaghetti or "mote" (cooked maize grains soaked in an alkaline solution, lime or ashes), stews with different types of meat and vegetables, and fried foods (chicken, "empanadas" (small pies), "milanesas" (meat covered with breadcrumbs), potatoes); also roast lamb with potatoes, polenta (maize grits) with meat and cheese, among others.

**Conclusions:** The feeding habits of these families show the influence of socio-economic, regional and cultural factors on their dietary patterns.

**Key Words:** rural population, dietary patterns, regional foods. Projects UBACYT M054 y B063.

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## 27/500. Nutrition and Healthy Lifestyle

### **Nutrition survey of Madrid (Spain) (enucam, 2009): energy and nutrients intake evaluation**

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**Introduction:** The Region of Madrid has showed an evolution during the last years not only of an increase in its population but also

the diversity (e.g. immigrants). The last nutrition survey in Madrid was made in 1994. Fifteen years later, the Institute of Nutrition and Eating Disorders of the Region of Madrid (INUTCAM) and the Spanish Nutrition Foundation (FEN), implemented a new nutrition survey in Madrid which studied the current state and observed the changes in food patterns and health habits of this population.

**Objectives:** To evaluate energy and nutrients intake in adult people from the Region of Madrid and to compare with the recommended.

#### **Method/Design:**

The representative sample of the ENUCAM study was stratified for sex, age and habitat, and included 1,553 subjects (697 men, 856 women; age>18 years). Individual energy needs was obtained from the Harris and Benedict formula and physical activity factor. The energy and nutrients consumption were calculated using 24-hour recall.

**Results:** The mean energy intake was 2,110±825 kcal/person/day which covers on average 88.5% of individual energy needs. The contribution of macronutrientes and alcohol to energy was 18.6±4.9% for proteins, 32.5±10.5% for lipids, 47.8±10.7%, for carbohydrates and 1.1±2.9% from alcohol. Dietary fat quality was 10.2±4.2% SFA, 13.6±6.3% MUFA and 4.8±2.5% PUFA. Mean fiber intake was 19.5±10.2 g/person/day. Minerals that did not reach 80% of the Recommended Nutrient Intakes for the Spanish population were zinc (65.0 % population), magnesium (42.2% population), potassium (30.8% population), calcium (26.1%) and iron in women only (41.6% population). Moreover, vitamins that not reach the recommended were folic acid (78.5%), vitamin A (78.2%), vitamin D (84.8%) and vitamin E (91.7%).

**Conclusions:** The percentage contribution of proteins and saturated fatty acid to total energy intake was higher than recommended and the contribution of certain micronutrients appears to be insufficient. Therefore, strategies that encourage a healthy diet and adequate intake of nutrients should be a priority for future nutritional policies.

**Key Words:** Energy intake, Nutrients intake, Nutrition Survey, Madrid, Spain.

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## 27/501. Nutrition and Healthy Lifestyle

### **Prevalence of underweight and stunting of infants in Bulgaria by ethnicity, gender and residence**

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**Introduction:** Nutritional status of children has an impact on their health and development.

**Objectives:** To determine the differences in prevalence rate of stunting and underweight in infants in Bulgaria, resulting from ethnicity, gender and place of residence.

**Method/Design:** A cross – sectional survey on a nationally representative sample covering 1050 infants was conducted in 2007. The data were collected by active interview with the mothers. Height and weight of infants were measured, using standard methodology. WHO indices Height-for-age (HA) and Weight-for-age (WA) for assessment of nutritional status were implemented.

**Results:** The prevalence of stunting among all studied infants (HA<-2Z) was 7.8%, with great differences according to the ethnicity: Bulgarian (5.2%), Turkish (10.5%), Roma (24.5%). The highest stunting among Roma boys aged 0-5 months (45.2%) was revealed.

Stunting was higher in infant living in the villages than those with urban residence.

The prevalence of underweight among infants (WA<-2Z) was 3.4%. Underweight prevalence was lower than 5 % (WHO reference limit for a population-acceptable rate) among infants with Bulgarian (2.2%) and Turkish (4.1%) ethnicity. Roma infants with underweight were 11.8% as the prevalence was the highest among Roma boys aged 0-5 months (16.3%).

Underweight rate among infants wasn't associated with the place of living (urban - 3.2%, rural – 3.6%).

**Conclusions:** In average, the prevalence of stunting and underweight among infants in Bulgaria is in the frames of acceptable population rate according to WHO criteria, but significant differences were evaluated by ethnicity and residence.

**Key Words:** underweight, stunting, children, ethnicity, residence

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### 27/503. Nutrition and Healthy Lifestyle

#### **Relation between nutritional habits, physical activity and biochemical profile of a teen population of Granada**

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**Introduction:** The prevalence of obesity is reaching epidemic proportions. In the last years, figures have doubled for adolescent obesity in the United States and prevalence reports indicate similar accelerating rates for adolescents in the European Union including Spain and other Mediterranean countries. Obesity is particularly severe when initiated during childhood and adolescence, and needs to be regarded as a separate disorder demanding specific research and treatment efforts. In this article we present the results of the initial assessment of a group of teenagers who employees may participate in a multidisciplinary program of obesity. Treatment duration is 6 months.

**Objectives:** 1. To determine the nutritional state of a group of teenagers and compare scores on the fast test for Kreceplus.

2. Compare nutritional status and sanguineous parameters.

**Method/Design:** Descriptive study.

Participants: 64 adolescents between 11 and 17 years. It conducted an assessment of nutritional status from the index of corporal mass, bioimpedancia and sanguineous parameters were determined. All informed on their dietetic ingestion and knowledge on feeding, also Kreceplus test was completed (used in the study enKid).

**Results:** Based on the nutritional state were settled down two groups: group control (those that presented with normal weight) and clinical group (those that presented overweight or obesity). When comparing the results obtained in both groups have been significant differences in the following biochemical parameters: uric acid (p=0.035), triglycerides (p=0.019), cholesterol HDL (p=0.013), transferrin (p = 0.025), insulin (p = 0.011) and anthropometric: total percentage of fat (p=0.002), greasy mass (p=0.000), thin mass (p=0,011) and water (p=0.011). Also we found significant differences in the test Kreceplus (p=0.035).

**Conclusions:** 1. The high percentage of adolescents with obesity and inadequate biochemical values has been confirmed. 2. The high percentage of adolescents with inadequate nourishing habits and low physical activity has been determined.

**Key Words:** Obesity, teen, nutritional stage, physical activity, biochemistry

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### 27/504. Nutrition and Healthy Lifestyle

#### **Development of a nutrition knowledge test**

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**Introduction:** According to the literature, knowledge is one of the parameters influencing dietary behavior. Thus, it is of great importance producing a valid instrument to measure nutritional knowledge.

**Objectives:** To develop a test (in the form of a questionnaire) in order to assess the basic nutritional knowledge level of adolescents and adults. Also to investigate the possible unawareness on nutrition terms which are considered keys in forming dietary patterns.

**Method/Design:** The questionnaire consists of 50 items, can be completed in less than 15 minutes and tests 5 knowledge domains: a) food groups, b) macro- and micro- nutrients, c) nutrient and energy content of some commonly daily consumed foods, d) nutrient sources, e) nutrient needs/ general. In order to estimate the final nutrition knowledge score, every right answer attributes 1 point and 0 any wrong one. 70 subjects were recruited: 25 adults 25-35 years old and students attending the 3rd High School and 3rd Lyceum.

**Results:** Difficulty and discrimination indexes were calculated for every item. Test-retest reliability was examined and 3 nutrition experts reviewed the questionnaire for the construct and face validity. For the final version, questions were paraphrased, others totally revised, and some rejected, based on the respondents' comments as well as the above mentioned analysis.

**Conclusions:** The test meets psychometric criteria for reliability and validity thus it is considered suitable to measure knowledge before and after nutrition education intervention programs implemented in

groups of adolescents and/or adults. Due to the basic nutrition content of the item pool, this test can easily be used in other countries too.

**Key Words:** Dietary Knowledge, Psychometrics, Questionnaire, Nutrition

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### 27/508. Nutrition and Healthy Lifestyle

#### **Consumer preference for and use of portion information on food and drink packaging: a Pan-European Study**

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**Introduction:** In a climate of overweight and obesity, the amount consumed is just as important as what is eaten.

**Objectives:** To explore if and how European consumers' preference for and use of portion information on food and drink labels when using nutrition information.

**Method/Design:** A representative sample of 13,117 respondents aged between 18-65 years from 6 European countries (Germany, UK, Spain, France, Poland, Sweden) completed a web-based questionnaire consisting of a range of questions on consumers' use of portion information when using nutrition information, demographics and scales for respondent segmentation (e.g. health interest, nutrition knowledge, numeracy).

**Results:** For 15 out of the 19 food types studied, at least half of respondents in all six countries thought the stated portion size was 'exactly right'. Where they differed, they were likely to think it was too small, rather than too big. Respondents were slightly more likely to agree than disagree to want portion information more widely available on packaging. The preferred portion information format depended on the type of food. Per pack was the preferred format for most of the foods types tested. Per 100 g/ml was the preferred format for cheese, soft drinks, soup and condiments. And where the food type can be split into single units, nutrition information by unit was the most or second most preferred format. Most consumers were able to accurately read and relay nutrient information from labels. Providing nutrition information per portion in addition to per 100g information increased consumers' ability to establish the nutrient content of a portion.

**Conclusions:** The study provides evidence that when nutrition information per portion is present on pack in addition to per 100g/ml information, it helps consumers to use nutrition information correctly and quickly. The challenge remains to encourage consumers to look for and use the information in the first place.

**Key Words:** portion size, food labelling, European consumers

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### 27/512. Nutrition and Healthy Lifestyle

#### **Anaemia and associated infection in peri-urban communities in Accra**

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**Introduction:** Anaemia prevalence is a growing problem in developing country especially among women. This is compounded by increased infection and increased micronutrients deficiency.

**Objectives:** Our study therefore tends to look at the prevalence of anaemia and its associated factors in peri-urban communities of Accra.

**Method/Design:** Study was a cross-sectional design in two peri-urban communities in Accra. Ninety household (made of a man and woman) were sampled, and their socio-demographic status was assessed. Subject's height, weight, skin fold measurements was taken. Blood pressure was measured using sphygmomanometer. Blood samples were taken and analysed for haemoglobin (Hb), serum albumin, ferritin and C-reactive protein (CRP). Three non consecutive repeated 24-hour dietary recalls were administered to each subject to assess dietary intake.

**Results:** Prevalence of anaemia (30.4%) was very high, especially among women (45.8%). Serum albumin levels of most subjects (99.4%) were adequate, but 11.1% recorded high CRP levels (this was higher in women (13.3%)). Very high serum ferritin levels were recorded in 15.8% of subjects. Dietary inadequacy of vitamins A, E, C, thiamine, riboflavin, niacin, B6, folate, B12, zinc, and iron were 69.3, 99.4, 26.1, 52.3, 86.4, 29.0, 21.0, 76.1, 39.8, 84.7, and 42.0 percents respectively. Anaemia was associated with infection (CRP) (p-value=0.008) and adequacy of dietary iron (p-value=0.000).

**Conclusions:** Anaemia prevalence in study community was very high and was associated with infection and dietary adequacy iron consumed.

**Key Words:** Anaemia, Infection, Iron deficiency

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### 27/519. Nutrition and Healthy Lifestyle

#### **Portion size of meals and rejection rate in dishes and trays in a university restaurant**

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**Introduction:** The size of portions and utensils have been indicated as factors in the increase of food consumption.

**Objectives:** Analyze the portioning and rejection rate in university restaurants that use different utensils.

**Method/Design:** We studied two units: the restaurant I (RI), where the user is served on trays (T) and restaurant II (RII), which uses plates (P). P and B were weighed during lunchtime, after portioning meals (initial quantity - IQ) and upon return to deliver the utensils to clean (final quantity - FQ).

A balance, tared, was positioned to measure the foods and identified the sex of the user. It was determined the average weight between the trays (648.58 g) and dishes (361.58 g). We calculated the average amount of initial portion size (IQ) and waste (FQ) and the rejection index (RI) obtained by equation  $FQ/IQ \times 100$ .

**Results:** Data collection was performed during three days in the RI and RII in one day, totaling 1049 IQ records and 824 FQ. IQ and FQ averages were respectively  $575.55 \pm 99.73$  and  $164.91 \pm 109.73$  in RI and  $465.80 \pm 152.81$  and  $31.72 \pm 59.01$  in the RII. Significant difference respectively between the mean IQ of men and FQ ( $p < 0.0001$ ) in RI ( $614.09 \pm 85.22$  and  $156.04$ ) and RII ( $516.76 \pm 147.61$  and  $28.96 \pm 58.86$ ), a difference that was also found between IQ and FQ in women ( $p < 0.0001$ ). The IR was higher in the RI, both in the overall assessment (17.32% in RI and 6.82% in RII) and in evaluations between males (13.87% in RI and 5.65% in RII) and female (23.71% in RI and 9.75% in RII).

**Conclusions:** It was found that both the portioning as the rejection rates is higher in the restaurant with the use of tray in relation to the restaurant where customers serve food on the plate.

**Key Words:** portion size, food consume, waste, quality control,

based on different grains or legumes – oat, rice, spelt, soya drink with or without special flavour.

There are many reasons why people start to eat vegan: health problems, religion backgrounds, ethics, spirituality etc. Anyhow, as all diets also vegan diet must be various to get all required substances (proteins – essential amino acids, carbohydrates, fats, minerals, vitamins etc.) for a healthy living.

**Method/Design:** There was an interest to examine, if vegan diet meet the nutritional requirements. The 1-year preliminary study included 25 vegans and 25 omnivores aged from 27 to 44, men and women. There were compared concentrations of the basic biochemical and hematological parameters, and ferritin, vitamin B12, and folate in serum.

**Results:** There have not been seen any significant differences between all analysed parameters. In vegans were seen lower results only in some parameters: in serum – total cholesterol, vitamin B12, and in whole blood – leukocytes.

**Conclusions:** No significant difference between vegan and omnivore diet in the basic biochemical and hematological parameters were seen. To get deeper insight of nutritional requirements, in the study should be included more nutritional and essential parameters based on detailed questionnaire.

**Key Words:** vegan, omnivore, diet

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## 27/522. Nutrition and Healthy Lifestyle Introduction to the vegan diet

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**Introduction:** Vegan diet is the diet without any animal products, milk and milk products, meat and meat products, eggs, and seafood. Some vegans exclude also nightshades (tomato, potato, eggplant, paprika), tobacco, coffee, alcohol from their diet.

**Objectives:** There can be found plenty of non-animal products: grains – wheat, spelt, kamut, triticale, millet, oat, quinoa, amaranth, buckwheat; legumes – lentils, chick-pea, soya; all the vegetables, especially fresh; all kind of fresh fruits; nuts and seeds – sunflower and pumpkin seed, hazelnut, almonds, cashew nuts, pecans, macadamia, baobab; different extra virgin oils – olive, sunflower, sesame; sweeteners – non processed malts and syrups, and all kind of spices. Derivatives (drinks, cousine, ice-cream, pasta, bread, cakes, etc.) are

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## 27/525. Nutrition and Healthy Lifestyle Assessment of haematological indexes and serum iron in a group of teachers of the university of Granada

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**Introduction:** Iron deficiency is the leading cause of nutritional anaemia in both developed and developing countries. Iron is an element containing all body cells, involved in oxidative metabolism, such as transport (hemoglobin) and oxygen storage (myoglobin), among other functions.

**Objectives:** To evaluate the levels means of the biochemical markers of the nutritional iron status in a voluntary population of professors in the Faculty of Pharmacy, University of Granada and establish relationships with lifestyle and dietary habits.

**Method/Design:** It has been conducted a study in the community of professors at the University of Granada, aged between 30 and 65 years who have been subjected to a review of nutritional status by biochemical parameters related to nutritional iron status (haemoglobin, erythrocyte count, erythrocytary indexes, haematocrit). Likewise, a survey of food consumption frequency during the past year was conducted. Information obtained was tabulated and analyzed using SPSS software. The results were compared with the WHO International Standard.

**Results:** All the population studied had hemoglobin values that are within the reference values, thus ruling out the presence of anemia (the average score is 13.91g/dl). Serum iron, haematocrit and mean corpuscular volume values reflect normals and its average were 116.7 µg/dl, 42.5 % and 87.5 fl respectively.

**Conclusions:** In conclusion, the results reveal that iron status of teachers in the Faculty of Pharmacy, University of Granada is within the normal range in both iron intake and nutritional indicators in spite of the difficulties of this group in getting a balanced diet.

**Key Words:** Iron status indexes, iron deficiency, adults

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## 27/526. Nutrition and Healthy Lifestyle

### Hemolysis of red blood cells and iron needs in athletes

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**Introduction:** People often think that sports, the life of the erythrocytes in athletes may be lower than in sedentary subjects, due to different causes and could be due to the contraction of large muscle mass or impact on the tread in athletes. Therefore, the iron needs of athletes may be higher

**Objectives:** The destruction of red blood cells in the sport, to test whether iron requirements of athletes could be increased.

**Method/Design:** There has been a review of different articles that examined the rate of destruction of red blood cells in athletes.

**Results:** Schobersberger et al. (1990) found that after a strength training 6 weeks, a significant decrease in rates of haptoglobin. In soccer players, also saw a decrease of haptoglobin during the season. Triathletes (Telford et al. 2003) and runners (Weight et al., 1991).

**Conclusions:** Based on the results, it is shown that both strength training, such as those with character aerobic (endurance) or mixed, have a higher hemolysis, so that the iron needs of these athletes are higher. Therefore, it should monitor the intake of iron in these athletes to ensure their increased requirements.

The first conclusion we can draw clear is that athletes have lower values than non-athletes haptoglobin, finding this finding in all studies that have compared these two populations. So, we could say that the average life of erythrocytes in athletes is lower in athletes.

**Key Words:** Iron, hemolysis, sport, nutrition

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## 27/532. Nutrition and Healthy Lifestyle

### Articulating health through food labelling: encouraging healthier choices

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**Introduction:** Nutrition labelling is recognized as a key tool for combating this problem by providing consumers with information which promotes healthy eating.

**Objectives:** To investigate the extent to which food labelling systems (FLS) encourage healthier choices.

**Method/Design:** Laddering interviews with three groups (parents; 55+; teenagers) of 20 participants were carried out in the United Kingdom. The eight FLS studied varied in complexity (e.g. numerical, graphical and colour-based information), directiveness and benchmarking (nutrient- and product-level).

**Results:** The relationship between gross amount of information presented and actual label use is mediated by the type of benchmarking used and by what participants think its level of directiveness implies about them. Participants suggested they could decrease the cognitive workload of an ostensibly complex FLS by initially engaging only with the traffic light colours. Participants were unlikely to engage with non-directive FLS without benchmarking because these were slow to use and difficult to understand, offering objective information but no tools for use; thus suggesting an erosion self-efficacy and decreased likelihood of use in future, particularly less experienced shoppers. Semi-directive FLS with nutrient-level benchmarking gave both information and tools for meaningful engagement, increasing self-efficacy and ability to use labels effectively. A product-level logo FLS sacrificed all else for speed and ease of use, reducing decision-making rather than empowering the making of informed choices.

**Conclusions:** Future FLS designs need to consider the psychological as well as practical reasons why consumers choose to engage with some FLS and ignore others. In removing any obvious link between dietary recommendations and hard facts, overly simplified labels sacrifice flexibility, utility and persuasiveness on the assumption that ease and speed are all. By contextualising real information with colourful nutrient-level benchmarking an optimal FLS may encourage shoppers to make their own informed decisions, restoring that link and empowering them to take more interest in nutrition in the future.

**Key Words:** food labelling, consumer research, qualitative research

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27/535. Nutrition and Healthy Lifestyle

**Situation analysis of snack consumption in obese preschoolers at local nursery in Thai community**

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**Introduction:** Obesity in preschoolers is a significant problem with increasing trend.

**Objectives:** This study aimed to describe situation of consumption behaviors on snack among obese preschoolers.

**Method/Design:** The study used mixed methods design. Data were collected by using questionnaire, field notes and in-depth interviews of stakeholders including mothers of obese preschoolers aged 4-5 years old, teachers at a local nursery, community members, owners of the community shop, and a local administrator responsible for the local nursery in a community.

**Results:** Results revealed that consumption behavior on snack of the preschoolers included access to snack taken by their mothers. The mothers mostly took their children to buy snack from community shops, and supermarkets closed to their home due to convenience, and limitation of information on concealed sodium. The reason why the preschoolers had snack is that they preferred its taste, and free gift in the package. Types of snacks they consumed with the highest rate were snacks containing rice-starchy and fat, and protein, respectively. The consumption rate was averaged at 1-4 packs per time, 1-2 times per day. During weekday, they usually had snack in the morning before going to the nursery and in the afternoon after finishing from school. Whereas in the weekend, they had been eating snacks throughout the day. Regarding consumption pattern, results revealed that the preschoolers had snack with carbonated drink while playing.

**Conclusions:** It is concluded that information on concealed sodium, nutrition label read, selection, and consumption of snack and beverages, including the impacts of obesity that affect consumption in children is needed. Family, community and stakeholder involvement for behavioral modification on snack consumption should be integrated for promoting nutritional health in preschoolers.

**Key Words:** Preschoolers, Obesity, Snack Consumption

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27/539. Nutrition and Healthy Lifestyle

**Inclusion of family farm products and organic foods for school feeding in Southern Brazil**

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**Introduction:** In Brazil, a 2009 federal law defined that from all government's transferred funds to all municipalities, as part of the National School Feeding Program (PNAE), at least 30% should be used to purchase food from family farms (FF), and a part of these should be organic foods.

**Objectives:** To determine the percentage of municipalities of Santa Catarina state (southern Brazil) that, in 2010, bought food from FF and organic foods for school feeding, as well as the difficulties for the implementation of this policy.

**Method/Design:** Descriptive study, based on a census of all municipalities in the state (n=293). Required information was collected at each municipal secretary of education with the manager for school feeding, based on a structured questionnaire.

**Results:** 90% of all municipalities answered the questionnaire (n=264). Food acquisition from FF occurred in 61% of the municipalities, and 23% bought organic foods. Big cities (>100,000, n=10) showed smaller percentages (30% for FF and 10% for organic food) than the smaller ones. Of the municipalities which mentioned get food from FF, only 77% spent  $\geq 30\%$  of the resources for this purpose. Among those buying organics, 41% reported problems for its use, especially low regional production, lack of certification and difficulties in transportation/storage (33% each problem). Also 29% reported high price and lack of training on production/consumption of organic products. Most of these difficulties were also found for FF acquisition.

**Conclusions:** Acquisition of food from FF and organics in southern Brazil for school feeding is still deficient. Increase consumption of these foods needs politics involving public managers, farmers and schools to reduce difficulties.

**Key Words:** Family farms, organic foods, school feeding, early nutrition

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27/540. Nutrition and Healthy Lifestyle

**Body composition of health service users at a university hospital**

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**Introduction:** Body composition is a major indicator of health.

**Objectives:** The objective of this study was to describe body composition of health service users at a university hospital.

**Method/Design:** The sample consisted of 15 male and 45 female adults who participated in health fair. Data were collected by using TANITA body composition analyzer BC-420MA.

**Results:** Results revealed that mean age of the sample was 52.63 + 16.2 years. The result of body composition included body mass index (BMI) was at average of 23.49 + 3.21 kg/m<sup>2</sup>, percentage of body fat 29.03 + 7.90, fat mass 17.34 + 6.15 kg, muscle mass 39.45 + 6.89 kg, percentage of total body water 30.22 + 5.24, bone mass 2.33 + 0.38 kg, and visceral fat rating 7.48 + 3.74. According BMI, majority of them were malnutrition (60.0%) including undernutrition (1.7%), overweight (25.0%), first degree obesity (30.0%) and second

degree obesity (3.3%).

**Conclusions:** Results of this study suggest that health team develop an approach to decrease body fat among them.

**Key Words:** Body Composition, Health Service Users

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**27/546. Nutrition and Healthy Lifestyle**  
**Nutrition knowledge of young professional footballers**

*S. Fallows; L. Evans.*

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**Introduction:** Nutrition knowledge in general has an important role in determining an individual's health and fitness. Sports nutrition is an essential part of an athlete's program as without the right nutrition, fitness and performance may be hindered. There is a shortage of studies on nutritional knowledge on football players and no studies were found with participants under 18 years old. The importance of nutrition and hydration in young football players cannot be stressed enough. Despite these facts, it is not evident that any particular nutrition education provisions are currently in place to target this vulnerable group.

**Objectives:** It was hypothesised that nutrition knowledge amongst young professional footballers would be poor. The study aimed to assess the nutrition knowledge and attitudes of professional football players in aged 16-18 years old and to identify any areas of weakness.

**Method/Design:** A nutrition knowledge questionnaire was administered to 48 professional male football players aged 16-18 years old. Three professional clubs participated in the study. 19 players from an English Premier League club, 15 from a League Two club and 14 from a League One club.

**Results:** The mean overall nutrition knowledge score for the football players was 63%. There was no significant difference in nutrition knowledge found between clubs. No significant difference in mean scores for subsections of the questionnaire; general nutrition, sports nutrition, supplements and hydration were found. Nutrition attitudes of the players were positive overall, with 100% of players aware of the importance of nutrition for performance. 94% of players believed they would benefit from more nutritional advice

**Conclusions:** Nutrition scores reflect a good overall knowledge of nutrition for football however, players still believe that they would benefit from more nutritional information emphasising the need for nutrition education in team sports.

**Key Words:** Nutrition, knowledge, professional footballers

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**27/547. Nutrition and Healthy Lifestyle**  
**Nutrition knowledge of Irish parents and its relationship to the packed lunch they provide for their children**

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**Introduction:** There is growing concern about childhood obesity. Parents have substantive control over children's food choices. The packed school lunch is generally controlled by parents.

**Objectives:** This study aimed to investigate if the level of Irish parents'/guardians' nutritional knowledge reflects the foods they provide in their children's packed lunch. Another aim of the study was to determine if parents'/guardians' level of education reflects their level of nutritional knowledge. A final aim of the study was to determine whether boys or girls had healthier lunchboxes.

**Method/Design:** The study population consisted of 35 8-9 year old children from a South Dublin primary school and their parents/guardians. A lunchbox questionnaire was completed by the children and a General Nutrition Knowledge Questionnaire for Adults was completed by the parents/guardians. Analysis sought to determine whether any correlations existed between the level of nutritional knowledge and the foods provided; the level of nutritional knowledge and the level of education; and to determine any differences between the boys' and the girls' lunchboxes.

**Results:** The level of parental nutritional knowledge does not reflect the foods they provide in their child's lunchbox ( $p > 0.05$ ). There was no relationship found between level of nutritional knowledge and level of education ( $p > 0.05$ ), nor was there any significant difference ( $p > 0.05$ ) between the health status of the boys and girls lunchboxes. The standard of lunches was low, as was the level of nutritional awareness of the parents/guardians. This study attempts to fill a gap in the literature, investigating whether the level of parental nutritional knowledge reflects the lunches they provide in their children's packed lunch.

**Conclusions:** The results show that level of nutritional knowledge does not reflect the foods parents/guardians provide in packed lunches. Health promotion strategies are needed to target new areas in order to broaden nutritional awareness in the Irish adult population. Healthy lunchbox strategies are recommended to be employed by parents and/or schools in order to improve the nutritional quality of these meals.

**Key Words:** Nutrition knowledge, parents, Ireland, school lunch

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27/549. Nutrition and Healthy Lifestyle

**Inclusion of organic food for school feeding: opportunities and limitations according to school kitchen staff in Southern Brazil**

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**Introduction:** In Brazil, a federal law defined in 2009 that all municipalities have to acquire products from family farms for school feeding, and part of them should be organic foods. The role of school kitchen staff is essential for appropriate implementation of this legislation.

**Objectives:** To evaluate kitchen staff from public schools in the Santa Catarina state (southern Brazil) about knowledge, opportunities and difficulties of using organic foods for school feeding.

**Method/Design:** Descriptive study including a stratified random sample of 240 (41%) of the 588 schools in all the municipalities which bought organic food for school feeding in 2010 (n=55 municipalities). The head of the school kitchen staff in each selected place was interviewed.

**Results:** Response rate from selected sample was 100% and acquisition of organic foods occurred in 99% of selected schools. Only 47% of respondents received any training about using organic foods in the last two years. Main topics discussed in the trainings were preparation care (96%), benefits for students/community (94%), transport/storage (86%), farm production of organic foods (71%) and legislation (57%). Although less than a half received training, all interviewed identified benefits for students and/or the community with using organic foods for school feeding. The most important changes perceived with the introduction of organic foods were: reduction in consumption of fruits/vegetables by school children (66%), workload increase (28%), lower food durability (23%) and lower yield (4%). These parameters were similar among cooks who either received or not training courses. Only 13% of the cooks mentioned difficulties with using organic foods, and the main problems were receiving/stocking (44%) organic foods and acceptance by children (28%).

**Conclusions:** Even with small percentage of cooks with training about using organic foods, knowledge of benefits was highest. Main difficulties were related to acceptance by children and problems with storage/durability of organic foods.

**Key Words:** Organic foods, school feeding, difficulties, opportunities, kitchen staff

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27/552. Nutrition and Healthy Lifestyle

**Nutritional contribution and food consumption among schoolchild group living in Sidi Bel Abbes, Algeria**

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**Introduction:** The aim of this study is to evaluate the nutritional status

**Objectives:** The aim of this study is to evaluate the nutritional status of 882 adolescents considered as healthy aged between 10 to 19 years living in Sidi Bel Abbes the west of Algeria.

**Method/Design:** The food inquiry carried out by the 24-hours record method in different institutions (secondary and high schools) throughout 9 months of the year 2006.

**Results:** Result showed that the socioeconomic level is considered as medium, as well as for the anthropometric parameter's measurements (body weight, height, BMI) which were comparable with recommendations. The daily energy intake was suitable compared with the dietary recommendations. However, the carbohydrate intake, particularly the complex ones, was higher.

**Conclusions:** he PUFA were also highly consumed, when the calcium and C vitamin are poorly brought.

**Key Words:** Adolescent, Nutritional, status, Dietary, recommendations

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27/554. Nutrition and Healthy Lifestyle

**Do dietary patterns differ in relation to level of alcohol intake?**

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**Introduction:** There is a paucity of research-based evidence to assess the association of the nutritional patterns amongst alcohol drinkers; thus there is a need for intensive studies.

**Objectives:** This cross-sectional study assessed the differences in the dietary patterns in relation to the level of alcohol intake amongst middle-aged Finnish men.

**Method/Design:** Data came from the Kuopio Ischemic Heart

Disease Risk Factor (KIHD) Study, an ongoing population-based cohort study since 1984 aiming at investigating the risk factors of cardiovascular diseases and other chronic illness. 2634 male participants aged 42-60 years were recruited at the baseline for this study. Food intake was collected by a 4-day food diary method. Self-reported alcohol consumption was assessed with quantity-frequency method based on the Nordic Alcohol Consumption Inventory from which average weekly alcohol consumption was calculated. Analysis was performed using ANOVA and Pearson's Chi Square tests.

**Results:** Heavy drinkers had a lower intake of milk ( $P=0.001$ ), whole grains ( $P=0.020$ ), fiber ( $P<0.001$ ), folate ( $P<0.001$ ), vitamin C ( $P=0.015$ ), tea ( $P=0.008$ ) and iron ( $P=0.002$ ) than previous and moderate drinkers. Intake of legumes ( $P=0.001$ ), fish ( $P<0.001$ ) and beef ( $P=0.005$ ) amongst previous drinkers was lower when compared with heavy drinkers. There is statistical significant difference which revealed a higher mean intake of vitamin D, MUFA, PUFA, protein and fat in heavy drinkers than previous and moderate drinkers.

**Conclusions:** Poor nutritional intake was found among heavy drinkers in contrast with previous and moderate drinkers. Consumption of animal products was predominant amongst heavy drinkers. This should be considered in future epidemiological research when studying dietary patterns of alcohol consumers as a risk factor for health outcomes.

**Key Words:** Dietary patterns, alcohol intake, nutrients, food groups.

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### 27/555. Nutrition and Healthy Lifestyle Dietary modulation of redox status in humans: the role of flavonoids

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**Introduction:** There is evidence that antioxidant-rich foods are able to modulate plasma Non-Enzymatic Antioxidant Capacity (NEAC) in humans, however the molecules responsible for this effect have not been clearly identified, as yet. Recently, a group of bioactive compounds, polyphenols (PP), has raised greatest interest, thanks to the antioxidant properties demonstrated by in vitro and ex vivo models. However, the biological in vivo effect of these molecules is still under research.

**Objectives:** The available literature on the in vivo ability of PP-rich foods to modulate plasma NEAC was reviewed and critically discussed

**Method/Design:** A search of Medline database for human acute and chronic intervention studies exploring dietary impact on plasma/serum NEAC as primary outcome and PP levels as secondary outcome, was carried out, using the search terms "Antioxidant capacity", "Polyphenol", "Diet" and specific food groups and/or items (fruit, fruit juice, nut, oil, soy, vegetable, tea, chocolate, wine, galenic, capsule, extract).

**Results:** We examined a total number of 227 trials. Among these,

only the 33.5% have associated assessment of NEAC with markers of PP bioavailability. The percentage of interventions showing a parallel increase in plasma levels of NEAC and PP was 69% among acute trials, and only 25% among long term studies. The majority of these studies reported a clear discrepancy between PP concentration in body fluids and the extent of NEAC increase. Moreover, although it is well known that once ingested, polyphenols undergo a complex metabolism, only 4 studies out of 227 measured specific PP metabolites

**Conclusions:** Antioxidant-rich foods are able to modulate oxidative stress and increase plasma NEAC in humans. However, the identification of the molecules responsible for this effect is far to be obtained and, based on our review, the evidence of an antioxidant in vivo action of PP is still scarce.

**Key Words:** Non-Enzymatic Antioxidant Capacity (NEAC), oxidative stress, plant foods, polyphenols

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### 27/556. Nutrition and Healthy Lifestyle Role of a fruit-based drink in the prevention of postprandial oxidative stress in humans

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**Introduction:** Postprandial metabolic stress, caused by the ingestion of High Fat and Sugar Meals (HFSM), is recognized as an important factor involved in the development of cardiovascular risk. The link is thought to be the over-generation of reactive oxygen species and the onset of an inflammatory response. Dietary antioxidants have been proposed to reduce postprandial metabolic stress, however no clear evidence is available in humans.

**Objectives:** We investigated the effects of an antioxidant-rich drink on markers of redox status in healthy overweight volunteers, following the ingestion of HFSM.

**Method/Design:** The study followed a double blind, placebo controlled, randomized, crossover design, involving 14 otherwise-healthy overweight volunteers, randomly assigned to two groups: high-fat meal + 500 ml placebo beverage (HFSM-P) group and high-fat meal + 500 ml fruit-based drink (HFSM-FBD) group.

**Results:** HFSM-P induced an endogenous antioxidant response between 2 and 4 hours from ingestion, through increments of thiols (SH,  $p<0.001$ ) and uric acid (UA,  $p<0.01$ ), leading to higher plasma non-enzymatic antioxidant capacity (NEAC) at 4 hour-point ( $p<0.01$ ). HFSM-FBD inhibited the endogenous antioxidant reaction, reducing SH ( $p<0.01$ ) and showing a trend of reduction of UA plasma levels. With respect to HFSM-P, the ingestion of the antioxidant-rich drink changed the pattern of NEAC increase, by anticipating the peak of increase from 4 to 1 hour post-ingestion ( $p<0.05$ ).

**Conclusions:** The endogenous antioxidant response to HFSM can be inhibited by a source of exogenous and ready to use antioxidants, which may better cope with the metabolic abnormalities induced by fat and sugar overloads. Although further in vivo studies

are needed, results from this investigation give new insights on the mechanisms of antioxidant defense activated by the body to counteract postprandial stress.

**Key Words:** high-fat-sugar-meal, postprandial stress, fruit based drink, antioxidants, uric acid

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**27/557.** Nutrition and Healthy Lifestyle

**Cooking effect on in vitro non-enzymatic antioxidant capacity (NEAC) of chicory (radicchio rosso di treviso)**

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**Introduction:** Vegetables are known to be good sources of bioactive compounds with antioxidant activity. These molecules have been linked to reduced risk of stroke and coronary heart disease. Processing may affect the bioavailability of these compounds.

**Objectives:** Evaluating and comparing the effect of common domestic cooking practises on in vitro Non-Enzymatic Antioxidant Capacity (NEAC) of chicory.

**Method/Design:** Twenty Kg of chicory were divided into five equal portions. One portion was retained raw and the others were oven-cooked, grilled, steamed and boiled. Preliminary tests were conducted in order to define optimal time-temperature combination, according to ideal "cook-values". NEAC was analyzed by two assays (ie. TRAP: Total Radical-Trapping Antioxidant Parameter, and FRAP: Ferric Reducing Antioxidant Parameter).

**Results:** All cooking methods resulted to increase chicory NEAC, with the highest increment recorded after grilling at 150°C for 20 minutes (percent variation with respect to raw value ranging from about +45 to +150). In case of oven-cooking, the time-temperature combination of 170°C for 7.5 minutes resulted in the greatest TRAP and FRAP increase, when compared to both lower (150°C) and higher (190°C) temperatures. Boiling and steaming for short time determined higher TRAP and FRAP increases with respect to longer cooking (3.5 vs 6.5 minutes and 3 vs 5 minutes for boiling and steaming respectively). On the contrary, grilling for longer time-durations (20 vs 16 minutes) resulted in higher TRAP and FRAP increments.

**Conclusions:** Our results show that, despite generally accepted idea, cooking may not cause losses in antioxidant capacity of vegetables. In contrast, we recorded an increase of chicory in-vitro NEAC. Optimal time-temperature combination, which resulted to vary according to different cooking practices, may promote the destructure of vegetable cellular matrix, with consequent increased availability of bioactive compounds. Moreover, the formation of new compounds with antioxidant activity cannot be ruled out.

**Key Words:** Non-Enzymatic Antioxidant Capacity, chicory, cooking.

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**27/558.** Nutrition and Healthy Lifestyle

**Oven-cooking effect on antioxidant properties of apples cv. Golden**

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**Introduction:** Vegetable consumption is associated with reduced risk of cardiovascular diseases. This prevention is thought to be mediated by antioxidant compounds, among which polyphenols (PPs) have gained the greatest interest. Nonetheless, PPs content in plant-food may be strongly affected by processing

**Objectives:** In the context of a larger project, financed by the Italian Ministry of Agriculture, Food and Forestry, aimed to advice "best practices" to agronomists, food-industries and consumers for optimal food-processing conditions, we report preliminary results on the effects of oven-cooking on Non-Enzymatic Antioxidant Capacity (NEAC) and PPs content of apples

**Method/Design:** Apples cv. Golden were cooked in an electric oven at 160, 180 and 200°C. Cooking time-duration was set according to two cook-values, corresponding to sub-cooked and cooked apples and resulting in equal firmness, independent of temperature. NEAC was analysed by three assays (Total Radical-Trapping Parameter, Ferric-Reducing Antioxidant Power and Crocin bleaching inhibition) and PPs (free and conjugated forms) by using the Folin-Ciocalteu reagent

**Results:** Oven-cooking determined a general NEAC increase. The highest NEAC values were recorded after cooking at 200°C for 10 minutes, with a variation with respect to raw value that ranged from about 170% to 350% among different assays. This time-temperature combination also prevented free PPs loss, while caused the greatest release of the PPs conjugated forms (almost 80% of the initial value)

**Conclusions:** Our results indicate that cooking is not detrimental from an antioxidant point of view, on the contrary, under selected conditions, cooking can even potentiate in-vitro food antioxidant capacity. In case of oven-cooked apples, cooking at high temperature for short period of times seems to be the best strategy in order to limit the loss of bioactive compounds and to allow a destructure of cellular matrix, with consequent release and increased availability of bound PPs, possibly displaying high antioxidant activity

**Key Words:** Non-Enzymatic Antioxidant Capacity (NEAC), polyphenols, oven-cooking, apples

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27/560. Nutrition and Healthy Lifestyle

### Impact of neutrofin formulations in the treatment of iron deficiency anemia in pregnancy

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**Introduction:** Iron deficiency anemia is one of the highest nutritional deficiencies prevalent in the world, mostly in pregnant women, children and the elderly. Trofin is a natural anti-anemic product, composed of hem iron with high absorption and bioavailability, aminoacids, proteins and honey. Its formulation in tablets (Neotrofin™) combined with Vitamin C (Neotrofin C™) and Folic Acid (Neotrofin CF™), makes it an attractive product for the treatment of this deficiency state, specially in pregnancy.

**Objectives:** Determine the effectiveness of Neotrofin™ formulations in the treatment of iron deficiency anemia in pregnant women of a community of Havana.

**Method/Design:** We performed a cross sectional study with a total of 320 pregnant women, divided randomly into 4 treatment groups. Group I) Neotrofin™, Group II) Neotrofin C™, Group III) Neotrofin CF™ and Group IV) Ferrous Fumarate (as control). Hemoglobin (Hb), Hematocrit (HCT), Serum iron (FeS) and Reticulocytes (RT) were analyzed every 8 weeks, until delivery. The occurrence of adverse reactions was also monitored.

**Results:** At baseline, the prevalence of iron deficiency anemia was 45% -55%. In the first 8 weeks of treatment, the prevalence decreased to 20% -35% in the Neotrofin groups (without adverse events) versus 53% to 41% in Fumarate group (with 20% of adverse reactions). Hb increased to values higher than 110 g/L, with a significant increase in HCT, FeS and RT values in Neotrofin groups vs Fumarate (increased only to 101 g/L). The greatest increase in Hb was observed in pregnant women who began treatment in the first trimester of pregnancy and with Hb less than 8.9 g/L.

**Conclusions:** The new product Neotrofin™ was effective and safe for the treatment of iron deficiency anemia in pregnant woman, without adverse events. The product was certified by the ISO and its registration was done by the Ministry of Public Health of Cuba.

**Key Words:** Iron deficiency, anemia, anti-anemic

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27/562. Nutrition and Healthy Lifestyle

### Mineral composition of apple- golden delicious and red delicious grown in Iran

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**Introduction:** Nutritional information is used by public agencies and agricultural industries to promote fresh produce. People are looking for variety in their diets, and aware of the health benefits of fresh fruits and vegetables. In addition to meeting nutrient intake levels, greater consumption of fruits and vegetables is associated with reduced risk of cardiovascular disease, stroke, and cancers. Apple fruit is known not only for its nutritional qualities but also for its traditional use in natural medicine. Apples constitute an important part of the human diet, as they are a source of minerals.

**Objectives:** To determine some mineral content of apple cultivars grown in different locations throughout Lorestan province.

**Method/Design:** Apple cultivars were harvested from different locations throughout Lorestan Province of Iran and analyzed for mineral composition. The prepared samples were subjected to analysis for 3 elements (Fe, Zn, and Ca) by the flame atomic absorption spectrometry. Phosphorus was measured by Spectrophotometer and Sodium and potassium were measured by flame photometry

**Results:** Golden delicious and red delicious apple had 173.7 g and 46.7 g weight, respectively. The amounts of Iron, Zinc, Calcium, Phosphorus, Sodium, and Potassium for red variety were 0.24, 0.14, 27.6, 9, 4.8, and 63.8 and values for golden variety were 0.23, 0.14, 27.7, 8.8, 4.5, and 66.3 mg/100g fresh weight, respectively. The average Iron and Calcium contents for both varieties (100 g) were found to be 3.0% and 2.8% of the dietary reference intake (DRI) respectively, but less than 2% for other minerals.

**Conclusions:** Many of the mineral values such as Ca, P, and Na contents are greater than the IFCT values. Whereas, Fe and K values are less than those reported in IFCT.

**Key Words:** Golden delicious, Red delicious, Iron, Zinc, Calcium

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27/564. Nutrition and Healthy Lifestyle

### Dietary energy density is inversely associated with the diet quality indice among Iranian young adults

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**Introduction:** Dietary energy density might be associated with the quality of the consumed diet.

**Objectives:** Reporting the relationship between dietary energy density and diet quality index in Iranian youths.

**Method/Design:** This study was conducted on 410 female young adults in Isfahan. They were selected according to the stratified random sampling method. A validated semi quantitative food frequency questionnaire was used to assess the usual dietary intakes.



Dietary energy density was calculated as each individual's reported daily energy intake (kcal/d) into total weight of foods (excluding beverages) consumed (g/d). Diet quality was assessed by healthy eating index (HEI). HEI was calculated based on scoring to the five food groups, different kinds of fat and diversity score of the diet.

**Results:** Mean dietary energy density was  $1.5 \pm 0.2$  kcal/g and mean of HEI was  $57.5 \pm 16.0$ . Individuals in top tertile of HEI had the lowest mean of the dietary energy density (adjusted means among tertiles: 1st:  $1.57 \pm 0.23$ , 2nd:  $1.46 \pm 0.24$ , 3rd:  $1.49 \pm 0.23$ ;  $P=0.01$ ). There was an inverse and significant association between dietary energy density and HEI ( $r=-0.2$ ;  $P=0.001$ ).

**Conclusions:** There were inverse associations among DDS and dietary energy density in Isfahanian female youths. Further prospective investigations will be needed to confirm this finding.

**Key Words:** Dietary energy density, healthy eating index, diet quality,

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### 27/566. Nutrition and Healthy Lifestyle Iron status among Thai vegans

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**Introduction:** Despite the possible overall health benefits of vegan diets, there is concern that some vegans particularly females, may have low iron status due to no intake of heme-iron.

**Objectives:** The objective was to investigate the iron status of Thai adult vegans.

**Method/Design:** Forty-nine male and 60 female healthy vegans, aged 30-50 years, who have been on diet devoid of animal products including milk and egg for at least 5 years, volunteered for the study while 41 male and 45 female age- and BMI matched

omnivores served as controls. Iron status was assessed by measuring hematocrit, serum iron and serum ferritin.

**Results:** Serum iron and ferritin concentrations were significantly lower in vegans than in omnivores of both sexes. Female vegans had hematocrit values lower than female omnivores. Serum ferritin levels correlated with hematocrit values and serum iron concentrations but not with duration of vegan practice.

**Conclusions:** Thai vegans had low iron status some females had low hematocrit values. The poor iron status among Thai vegans is probably due to low bioavailability of iron in the vegan diets.

**Key Words:** Ferritin; Serum Iron; Vegan Diet

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### 27/568. Nutrition and Healthy Lifestyle Edible insects in world diets for healthy eating

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**Introduction:** Edible insects are a source of nutrients worldwide since ancient times and still consumed at rural communities and at high class restaurants at urban cities. Edible insects provide the macronutrients requested for healthy eating, proteins with essential amino acids, lipids with  $\Omega 3$ ,  $\Omega 6$  and  $\Omega 9$ , minerals Na, K, Ca, P and Fe, fiber and soluble carbohydrates, insects take nutrients from environment and metabolize to get primary metabolites by few biosynthetic paths to build up chemical compounds in animals such as insects. Due to environment conditions some species are seasonal however on proper conditions insects can be storage for further consumption without spoilage. Insects intake are in different metamorphosis stages; eggs, larvae, nymphs and adults and provide balance macromolecules for a healthy diet.

**Objectives:** The aim of this study is to assess macronutrients of five species of insects from different countries consumed at all continents.

**Method/Design:** Insects obtained at markets countries of origin in 2010 analyzed in Mexico according AOAC (2000) methods.

**Results:** Escamoles 1) ant eggs, from arid regions, in Mexico; Mopane 2) larva stage of emperor moth, from Africa; witchetty grub 3) larvae of Australian moth, Giant water 4) bug from Thailand and Culona 5) ant from Colombia. Data samples in dry basis was. Proteins: 1) 38.12%; 2) 51.18%; 3) 35.94%; 4) 61.89%; 5) 40.01%. Minerals: 1) 7.15%; 2) 5.75%; 3) 3.83%; 4) 4.95%; 5) 2.13%. Lipids: 1) 37.17%; 2) 20.03%; 3) 40.19%; 4) 7.21% 5) 37.17%. Fibre: 1) 0.79%; 2) 1.97%; 3) 1.09%; 4) 9.85%; 5) 8.09%. Soluble carbohydrates: 1) 16.77%; 2) 21.01%; 3) 18.95%; 4) 1.11%; 5) 13.86%.

**Conclusions:** Insects are good source of macronutrients worldwide, consumption by all kind of social groups, raw at rural communities and as gourmet dishes at urban cities, insects are a good source of macronutrients at world diets for healthy eating.

**Key Words:** Insects, macronutrients, nutrition.

### Mexican native food contribution to the word

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**Introduction:** Feeding of any social group not only means nutritions required for the good and healthy development of the human beings provided by food but also involve other factors such as, ecological, historical, socioeconomic and tradition among others that play an important role of the daily life of people. Mexican gastronomy since the prehispanic time include a wide variety of foods as part of population daily diet. Arrival of several staple from Europe and many others from Asia, major food trade began little by little to such degree that Mexico become a true worldwide food crossroad. Mexico contributed with a huge wealth of vegetables and fruits that nowadays are part of the international gastronomy and provide nutrients for a wellbeing and food health.

**Objectives:** The objective of this paper is to investigate foodstuff native from Mexico that contribute to world nutrition and welfare of population.

**Method/Design:** Research was conducted to find out the Mexican origin of food consumed worldwide and their role in nutrition.

**Results:** Corn and beans are the most widely consumed throughout the country and Latino America; cacao *Theobroma cacao* L. Much appreciated all over the world is a good source of flavonoids and polyphenols as epicatequina antioxidant related to reduce the risk of cancer, diabetes and cardiovascular diseases. Tomato *Lycopersicon esculentum*, essential component of typical dishes worldwide, highly contain of lycopene antioxidant, promote effects of immune enhancement and reduction of developing degenerative diseases as cancer and decrease cholesterol, is also high in potassium and calcium. Avocado *Persea mericana* M. tasty fruit very much demand, is a good source of monounsaturated MUFA and polyunsaturated FUFA fatty acids including 3 and 6 essential fatty acids in human nutrition.

**Conclusions:** Mexican native food provide to the world important and essential nutrients for a good health of people from all over the five of continents.

**Key Words:** Mexican native food, nutrition health, nutrients source.

### Role of chromium picolinate and L carnitina on body composition of athletes

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**Introduction:** It is important to evaluate the body composition of athletes in sports since it is known that exercise has a significant effect on athletic performance and has a potential to alter the body composition.

**Objectives:** . The purpose of this study is to assess the effect of chromium picolinate and L carnitina on body composition of athletes with a specific diet and training.

**Method/Design:** A study to explore the efficacy of chromium picolinate and L carnitina supplementation in 24 athletes male and female throughout 12 weeks; 12 of them with intake of 100 µg/day of chromium picolinate and 1 g/day of L carnitina and the other 12 with placebo, both groups with a diet of 50 kcal/kg of athletes weight, distributed in 70% carbohydrates, 1.8 g/kg athlete weight of proteins and 20% lipids approximately and a training of 18 h/week. The body composition measurements and evaluation of athletes was performance out by bioelectrical impedance analysis, skin fold thickness and anthropometric parameters.

**Results:** Data recorded gave the following results; athletes with diet and placebo, had a weight loss of 450g increase 1.24% body fat and 0.69% muscular mass; group with diet and ergogenetic supplement gain 100 g/weight, loss 2.34% body fat and increased 1.83% muscular mass.

**Conclusions:** In conclusion chromium picolinate increase lean body mass and decrease percentage of body fat. L carnitina regulate glucose levels and protect proteins, therefore the ergogenetic supplement combined with a balanced diet and adequate training lead to improve condition and regulate body composition of athletes.

**Key Words:** body composition, chromium picolinate, L carnitina, physical training.

### The current status of morning snack practices in primary schools in Rome, Italy

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of Milan, Italy; <sup>4</sup>MD, Department of Pediatrics, San Paolo Hospital, University of Milan, Italy.

**Introduction:** Despite its potential clinical relevance, practices of morning snack in children have been poorly investigated.

**Objectives:** The aim of this survey was to describe the current practices of the morning snack among children attending the primary schools in Rome, Italy.

**Method/Design:** A total of 967 children aged 9-10 years and attending 37 primary schools selected to represent homogeneously the distribution within the municipality of Rome were recruited in an observational cross-sectional study performed in 2010. Teachers advised children and their parents about the study protocol during an one morning class forum. Parents of children were invited to fulfil at home a standardized questionnaire about usual daily feeding and life style of children.

**Results:** A percentage of 90.8% completed questionnaires were returned. The morning snack was consumed habitually by 90.9% (95%CI, 88.8-92.8%) children at around 10 h o'clock. No difference was found between children that consumed or not the morning snack with respect to gender, maternal education or social level, and child's physical activity ( $P>0.05$ ). Liquid foods mostly assumed were juice fruit (25.2%), tea (7.3%) and milk (6.5%). Cheese/salami sandwiches (46.7%), pre-packaged snacks (44.7%), pizza/pizza-bread (28.1%) and breadsticks (14.5%) were the most frequently consumed solid foods. Fruit or yoghurt were assumed respectively by 20.3% and 8.5% of children.

**Conclusions:** Intervention programs should be planned to inform schoolchildren, parents, and teachers about the importance of healthy nutrition to possibly change their current morning snacks practices especially in the choice of foods.

**Key Words:** morning snack, young children

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#### 27/575. Nutrition and Healthy Lifestyle

### **Infant's growth through the first year of life and maternal pre-pregnancy body mass index.**

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**Introduction:** Despite its potential clinical relevance, association between maternal pre-pregnancy Body Mass Index (BMI) and infant's growth has been poorly investigated.

**Objectives:** To assess whether an association may exist between maternal pre-pregnancy BMI and infant's growth throughout the first year of life.

**Method/Design:** Prospective observational cohort study including 1246 at term, singleton, healthy newborns. Mothers were interviewed before discharge about pre-pregnancy weight, sociodemographic data, lifestyle and were given a diary to record the type of feeding during the study period. Maternal pre-pregnancy BMI was categorized according to the World Health Organization criteria as: underweight (BMI < 18.5 kg/m<sup>2</sup>), normal-weight (18.5 kg/m<sup>2</sup><BMI<25 kg/m<sup>2</sup>) and overweight (BMI ≥ 25 kg/m<sup>2</sup>). Infant's growth (weight, length, BMI) data were collected during visits scheduled at 1, 3, 6, 9, 12 months of life, and z-scores were calculated.

**Results:** Birth weight was lower in infants born to underweight (mean 3289 g, SD 384) than normal-weight (mean 3416 g, SD 408) and overweight mothers (mean 3426 g, SD 431) ( $P<0.05$ ). Throughout the first year of life, the infant's BMI z-score ranged between 0.37 and 0.77 in the whole sample but was significantly higher in infants born to overweight than underweight and normal-weight mothers from 6 months onwards (maximum  $P=0.024$ ). Significance of difference decreased ( $P=0.072$ ) after adjusting for confounders (breastfeeding, solid foods introduction and type, mother age, educational level. No overall significant difference occurred among underweight, normal-weight and overweight mothers for length z-score.

**Conclusions:** The infant's BMI z-score pattern throughout the first year of life may be associated with maternal pre-pregnancy BMI.

**Key Words:** infant's growth, pre-pregnancy BMI

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#### 27/581. Nutrition and Healthy Lifestyle

### **Food supplements commonly used in weight management and their role in a comprehensive strategy**

*L. Arranz; R. Farré; B. Gonzalvo; A. Roset.*

**Introduction:** Weight control is of increasing importance nowadays due to the growing figures of overweight and obesity. Comprehensive strategies are needed to efficiently tackle this health problem. There are many products on the market directed at people who want to lose weight. Some dietetic foods and food supplements should be seen as contributors in the management of weight loss activities.. The usefulness of these products depends on their mechanisms of action and on the individualized program used by each person

**Objectives:** To compile the most used products directed at weight control and the main recommendations to use them adequately in the overall management of obesity and overweight

**Method/Design:** Some well established and reliable sources of information about food supplements and dietetic products were consulted. Some information related to weight management was collected, the products based on more scientific reliable data were selected, and their mechanisms of action in the body and their recommendations of use reviewed.

**Results:** There are some dietetic foods and food supplements available that could be useful to help and improve the outcome in weight management. The mechanisms of action can be; increasing satiety, reducing fat absorption, controlling energy intake, or increasing energy expenditure. Therefore, depending on these, the advice on the

proper use will be different for each product

**Conclusions:** There are a large number of products in the market focused on weight control, and lots of people are interested on them, although they do not always have enough information to choose the right one. Knowledge of them as possible tools for use in a comprehensive weight loss strategy is very useful to improve the advice given by health professionals on this issue

**Key Words:** food supplements, dietetics, weight control, health, strategy

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### 27/583. Nutrition and Healthy Lifestyle

#### Hydration study in humans: volume and osmolality of 24h urine correlate best with fluid intake

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**Introduction:** Results of a clinical study conducted on 71 healthy adults in real-life conditions, showed the possibility to define low and high drinkers (<1.2L and >2.0L of total daily fluid, respectively) in the French population according to urinary variables. This study also allowed us to collect the same variables on 11 medium drinkers, i.e. in between 1.2L and 2.0L of total daily fluid. Therefore, a new statistical analysis was completed on this wider population data set.

**Objectives:** The aim was to describe the correlation between urinary variables and the natural daily fluid intake.

**Method/Design:** In total, 82 healthy subjects (43 women; 39 men) aged 31.6 ± 4.4 y (SD), with a BMI of 23.3 ± 2.7 kg/m<sup>2</sup>, completed this study, which was performed during usual daily activities. During the 4 days of the study, subjects fulfilled an on-line dietary record specifically designed to track fluids. First morning urine and 24-h urine were collected the first day and the 3 next days.

**Results:** The correlations of fluid intake with urine physiological variables were calculated for each day of experiments: (1) Variables of first morning urine showed weak correlation with fluid intake ( $r^2 < 0.2$ ). (2) The strongest correlations with fluid intake were observed with 24-h urine volume and 24-h urine osmolality ( $r^2 = 0.5$  and  $r^2 = 0.6$ , respectively, for the last day of experiments). (3) A multi-factorial analysis confirmed that these correlations were similar whatever the days of experiment.

**Conclusions:** This clinical study, conducted in real-life conditions, exhibits a strong relationship between fluid intake and the physiological biomarkers 24-h urine volume and 24-h urine osmolality. This suggests that they can be considered as useful predictors of level of fluid intake and allow possibilities to assess hydration status in

free-living conditions.

**Key Words:** Hydration Indices, Humans, Daily Conditions

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### 27/587. Nutrition and Healthy Lifestyle

#### Maternal diet in breastfeeding

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**Introduction:** The mother's diet and an increase in energy needs are key elements for successful breastfeeding.

A nutritional education plan directed at women, who are thinking of becoming pregnant, are pregnant, and breastfeeding mothers has been prepared by a group of pharmacists in Spain.

From the results obtained in the Autonomous Community of Catalonia it was noted that there were some dietary habits that were not appropriate in these stages. The consumption of dried fruits is very low, and 10% of the women do not take milk products during pregnancy or breastfeeding. It was also found that 7% of women followed a low calorie diet during breastfeeding.

**Objectives:** Practical information was offered from pharmacies so that breastfeeding women could improve their diet and avoid low calorie diets and other dietary mistakes during this period.

**Method/Design:** A representative sample of 280 pharmacists was chosen from pharmacies participating in the Plenufar campaign. An information leaflet prepared by the Nutritional Advisory Group of the Barcelona Collegiate of Pharmacists was distributed to breastfeeding mothers, under the slogan "there are no limits in your diet, the richer the better". The web site of the Pharmacist Collegiate was used to present these guidelines.

**Results:** It has been shown that mothers go to pharmacists seeking advice on breastfeeding their babies, and the pharmacy is an ideal place to circulate material that can reach the highest possible number of women.

**Conclusions:** The information leaflet enables the pharmacist to continue the task giving nutritional advice by providing basic knowledge to promote healthy eating habits and avoid bad diet practices in such an important stage of life like breastfeeding.

**Key Words:** Maternal Diet and Plenufar Campaign.

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### 27/598. Nutrition and Healthy Lifestyle

#### Slow food: a strategy in the search for food and nutrition safety

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Curitiba, Brazil; <sup>4</sup>History of eating habits. PUCPR. Curitiba, Brazil.

**Introduction:** This review of literature highlights some of the changes society has undergone concerning food and eating throughout the history of eating habits. Fast, cheap and practical have become the most valued characteristics when referring to food, as opposed to quality, quantity, cultural and social aspects represented in the act of eating. Thus, the eating habits that emerge are marked by the excessive consumption of industrialized, high-sugar and high-fat foods, resulting in changes in the worldwide epidemiological profile, as well as amongst the Brazilian population. In response to Brazil's new reality Food and Nutrition Security (FNS) has emerged, presenting the right to access food whilst respecting its diverse aspects. The Slow Food movement was originated in Italy, in reaction to the standardizing effects, frantic life styles and the fading of regional cuisine traditions.

**Objectives:** The present study aims at revealing the possibility of the Slow Food movement, through its principals and the correlations with the guidelines of the FNS policy, being a strategy in seeking Food and Nutrition Security

**Method/Design:** Virtual databases, namely Scielo and LÍlacs, as well as books were researched from August of 2009 until June of 2010

**Results:** The Slow Food movement can be considered a support and structuring instrument to the FNS policy, as it adapts directly to the seven main guidelines.

**Conclusions:** It is possible to affirm that the Slow Food movement could be perceived as a strategy for FNS through the following aspects: the strengthening of family agriculture, sustainability, recovering the habit of sharing meals, respecting biodiversity, preserving regional cuisine, promoting healthy eating habits amongst children, Arca do Gosto, Terra Madre, Fortalezas, Educação do Gosto, also concepts such as eco-cuisine and "Good, clean and just" foods.

**Key Words:** History of eating habits. Nutrition. Food and Nutrition Security. Slow Food. Fast Food. Eating habits

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#### 27/599. Nutrition and Healthy Lifestyle

### **Meat consumption and changes in eating habits between 1980 and 2010 - Curitiba, Brazil**

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**Introduction:** This study is a historical analysis of meat consumption and the economic, social and nutritional influences upon this consumption. A correlation between meat consumption within the residence and outside of it was carried out, based on Brazilian databases.

**Objectives:** The objective of this study was to perform a his-

torical analysis of meat consumption and the economic, social and nutritional influences upon this consumption.

**Method/Design:** This study consists in a descriptive research with a qualitative approach, in which historic data on the policies for meat supplying were analyzed. Data was originated from studies within a newspaper published at a state level and a national journal, between 1980 and 2009, including a total of 1392 newspaper and 1537 journal issues.

**Results:** The present research verified that meat consumption in Brazil is directly associated to the population's income and purchasing power. The influence of public policies on economics and the supplying process were evident in the consumption level of this product. The pattern of meat purchase and consumption suffered changes. In 1980, purchase was made mainly in butchers and from the 1990's onwards a greater amount of meat was purchased in supermarkets. Another change involved the growing concern on the effects of meat consumption on health, which culminated in a rise in the consumption of poultry. The consumption of pork and fish was reduced during this period.

**Conclusions:** Even though protein intake was considered adequate, in certain locations it was bordering excessive consumption, creating a concern in relation to the high ingestion of fatty meats.

**Key Words:** Changes in eating habits. Meat consumption27/601. Nutrition and Healthy Lifestyle

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#### 27/603. Nutrition and Healthy Lifestyle

### **BMI versus body fat in Belgian children 5-11 years old.**

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**Introduction:** BMI is widely used as an index of fatness in pediatrics and describes growth in terms of total body weight only. Nevertheless, recent technologies can measure body fat more directly.

**Objectives:** To consider the appropriateness of BMI versus fat mass index (FMI) as indicator of body fat.

**Method/Design:** In 481 children between 5 and 11 years old (53% male) weight and height were measured to calculate BMI (weight/height<sup>2</sup>). Body fat percentage (BF%), fat mass (FM) and fat-free mass (FFM) were measured by air-displacement plethysmography (BODPOD®). Fat-free mass index (FFMI=FFM/height<sup>2</sup>) and fat mass index (FMI=FM/height<sup>2</sup>) were calculated to eliminate the influence of stature.

**Results:** Males had a smaller FM, FMI and BF% and a larger FFM and FFMI than females (p<0.01). However, BMI was not significantly different between genders. If BF%, FMI, FFMI and BMI were plotted together stratified by age and gender, a given BMI could embrace a wide range of BF% (e.g. two 5-years-old girls with a BMI of almost 15, but a BF% of 7% versus 25%) and the BF% line

increased with increasing FFMI. FMI and FFMI are not significantly correlated in males and only weakly ( $r=0.29$ ) in females. BF% and FMI showed high correlations in males ( $r=0.97$ ) and females ( $r=0.96$ ) ( $p<0.001$ ). The correlation coefficient between FMI and BMI was 0.75 and 0.89 in males and females respectively, while only 0.59 and 0.78 between BF% and BMI ( $p<0.001$ ).

**Conclusions:** BF% and FMI are analogous indicators of adiposity. However, FMI has the advantage of being less dependent of fat free mass. BMI was not perfectly appropriate as indicator of FMI as (1) the correlation was weaker than between BF% and FMI, (2) a given BMI could embrace a wide range of BF% and (3) boys and girls differed in FMI but not in BMI.

**Key Words:** BMI, body fat, bodpod, fat mass index

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### 27/604. Nutrition and Healthy Lifestyle

#### **Development of a bioassay system to screen for chemicals mimicking the anti-aging effects of calorie restriction**

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**Introduction:** Suppression of the GH/IGF-I pathway in Ames dwarf (DF) mice, and caloric restriction (CR) in normal mice extends lifespan and delays the onset of age-related disorders. In combination, these interventions have an additive effect on lifespan in Ames DF mice.

**Objectives:** In this study, we tried to identify the signaling mechanism and develop a system to assess pro-longevity status in cells and mice.

**Method/Design:** We previously identified genes up-regulated in the liver of DF and CR mice by DNA microarray analysis. Motif analysis of the upstream sequences of those genes revealed four major consensus sequence motifs.

**Results:** One of the synthesized sequences bound to HNF-4 $\alpha$ , an important transcription factor involved in liver metabolism. Furthermore, using this sequence information, we developed a highly sensitive bioassay to identify chemicals mimicking the anti-aging effects of CR. When the reporter construct, containing an element upstream of a secreted alkaline phosphatase (SEAP) gene, was co-transfected with HNF-4 and its regulator PGC-1, SEAP activity was increased compared with untransfected controls. Moreover, transient transgenic mice established using this construct showed increased SEAP activity in CR mice compared with AL fed mice.

**Conclusions:** These data suggest that because of its rapidity, ease of use, and specificity, our bioassay will be more useful than the systems currently employed to screen for CR mimetics, which mimic the beneficial effects of CR. Our system will be particularly useful for high-throughput screening of natural and synthetic candidate molecules.

**Key Words:** anti-aging, calorie restriction mimetics, phytochemical screening, bioassay

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### 27/609. Nutrition and Healthy Lifestyle

#### **Hypermetabolism and metabolic inflexibility in hiv-infected patients with lipodystrophy**

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**Introduction:** Metabolic inflexibility is characterized by the absence of increased fat oxidation in skeletal muscle during fasting conditions and by impaired ability to switch from fat to carbohydrate oxidation in response to insulin. There is increasing evidence that insulin resistance and diabetes mellitus type 2 (DM2) are strongly related to disturbances in skeletal muscle lipid metabolism and metabolic inflexibility in the non-HIV-infected population.

**Objectives:** To determine whether substrate oxidation is altered in human HIV lipodystrophy syndrome, we compared energy expenditure and substrate oxidation in 10 HIV-infected men with lipodystrophy syndrome, 22 HIV-infected men without lipodystrophy syndrome and 12 healthy controls.

**Method/Design:** We compared substrate oxidation during fasting and 30 minutes after eucaloric breakfast consumption (300kcal). Energy expenditure and substrate oxidation were assessed by indirect calorimetry and body composition was assessed by dual-energy x-ray absorptiometry.

**Results:** Resting energy expenditure adjusted for lean body mass (LBM) was significantly higher in the HIV-infected group with lipodystrophy compared to healthy controls ( $p = 0.02$ ). Lipid oxidation was lower in men with HIV lipodystrophy compared to healthy controls ( $p = 0.03$ ). Thirty minutes after the consumption of eucaloric breakfast there was a significant increase in carbohydrate oxidation only in HIV+LIPO- and Control groups ( $p < 0.05$ ) and this was not observed in HIV+LIPO+ group.

**Conclusions:** The impaired substrate use observed in HIV-infected men with lipodystrophy demonstrates the existence of metabolic inflexibility and may lead to difficulty in treatment including the dietetic counseling and a worse quality of life in this group.

**Key Words:** HIV-lipodystrophy, metabolic inflexibility, carbohydrate oxidation, energy expenditure

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## 27/610. Nutrition and Healthy Lifestyle

### Assessment of health risk of additives usage in soft drink for population health status in Montenegro

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**Introduction:** Consumption of soft drinks in the world is increasing, especially young people and children consume them.

According to data, in Montenegro 4 litres of juice are consumed per capita, and 30 litres of soft drinks..

**Objectives:** The aim of this study is to determine the risk to health arising from use of additives in soft drinks.

**Method/Design:** Analyses involved 27 samples, different kinds of soft drinks from abroad (France, Slovenia, Serbia, Bosnia...) and from retail trade. In all samples HPLC content of benzoic and sorbic acids and sweeteners were assessed. We also determined the presence of colours by paper chromatography.

**Results:** Benzoic acids content was ranged from 5 to 102.50 mg / l, (average content of 39.00 mg / l), the content of sorbic from 5 to 152.40 mg / l, found in one sample (the average content of 8.9 mg / l). Other samples didn't consist sweeteners. In five samples the presence of the permitted food colours E 110, E102, E122, E131 E 129 was found.

**Conclusions:** Based on these results we can conclude that there is no risk to health from the use of sorbic acids, saccharin and acesulfame K in soft drinks. The realized daily intake of benzoic acids was 0.45% of ADI, which means that there is a risk of the use of preservatives in soft drinks. In five samples colours were found with a allowed amount of limited to 50 mg / l including tartrazine which is considered potentially the most harmful. Determining the amounts of these colours would be necessary to assess the risk of their entry from refreshing soft drinks and other products that contain them

**Key Words:** additives, soft drinks, risk

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## 27/612. Nutrition and Healthy Lifestyle

### Food behavior of students of metropolitan autonomous university-x Mexico

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**Introduction:** In Mexico the signs of an epidemiologic and nutritional transition of university students are numerous. Sociocultural and tradition factors have influence and persist on behavior of students in particular about food. The students conduct is influenced by socioeconomic level fashion or by a certain body image.

**Objectives:** The purpose of this longitudinal study is to identify and describe the food behavior of Metropolitan Autonomous University-X in Mexico.

**Method/Design:** The study was carried out by a transverse descriptive survey by questionnaire applied to a population of 906 students 48.7% male and 51.3% female, aged 18 to 25 during September 2010 to April 2011 including food practices, regularity of meals consumption, place time, preferred meals and snacking.

**Results:** Data input was: meal consumption breakfast miss out at home 43.5%; breakfast at University 22.4%; lunch at University 89.3%; diner at home or with friends 65%. Food preference: tortillas 75.5%; bread 24.5% rice 41.1%, pasta 23.3% beans 85.9%; vegetables 15.3%; fruits 63.5%; meat or chicken 48%; fish 16.3%. Snacks: sweets 65%; biscuits 54.7%; seeds 32.6%, chips 62.8%. Cultural consumption: tamales 87%; tortas 75%; tacos 95.6%. Café: 81.3%; drinks 63.7%.

**Conclusions:** In conclusion, students behavior are related to sex, age and socioeconomic level, food is characterized by strong consumption of starch products, low fuel intake of vegetables and fruits, consumption of meats products are related with socioeconomic level. Break-fast is the meal more neglected, high snacking with strong contents of carbohydrates and lipids. Programs of nutrition education must be developed at the University.

**Key Words:** Food behavior, nutrition, food tradition, socioeconomic.

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## 27/613. Nutrition and Healthy Lifestyle

### Plenifar IV: nutritional education in the preconception phase, pregnancy and breastfeeding

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**Introduction:** Due to the importance of the mothers' diets in the future development of their children, the General Council of Official Associations of Pharmacists carried out an epidemiological study, the Plenifar IV: Nutritional Education in the Preconception Phase, Pregnancy and Breastfeeding, between November 2009 and February 2010.

**Objectives:** To evaluate the nutritional condition of the women who are in these situations, preventing or detecting possible nutritional deficiencies that could appear and any dietary mistakes that they might make.

**Method/Design:** The 2,800 participating pharmacists performed a series of anonymous surveys on women who were actively seeking a child, who were pregnant or breastfeeding mothers (children from 0-12 months). A series of specific surveys were prepared for each of the situations that included a total of 45 questions, grouped into 6 sec-

tions: general information, obstetric information, information about breastfeeding, habits, physiopathologic condition of the mother and the mothers' eating habits. Each participating pharmacist had to fill in a total of 10 surveys. Once the data collection period had finished, 13,845 valid surveys were received.

**Results:** Spanish women preferred to breastfeed their babies. Therefore, over 75% of the women in the preconception phase or who were pregnant thought they would only breastfeed their children, whilst amongst the breastfeeding women, 63.4% only breastfed their children. A high awareness about harmful habits during pregnancy was also observed. Smoking dropped considerably, as well as the occasional consumption of alcohol. The women followed the normal recommendations of eating several portions of fruit, vegetables, dairy products and cereals every day, as well as eating meat, fish, eggs and pulses on a weekly basis.

**Conclusions:** The information collected by the pharmacists about nutrition for the women in these phases, may help to establish healthy eating habits that have a positive effect on the health of their children.

**Key Words:** Plenufar, Pregnancy, Preconception, Breastfeeding, Pharmacies.

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### 27/615. Nutrition and Healthy Lifestyle **Nutritional quality of the school-day breakfast in Irish children (5-12y)**

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**Introduction:** It is widely accepted that breakfast consumption is important for nutritional well-being in children. With an increase in overweight and obesity among children in Europe and an expected increase in many chronic diseases, schools have been identified as a priority setting for nutrition education and intervention.

**Objectives:** To examine the nutritional quality of the school-day breakfast in Irish children and to investigate its contribution to the overall school-day diet.

**Method/Design:** A dataset of food and drink consumption on school-days (n=2437) was established using data from The National Children's Food Survey (2003-2004) in Ireland. Food intake data were collected using a weighed food record. Nutrient intakes were estimated using WISP© based on McCance and Widdowson's The Composition of Foods, 6th Edition and The Irish Food Composition database. Breakfast was defined as 'any food or beverage consumed before school'.

**Results:** Breakfast was consumed by 98% of children with an uptake of 93% of potential breakfast occasions. The mean energy intake at breakfast was 1112KJ contributing 16% to mean daily energy intake. Breakfast was found to be low in fat (26% total energy) and high in carbohydrate (60% total energy). Relative to energy, breakfast contributed a greater proportion to mean daily intakes (MDIs) of carbohydrate, starch, total and added sugars, dietary fibre, iron, phospho-

rous, calcium, total niacin equivalents, folate and the other B vitamins. Conversely, the contribution of breakfast to MDIs of protein, total fat, saturated fat and vitamins A, D and E was proportionally lower.

**Conclusions:** Breakfast was widely consumed among Irish children on school-days. It was typically a low fat nutrient-dense meal contributing significantly to mean daily intakes of carbohydrate, dietary fibre and a range of micronutrients.

**Key Words:** Breakfast Children School Dietary Quality Food Surveys

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### 27/616. Nutrition and Healthy Lifestyle **Classification of free-living populations differ by calculation method of Dietary Energy Density**

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College Cork. Republic of Ireland.

**Introduction:** Dietary Energy Density (DED) has been associated with increased energy intake and weight-gain. DED is defined as the amount of available dietary energy per unit of weight (kJ/g). It is highly dependent on the amount of water in the diet and the inclusion of beverages has a lowering effect on the final result of DED. There is no agreed way to calculate DED and there is currently much debate on the best approach.

**Objectives:** To examine the sensitivity and specificity of five methods of calculating DED in classifying a free-living population, into low, medium and high DED categories, using one of the methods, food only, as a reference method.

**Method/Design:** A 4-day food record was used to collect food intake data from 1500 adults (18+ years) in the Irish National Adult Nutrition Survey (2011). Analysis of dietary intake data was carried out using WISP© (Tinuviel Software, Anglesey, UK) which contains data from McCance and Widdowson's The Composition of Foods, 6th Edition and The Irish Food Composition Database. DED was calculated using five methods of calculation: food only; food and beverages excluding water; food and beverages >21kJ/100g; food and alcoholic beverages; all food and beverages. Crosstabulation and a Kappa Measure of Agreement were used to examine the sensitivity and specificity of the different methods of calculation in comparison to the reference method.

**Results:** The different methods of calculation showed no consistency in assigning participants to either the low, medium or high energy density categories. Kappa values ranged from 0.28 to 0.37 between the different methods (p<0.001).

**Conclusions:** Calculation methods for DED are not interchangeable as very different classifications are found with different methods. Methods of calculation of DED should therefore be clearly defined by researchers and care should be taken when making comparisons.

**Key Words:** Energy density, methodology, free-living, adults



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27/619. Nutrition and Healthy Lifestyle

**Sedentary behaviours and inflammatory status in children and adolescents.**

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**Introduction:** Sedentary behaviours and screen time are not only related with the degree of obesity but also with inflammation.

**Objectives:** To assess the relationship between inflammatory proteins and sedentary behaviours, specially screen time.

**Method/Design:** 138 subjects (62 males and 76 females) aged 3.6 to 15.3 were studied. According to Cole criteria 55 out of them were classified as normal weight, 29 as overweight and 54 as obese. Weight and height were measured, and body mass index (BMI) was calculated. A validated questionnaire about sedentary behaviours was used to assess lifestyle patterns. The inflammatory parameters studied were: C-reactive protein (CRP), total-plasminogen activator inhibitor 1(tPAI1), active-plasminogen activator inhibitor (aPAI), interleukin 6 (IL6), resistin and hepatocyte growth factor (HGF).

**Results:** We observed significant inverse correlations between sleep hours during weekdays and weight, BMI, waist circumference, blood pressure (systolic and diastolic)( $p < 0.001$ ) and screen time. Also, correlations between sleep hours during weekdays and moderate physical activity were found. Weight and BMI were related with screen time and cellular phone use and these patterns inversely related with light and moderate physical activity ( $p < 0.001$ ). After adjusting by BMI, children who watch more TV hours during weekdays had higher mean values of resistin ( $p < 0.05$ ), aPAI ( $p < 0.001$ ) and tPAI( $p < 0.001$ ); children using more videogames, computer and cellular phone, during week days, were also higher related with mean values of aPAI ( $p < 0.001$ ) and tPAI ( $p < 0.001$ ).

**Conclusions:** These results suggest that sedentary patterns are related with some inflammation markers, all of them considered indicators of coronary risk.

**Key Words:** Sedentary, Inflammation, Children, Adolescents.

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27/620. Nutrition and Healthy Lifestyle

**Dietary patterns influencing dietary fibre intake of Irish adults aged 18-64 years**

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**Introduction:** Inadequate dietary fibre (DF) intakes can put one at risk of impaired bowel function and constipation. There is a high prevalence of inadequate dietary fibre intake among Irish adults, with 81% having inadequate intakes.

**Objectives:** To investigate the dietary patterns influencing dietary fibre intake in Irish adults.

**Method/Design:** The National Adult Nutrition Survey database was used for the analysis, which contains dietary intake data from a representative sample of Irish adults aged 18-64 years ( $n = 1274$ ). Data were collected using a 4-day semi-weighed food diary and entered into WISP©, which is based on McCance and Widdowson's The Composition of Foods 6th edition and the Irish food composition database. Subjects were stratified by age-group and gender and DF intake was split by tertiles, giving low, medium and high DF consumers.

**Results:** DF intake was 12g/d in low DF consumers and 28g/d in high DF consumers. High DF consumers (30g/10MJ food energy) had more fibre-dense diets than low DF consumers (19g/10MJ food energy). Wholemeal/brown breads (24%), fruit (19%), ready-to-eat breakfast cereals (16%) and vegetables (14%) together accounted for over 70% of the difference in DF intake between low and high DF consumers. Compared to low consumers, among high DF consumers there was a higher % consumers and greater frequency of intake of all four food groups and a greater mean intake per eating occasion of wholemeal/brown bread, ready-to-eat breakfast cereals and vegetables.

**Conclusions:** Over 70% of the difference in DF intakes between low and high DF consumers is attributable to differences in the patterns of intake of wholemeal/brown breads, fruit, ready-to-eat breakfast cereals and vegetables. This research may be useful in developing strategies for increasing DF intake in Irish adults and for the development of food-based dietary guidelines.

**Key Words:** Dietary Fibre, Adults, Consumption Patterns, Dietary Guidelines, Food Diary

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27/621. Nutrition and Healthy Lifestyle

**Contribution of ready-to-eat breakfast cereals to nutrient intakes in Irish teenagers aged 13-17 years.**

*E. Walsh; E. Hannon; J. Walton; A. Flynn.*

School of Food and Nutritional Sciences. University College Cork.

**Introduction:** Breakfast cereals are generally high in carbohydrate, low in fat and some are high in fibre. Many also contain

substantial amounts of essential vitamins and minerals. Ready-to-eat breakfast cereals (RTEBC) are a popular choice for both breakfast and snacks throughout the day and an association between RTEBC consumption and displacement of food energy from fat with energy from carbohydrate has been shown.

**Objectives:** The objective of the present study was to estimate the contribution of RTEBC to macro- and micronutrient intakes in Irish teenagers.

**Method/Design:** A 7-day food record was used to collect food intake-data from 441 teenagers (224 males, 217 females) in the National Teen Food Survey. Analysis of dietary intake data was carried out using WISP© (Tinuviel Software, Llanfechell, Anglesey, UK) which contains data from McCance and Widdowson's The Composition of Foods, 6th Edition and The Irish Food Composition Database.

**Results:** A large proportion (81%) of Irish teenagers consumed a RTEBC over the recording period. In relation to their percentage contribution to mean daily intakes (MDI) of energy, RTEBC contributed lower percentages to MDI of protein, total fat and saturated fat, higher percentages of MDI of total carbohydrate and starch and a similar percentage of MDI of total sugars. RTEBC contributed to significant percentages (13%-26%) of MDI of iron, folate, vitamins B1, B2, B6 and niacin.

**Conclusions:** RTEBC contributed significantly to carbohydrate and starch intakes compared to their contribution to total energy. In addition to this, RTEBC contribute substantially to MDI of many micronutrients, particularly for iron, folate, niacin and vitamins B1, B2, B6 and B12.

**Key Words:** Nutrient Intakes Adolescents Breakfast Cereal

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## 27/625. Nutrition and Healthy Lifestyle

### The effect of family socio-economic status on dietary intake in adolescents in Morocco

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**Introduction:** Previous studies have shown that family socio-economic status (FSES) in developed countries is associated with optimal dietary intake in adolescents, but evidence is scarce on the situation in developing countries like Morocco

**Objectives:** The study's objective was to examine the influence of FSES on dietary intake in samples of Moroccan adolescents

**Method/Design:** Family socio-economic data were collected in a cross-sectional study of 293 adolescents living in the Ouarzazate municipality and the nearby rural town of Tarmigt, in southern Morocco. Dietary intake was estimated from the analysis of three dietary

logbooks per adolescent using the DIAL programme. Multilevel analysis compared the mean usual intakes of energy, energy from carbohydrates, proteins, fat, fatty acids and cholesterol in adolescents of disadvantaged and advantaged FSES

**Results:** Independently of sex, there was no significant difference in total energy intake between the advantaged and disadvantaged socioeconomic groups. The findings were similar for absolute and relative protein intake. However, absolute and relative intake of total carbohydrates and total lipids differed significantly depending on socioeconomic status. On one hand, absolute and relative intakes of total carbohydrates, and in particular complex carbohydrates (starch and fibre) were higher in pupils from disadvantaged households. Absolute and relative intake of simple carbohydrates did not differ between the two groups. On the other hand, absolute and relative intake of total lipids (saturated fatty acids, mono and polyunsaturated fatty acids) and cholesterol are significantly associated with better family socioeconomic conditions. This association is particularly marked by an increase in absolute intake of saturated, monounsaturated and polyunsaturated fatty acids and cholesterol in the advantaged households

**Conclusions:** Our results suggest that in this population of Moroccan adolescents, nutrition intervention and education strategies to promote healthy eating habits must take into account the socioeconomic status of the families of the adolescents

**Key Words:** Dietary Intakes, Adolescents, Ouarzazate, Morocco

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## 27/627. Nutrition and Healthy Lifestyle

### Low-to-moderate levels of overweight predict the incidence of cardiovascular events: The Spanish SUN cohort

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**Introduction:** Cardiovascular disease (CVD) is the leading cause of death and morbidity in industrialized countries.

The proportion of cardiovascular events burden attributable to overweight/obesity in Spain has been extrapolated from studies conducted in other countries.

**Objectives:** The aim of our study was to estimate the association between to the increment of body mass index (BMI) (Kg/m<sup>2</sup>) within levels usually considered as "normal" and CVD using a Spanish cohort of university graduates (the SUN project).

**Method/Design:** The SUN cohort followed-up prospectively 15550 Spanish men and women, all of them university graduates. Information was gathered at baseline with a previously validated 136-item semi-quantitative food frequency questionnaire. New cases of cardiovascular events were diagnosed by physicians or death cases by mailed questionnaires completed by their families.

**Results:** The SUN cohort is a young cohort with low average BMI (mean=23.6, SD=3.5), and a mean age of 38.6 years. After a median follow-up of 6.3 years we observed 74 cases of major cardiovascular disease (coronary heart disease or stroke). We built roughly quintiles of BMI (quintile 1: <20.5, quintile 2: 20.5 to 22.2, quintile 3: 22.3 to 24.0, quintile 4: 24.1 to 26.3 and quintile 5: >26.3) and the OR for each increase in successive quintiles of BMI from the lowest to the highest was 1.34 (95% CI 1.02-1.75) with a significant monotonic linear trend ( $p=0.03$ ), after adjusting for sex, age, hypercholesterolemia, hypertension and smoking.

**Conclusions:** An increase in successive quintiles of BMI within levels usually considered as "normal" is associated with a higher risk of CVD.

**Key Words:** cardiovascular disease, body mass index, overweight

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#### 27/631. Nutrition and Healthy Lifestyle

### **Cytotoxic effect, antioxidant activity and total phenolic compounds of rutabaga (*Brassica napus v. napobrassica*) seeds, sprouts and bulbs**

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**Introduction:** Nutritional and medicinal properties of rutabaga (*Brassica napus* var. *napobrassica*) are being under intensive research now. Recently a lot of attention is paid to sprouts, which have a really high and unique content of bioactive compounds. Unfortunately rutabaga sprouts have not been known and applied in nutrition yet.

**Objectives:** This study investigated the total phenolic compounds content in seeds, sprouts and bulb extracts of rutabaga as well as antioxidant activity of each particular feature. We also focused on evaluation if rutabaga may have any cytotoxic effect to cells. The additional aim of investigation was to learn if kinetic changes of sprouts breeding influence and enhance their activities.

**Method/Design:** Antioxidant activity of each particular feature of rutabaga was provided using two independent methods (FRAP, DPPH). Total content of phenolic compounds and flavonoids were estimated using spectrophotometric method. Cell culture – based assay (MTT test) was carried out to evaluate and exclude any toxic effects of particular extracts. In this study cytotoxic activity of methanolic and methanol-aceton extracts were investigated in human cell line Hep G2.

**Results:** Results obtained in experiments indicated that the highest antioxidant activity was presented in seeds and sprouts while in the older sprouts the activity significantly decreased. We have found out that breeding of sprouts in darkness led to obtain more effective extracts. The most interesting and promising observation was cyto-

protective effect of rutabaga sprouts and seeds in hepatocellular cell line.

**Conclusions:** Promoting the healthy dietary choices in human population is the best way to prevent diseases. The easiest natural method to improve immunity, metabolism and enhance overall health is to increase and rationalize consumption of vegetables. Therefore, apart from identification of healthy properties of rutabaga seeds, bulbs and especially sprouts, presented finding may help to promote the new applications of these "old" vegetables.

**Key Words:** rutabaga, sprouts, cytoprotective effect, antioxidant activity

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#### 27/632. Nutrition and Healthy Lifestyle

### **Effect of a program of cardiac rehabilitation on the levels of C-reactive protein**

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**Introduction:** The programs of cardiac rehabilitation are structured programs of education and activity guided toward lifestyle modification, increasing functional capabilities, and they suppose an innovation in the field of the prevention of cardiovascular diseases.

**Objectives:** The programs of cardiac rehabilitation are structured programs of education and activity guided toward lifestyle modification, increasing functional capabilities, and they suppose an innovation in the field of the prevention of cardiovascular diseases.

**Method/Design:** All the subjects suffered a cardiovascular event previously. 78 were following a program of cardiac rehabilitation and 39 were not. Samples of blood were extracted to determine the plasma CRP with a CRP-Turbidimetric commercial kit. Student's t test for independent samples was used to determine significant differences between groups, using the SPSS software version 15.0.

**Results:** A significant relation ( $P < 0.01$ ) between CRP levels and the accomplishment or not of the program of cardiac rehabilitation was found. The cardiovascular risk of the patients who followed the program were: very low (58.97 %), low (34.71 %), medium (6.41 %). Whereas the patients who did not follow up this program were: very low (56.41 %), low (30.76 %), medium (10.25 %) and high (2.56 %).

**Conclusions:** The accomplishment of a program of cardiac rehabilitation it is directly related with CRP levels, indicating that it is effective diminishing the inflammation, the progress of the atheroma plaque and the cardiovascular risk.

**Key Words:** cardiovascular disease, program of cardiac rehabilitation, C-reactive protein (CRP)

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**27/633.** Nutrition and Healthy Lifestyle

**Positive effect of a program of cardiac rehabilitation on some parameters of lipidic metabolism**

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**Introduction:** Following healthy lifestyle habits it is possible to improve the metabolic control of plasmatic lipids correlated and associated to cardiovascular pathology (Covas et al., 2006). An interesting innovation in the prevention of cardiovascular diseases is the implantation of programs of cardiac rehabilitation.

**Objectives:** To study the efficiency of a program of cardiac rehabilitation in recovery of patients who have previously suffered a cardiovascular event, by means of the assessment of some parameters related to the lipid metabolism.

**Method/Design:** In the current study took part 152 subjects who have suffered a cardiovascular event and were divided in 2 groups, as they were following or not a program of cardiac rehabilitation. Blood samples were taken to determine using commercial kits, total cholesterol, HDL-cholesterol, LDL-cholesterol and plasmatic triglycerides. Student's t test for independent samples was used to determine significant differences between groups, using the SPSS software version 15.0, (2008).

**Results:** There was a significant decrease in the triglycerides ( $P < 0.001$ ) and total cholesterol ( $P < 0.05$ ) and an increase in HDL-cholesterol ( $P < 0.01$ ) in the subjects that followed the program of cardiac rehabilitation, with regard to those who were not following the program. However, no differences were found in LDL-cholesterol.

**Conclusions:** The current results indicate that the programs of cardiac rehabilitation improve the lipidic profile and, therefore, they diminish the risk of suffering another cardiac event.

**Key Words:** Cardiovascular disease, program of cardiac rehabilitation, lipid metabolism

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**27/638.** Nutrition and Healthy Lifestyle

**Dietary inclusion of marine oily fish reduces cardiovascular disease risk markers in dyslipidemic Chinese women**

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**Introduction:** The beneficial effects of consuming oily fish in CVD prevention has been verified by a number of studies in western

countries, however, dietary intervention study for cardioprotective effects of oily fish is scarce in China. Meanwhile, the comparison of the beneficial effects of oily fish between different fish species has poorly been reported yet.

**Objectives:** This study was aimed to examine and compare the effects of Norwegian salmon, herring and local farmed pompano (*Trachinotus Ovatus*) as oily fish on CVD risk markers when included in Chinese diet.

**Method/Design:** In this 8-week parallel-arm, randomized intervention study, 126 Chinese women with hypertriglyceridemia, aged 35-70 y, were assigned to four groups to consume experimental lunch with 80 gram fillets of either one of three oily fish or daily meats (pork/chicken/beef/lean fish) for 5 days per week.

**Results:** The results showed that the inclusion of three oily fish significantly elevated the intake of n-3 LCPUFA while decreased dietary n-6/n-3 PUFA ratio. After 8-week intervention, three oily fish diets significantly elevated EPA plus DHA contents and decreased n-6/n-3 PUFA ratio in plasma CPG, and also significantly decreased serum concentrations of TAG, apo B, apo CII and CIII. Salmon and herring diets, but not pompano diet, significantly lowered TNF- $\alpha$  and raised adiponectin concentrations in serum. Salmon diet additionally decreased serum concentration of interleukin-6. There were no effects of oily fish diets on glucose and insulin sensitivity.

**Conclusions:** Dietary inclusion of salmon, herring and pompano as oily fish can effectively increase serum n-3 LCPUFA content and impose favourable biochemical changes in dyslipidemic middle-aged and elderly Chinese women, and these beneficial effects are mainly associated with the n-3 LCPUFA contents of these oily fish, ranging from high to low as salmon, herring and pompano in the present study.

**Key Words,** Dietary Intervention Study, Oily Fish, N-3 Fatty Acids, Cardiovascular Disease Biomarker, Women

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**27/640.** Nutrition and Healthy Lifestyle

**Dietary patterns in children and adolescents in Basque Country, Spain.**

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**Introduction:** In recent years there has been increasing interest in the identification of dietary patterns. Knowledge of food patterns is important for the identification groups at risk.

**Objectives:** The aim is to identify dietary patterns in children and adolescents living in Basque Country, Spain and analyse their association with several factors.

**Method/Design:** Cross-sectional analysis of baseline data of the

Nutrition Survey carried out in the Basque Country in 2004-2005.

#### Subjects and methods

The population comprised child and adolescent from Basque Country. The analysis was carried out in a random sample 1178 people aged 4-18-years, response rate of 78%. Diet was assessed using 2d 24 hour recalls with the Epic-soft programme adapted for use in this population. Dietary patterns were derived by applying principal components (PC) and cluster (CA) analyses in two age group, children 4 to 11y and adolescents 12 to 18y-old

**Results:** Five and six patterns accounting for 46% and 53% of dietary variation were identified in children and adolescents respectively. In both group three similar patterns have been identified and labelled as "sandwich", Mediterranean-like", milk-sweet or milk-breakfast cereals. A 50% of children and adolescents were clustered as following a diet characterised by significantly higher intakes of meat and meat products, bread milk and sweets; and low intake and fruit an vegetables.

**Conclusions:** Different dietary patterns have been identified, dietary patterns with a higher intake in processed meats, bread and sugar-biscuits have identified in both groups and the percentage permanence of pattern increase in adolescents. These results should be useful to development of promotion polices of healthy dietary habit

**Key Words:** Dietary Patterns, Principal Components

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#### 27/644. Nutrition and Healthy Lifestyle

### Lipid metabolism and habits in a group of teachers from the University of Granada

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**Introduction:** The community of university teachers because of his work, mostly sedentary and stressful as a result of carrying out both teaching and research activity, tend to affect the type of food, as well as the possibility of combining her professional life with physical activities. This could leads to an increased risk of cardiovascular diseases.

**Objectives:** To evaluate, in the community of teachers of the Faculty of Pharmacy, University of Granada, lipid status and the relationship between food habits and physical exercise.

**Method/Design:** The study was conducted in a community of professors from the University of Granada, aged between 30 and 65 years who has been assessed nutritional status by lipid metabolism related parameters (total cholesterol, LDL cholesterol, HDL cholesterol and triglycerides) and anthropometric parameters (body mass index, BMI). Likewise, a survey of food consumption frequency during the past year. Information obtained was tabulated and analyzed using SPSS 17.0 and the food intake values were converted into nutrient intake and fitness, thanks to Nutriber® software. The results were

compared with the WHO International Standard.

**Results:** The population studied has an average body mass index within the reference values (mean of 22.8, reference values from 18.5 to 25), as well as with biochemical parameters total cholesterol 182.2; LDL cholesterol 117.4; HDL cholesterol 61.5 and triglycerides 92.2. According to the nutritional study the most of the population follows the Mediterranean diet based on olive oil consumption and non-fatty fish rich in Omega-3.

**Conclusions:** The data obtained show that despite the work of the study population is sedentary and have little time for physical activities, lipid nutritional status is adequate. This is because of this population is located in a geographical location that follow the Mediterranean diet.

**Key Words:** Lipid metabolism, healthy population adult.

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#### 27/645. Nutrition and Healthy Lifestyle

### Dietary patterns of elderly living alone in 15 European countries. Comparative analysis of DAFNE-ANEMOS data

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**Introduction:** The number of elderly living alone has dramatically increased. Older individuals living alone may be vulnerable to poverty, social isolation, inadequate dietary intake and adverse health outcomes.

**Objectives:** To evaluate the effect of living alone in the food choices that elders make.

**Method/Design:** Data collected in nationally representative household budget surveys undertaken between 2002 and 2007 in 15 countries, covering Central, Eastern and South Europe, including the Balkan and Baltic region. Data were analysed in the EU-supported Data Food Networking (DAFNE) and Expansion and update of existing nutrition monitoring systems (ANEMOS) projects. The mean individual daily food availability was estimated for individuals aged 75 years and more, who live alone. Disparities according to the household's locality were also evaluated.

**Results:** Food availability in single elderly households is generally adequate and frequently higher than population mean intakes, reflecting either less eating out or the elders' tendency to accumulate foods. It is, however, the qualitative elements of their choices that are interesting. Compared to women, older men living alone generally consume more alcohol, animal lipids, dairies, meat products, but not red meat. Women prefer more poultry and olive oil, even in countries where olive oil is not largely consumed. Older individuals generally purchase smaller quantities of fresh vegetables and fruits compared

to younger ones. No gender differences were observed in relation to fresh fruit availability, but older men living alone acquire substantially less fresh vegetables than women reflecting probably limited cooking skills. Older individuals living in big cities report healthier food choices, indicating either better nutrition knowledge or access to larger food varieties.

**Conclusions:** The food choices of older Europeans living alone are adequate in terms of quantity, but need improvement in terms of quality. Older males, particularly in rural areas, report a significant consumption of saturated fat sources and alcohol.

**Key Words:** elderly, diet, household budget surveys

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### 27/653. Nutrition and Healthy Lifestyle

#### **Importance of sweets in the average pole diet - analysis based on quantitative data**

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**Introduction:** In Poland, in comparison with other European countries the level of confectionary products consumption varies at a lower level - 4 kg / person / year (Andrews, 2009). Nutritionists are reporting that over the last several years have changed the habits and preferences associated with the consumption of sweets (Jezewska-Zychowicz et al., 2011), which is one of the causes of modern diseases of civilization (Rivlin, 2007, Berg et al., 2008; Suliga, 2010).

**Objectives:** The aim of the study was the respondents' opinion of confectionary products consumed by the Poles with particular emphasis on the level, frequency and causes of their consumption on the background of the views of respondents about the influence of sweets on the health and functioning human being.

**Method/Design:** The experimental material were the results of the quantitative research conducted in 2010 on a sample of 1,000 consumers forming a representative group of Polish citizens above 18 years of age. In the analysis of empirical material to describe the structure of the population and individual variables used in analysis of frequency and cross tables, comparing data Chi2 test was used.

**Results:** An analysis of empirical material allowed the conclusions that the most common types of sweets were consumed cakes (average 3.75), wafers (average 3.65), milk chocolate (average 3.60) and bars (average 3.57). Rarely eaten bitter chocolate. Almost 40% of respondents consumed sweets at social gatherings.

Almost two fifths of respondents were aware that excessive consumption of sweets may have a negative impact on health and lead to weight gain (74.2%), and dental caries (51.0%).

**Conclusions:** Although it's still a significant consumers of sweets do not intend in future to reduce their level of consumption due to the fact that they are products of man yield benefits, such as associated with obtaining a better level of well-being.

**Key Words:** Confectionary Products, Level Of Consumption, Consumer Preferences, Health Effects

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### 27/658. Nutrition and Healthy Lifestyle

#### **Eating disorder risk according to the immigrant status in Spanish adolescents: the afinos study**

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**Introduction:** Eating disorders (ED) are important public health concerns in adolescence. A variety of biological, psychological and social factors may play a key role on ED development. Thus, certain situations such as immigration can lead to stress, especially in teenagers

**Objectives:** To evaluate the influence of immigrant status and duration of residence in the host country on the risk of developing ED (EDR) in adolescents living in Spain.

**Method/Design:** This study used a representative sample of 2086 adolescents (1069 females), aged 13 to 17 years, from the Madrid region, and who participated in the AFINOS Study. EDR was evaluated using the SCOFF questionnaire. The country of birth and duration in the host country was self-reported. Adolescents were classified into two groups (Spanish or immigrants) for the first analysis and then, immigrants were also divided into two groups according to the number of years of residence in Spain (more or less than 6 years).

**Results:** Around 25% adolescents from the whole sample were at EDR (17.5% vs. 31.6% for males and females, respectively;  $p < 0.001$ ). EDR was higher in the immigrant group (OR=1.39, CI= 1.08-1.79;  $p < 0.05$ ) compared with Spanish adolescents. A significant association was found between immigrant status and EDR in females (OR=1.69, CI= 1.23-2.32;  $p < 0.01$ ), but not in males. Additional analyses showed that immigrant females with a lower residence in Spain than 6 years had a significantly higher EDR (OR=2.08, CI=1.39-3.09;  $p < 0.001$ ) than Spanish females, whereas the group of immigrant females who had lived in Spain for more than 6 years was not associated with EDR. There were no significant associations between duration of residence and EDR in males.

**Conclusions:** The stress experienced by immigrant females faced with the adaptation to the host country might increase the possibility of developing ED, but only during the first years.

**Key Words:** Eating Disorders, Adolescents, Immigration

**Preliminary results of the assessment of nutritional assessment in a group of teen athletes performing table tennis**

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**Introduction:** Nutrition research in the athlete is a relatively new area of study that involves the application of nutritional principles to improve the performance. To date, the nutrition applied to the exercise tends to specialize, therefore depending on the final aims of the sport performed, emphasizes in the intake of different food sources. In spite of the advances registered in the field of the sports nutrition and the importance that a suitable nourishment has to improve the physical performance, the athletes forget oftenly to include the planning of an ideal diet within their training routines, as global strategy of preparation for the sports performance.

**Objectives:** The aim of the current study consisted of the accomplishment of a nutritional valuation to teenager athletes included in the sample of study, identifying the energetic needs of these athletes, and to correct possible deficiencies, improving their sports performance.

**Method/Design:** Population sample: 15 teenager athletes performing table tennis (12-18 years) included within the program of athletes in school age. Nutritional evaluation: a food frequency questionnaire of three non-consecutive days (being one of them part of weekend) was supplied. Data were processed with the NUTRIBER software. To calculate the energetic consumption, metabolic equivalents (METs) were used. Statistical analysis: SPSS version 18.0, 2009 has been used for data treatment, performing an ANOVA test.

**Results:** In the majority of athletes the intake of macronutrients are unbalanced, especially the carbohydrates that are of great importance as principal energetic source in the physical activity performance.

**Conclusions:** The preliminary results obtained in this study allow us to conclude that there would be necessary a program of nutritional education to satisfy the energetic needs derived from this stage of rapid growth and the physical activity performance.

**Key Words:** Nutritional status of athletes, macronutrients deficiency, dietary intakes, energy balance.

**Sugar composition of melon varieties. Differences between modern hybrids and old landraces**

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**Introduction:** Melons (*Cucumis melo* L.) are becoming the most consumed fruits around the world, with Mediterranean Europe showing high geographic, agricultural, and cultural diversity. Spain is a secondary centre for melon diversity, where commercial melon production is ~1.142 mil tons/year (~4% world). Many cultivars have been consumed traditionally but recently they have been substituted by few commercial varieties. Many studies show the healthy benefits of traditional Mediterranean diet, focused in food composition and diversity. But the impact of varietal substitution and crop genetic erosion has not yet been tackled.

**Objectives:** Sugar content and composition of 55 melon Spanish landraces have been compared with 2 melon varieties widely distributed nowadays at Spanish markets. Sweetness perception, tested by a trained panel, and consumers' preference are also discussed.

**Method/Design:** The 57 melon varieties were cultivated together, open-air, in a experimental station at Madrid. Determination of sucrose, D-glucose and D-fructose in melon juices was carried out by an UV method using an enzymatic kit (ref. 10716260035 r-Biopharm). Sensory analysis has been carried out by means of descriptive profiling by a trained panel, using a methodology developed by our group. Varietal acceptance was tested in 46 melon consumers.

**Results:** Landraces showed an average of 12.07 g total sugars /100gr FW (49% sucrose, 39% glucose, 12% fructose). However total sugars content ranged widely (from 5,85 to 18,66 g/100g). Also the ratios between simple sugars differed among varieties. Quantity and quality of sugars have a direct correlation to sweetness perception and also to sensory global appreciation.

**Conclusions:** The Mediterranean diet is based in a great diversity of products but also in a great variability into them. The global tendency to food homogenization could cause the lost of many sugar profiles, interesting for different necessities and preferences.

**Key Words:** *Cucumis melo*, sucrose, glucose, fructose

**Socio-demographic factors and consumption frequency in full-service restaurants in Brazil.**

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**Introduction:** Results from recent surveys made in Brazil highlight the growth in the number of out-of-home meals. Full service-type restaurants comprise one of the preferred places to eat out, which reveals the importance of identifying the profile of the consumer going to this type of establishment.

**Objectives:** The goal in this study was to examine associations between the consumption frequency in full service restaurants and socio-demographic factors.

**Method/Design:** Throughout January and February 2011, 271 consumers older than 18 years were interviewed in shopping malls in Campinas, considered a major urban center from the southeast Brazil. Using a questionnaire, information on the consumption frequency, for the previous three months, in full service restaurants was gathered, as well as socio-demographic ones (age, gender, education level and family income). Chi-square tests ( $p < 0.05$ ) were performed.

**Results:** For the populational group under scrutiny, 44.7% (approximately 39% among men and 49% among women) used to go to full service restaurants three times a month maximum, and 55.3% (approximately 61% among men and 51% among women) revealed to have chosen this type of establishment on a weekly basis: 24.7% between 1 and 2 times, 12.5% between 3 and 4 times and 18.1% minimum 5 times a week. The consumption frequency in full service restaurants was shown to be inversely proportional to age ( $p = 0.02$ ): while 62% of younger individuals (up to 29 years of age) visited full service restaurants on a weekly basis, among the older ones ( $\geq 45$  years) the proportion reached 42%. There were no significant differences when we considered the frequency in full service restaurants and the gender, education level and family income variables.

**Conclusions:** The restaurant consumer profile analysis may subsidize strategies for the food services sector development.

**Key Words:** Consumer, Frequency, Restaurant, Behavior

**Perception of Brazilian consumers regarding risks and benefits of eating raw vegetables out of home.**

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**Introduction:** The Brazilian population's diet is characterized, among other aspects, by the short intake of vegetables and by the increase in the number of meals taken out of home. The adhesion to restaurants may represent an opportunity for including a range of vegetables in their diet.

**Objectives:** The current study, with qualitative and exploratory nature, sought to get to know the perception of consumers in Campinas, Brazil, about the risks and benefits of eating raw vegetables out of home.

**Method/Design:** Two focus group sessions were conducted in the presence of a moderator, involving a total of twelve individuals, following a previously created interview guidelines. Both sessions were recorded and transcribed.

**Results:** Six types of risks were identified, to which consumers feel exposed when eating vegetables out of their homes: health (worries about the hygiene and contaminant presence, like bugs, worms and pesticide residues), social (worries about the judgment from relatives/friends in case the consumer stopped eating vegetables out of home), psychological (feelings of apprehension, worry and disappointment at making the choice), performance (worries mainly about sensorial aspects), financial (high price of vegetables, mainly at full-service restaurants) and time (possibility of wasting more time with the meal due to the inclusion of vegetables in it). Among the benefits of eating vegetables out of home, we highlight the health-related ones (and the participants emphasized the importance of eating vegetables out of home for adopting a diet which may contemplate the adequate number of portions from this group of food), the convenience (salads are already clean and ready-to-eat in restaurants) and variety of vegetables available in restaurants.

**Conclusions:** Strategies of promoting the consumption of vegetables may be developed based on the presented results.

**Key Words:** Focus group, Qualitative survey, Restaurants, Vegetables.



**Poultry meat in Poland- risk of prevalence of antibiotic resistance in Campylobacter spp**

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**Introduction:** Contaminated poultry meat is the main source of Campylobacter enteritis. Campylobacter spp. is the most common cause of human bacterial enteritis in EU countries. The rising level of resistance to antibiotics among Campylobacter spp. is recognized as an emerging public health problem.

**Objectives:** The aim of the study was to determine the susceptibility of Campylobacter spp. from chicken meat samples at retail level to five antimicrobial agents.

**Method/Design:** Laboratory analyses to detect thermotolerant Campylobacter spp. were performed in accordance with the EN ISO 10272-1:2006 standard procedure. To confirm suspect isolates and identify the species, polymerase chain reaction (PCR) was applied. Isolated cultures were analyzed for antimicrobial resistance using the disc diffusion assay. The antibiotics chosen were erythromycin, tetracycline, ciprofloxacin, streptomycin and gentamicin. In this study has also analyzed the molecular mechanisms of antibiotic resistance.

**Results:** A total of 169 poultry meat samples were collected from large retail outlets and smaller units in Warsaw (Poland) in 2010. Campylobacter bacteria were found in 60 samples (35.5%) of the total number embraced by the study. The most prevalent of the Campylobacter spp. was *C. coli* (65 %), whereas *C. jejuni* was identified in the remaining 21 (35 %). The results obtained point to the high percentage (91.7%) of Campylobacter isolates resistant to ciprofloxacin. 41 strains (68.3%) were resistant to tetracycline, 4 (6.7%) to erythromycin, 26 (43.3%) for streptomycin and only 1 (1.7%) to gentamicin. Moreover, 18 Campylobacter strains (31%) were found to be resistant to three antibiotics.

**Conclusions:** Campylobacter spp. were found in 35.5 % of the meat samples. The highest resistance rates were noted for ciprofloxacin. Eighteen of the isolated Campylobacter spp. (30%) exhibited multi-resistance.

**Key Words:** Poultry Meat, Campylobacter, Antibiotics Resistance

**Breakfast habits and health in a nationally representative UK sample**

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**Introduction:** Breakfast eaters have been reported to have better cognitive function, be less depressed, have better nutrient intakes and a lower body mass index (BMI) than people who skip breakfast. However, there is limited information relating breakfasting habits to measures of health and wellbeing across the UK.

**Objectives:** To report on UK breakfasting habits and the relationship with health and wellbeing from a recently surveyed nationally representative sample.

**Method/Design:** 1,068 adults completed a web-based survey. The survey included validated standardised scales to report wellbeing, physical activity and eating habits as well as original questions on breakfasting habits and frequency, and questions asking for height, weight and waist circumference.

**Results:** 66% of the respondents consumed breakfast every day, with only 6% never eating breakfast. Cereal was the preferred choice for 50% of the sample. Frequency of breakfast consumption was found to correlate with conscientiousness ( $r=0.12$ ), and wellbeing ( $r=0.16$ ) (for all,  $p<0.001$ ). Those eating breakfast every day get up earlier by 20 minutes during the week and 35 minutes during the weekend, compared to those eating breakfast less regularly ( $p<0.001$ ). Correlations between breakfasting frequency and moderate and vigorous physical activity were 0.08 and 0.09 respectively ( $p<0.01$ ). No correlation was observed between breakfast frequency and BMI or waist circumference (both  $r<0.05$ ;  $p>0.3$ ) and there were no differences in BMI and waist circumference of participants who never consumed breakfast those who always consumed breakfast ( $p>0.25$ ).

**Conclusions:** The majority of UK adults have breakfast regularly and these individuals tend to be, slightly more conscientious and show slightly higher levels of wellbeing. They get up earlier, and are marginally more active. In contrast breakfasting frequency is not correlated with BMI.

**Key Words:** Breakfast, survey, health, wellbeing.

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27/685. Nutrition and Healthy Lifestyle

**Assessment of weekly food variety of consumption by two different instruments in Portuguese elderly**

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**Introduction:** Methodology for food consumption assessment is an important issue in food habits research. Variety of food consumption may be an important indicator of the subject's ability to fulfil nutritional requirements and different instruments have been validated for different populations.

**Objectives:** To assess weekly food variety of consumption by using two different instruments in a elderly population.

**Method/Design:** The sample included 400 Portuguese with 65+ years stratified by sex, age (65-75, 75+ years) and living circumstances (living alone / with others). Data was collected by two instruments: food variety questionnaire (FVQ) & food frequency questionnaire (FFQ). Both were used in a study conducted by a single interview. Food variety by FVQ was evaluated based on the percentage of items that were consumed in the previous week, and variety from FFQ was determined by computing the percent of items with weekly frequency higher than once per week. We used paired-sample t-test to compare means and performed Pearson correlation and Cohen's K between FFQ and FVQ variables.

**Results:** The mean of FVQ was 49.7% SD= 12.2% and the mean for FFQ was 43.7% SD= 12.3%. These percentages were moderately correlated ( $r=0.591$ ,  $p<0.001$ ) and were significantly different ( $p<0.001$ ). We found higher agreement ( $k>0.540$ ,  $p>0.001$ ), for the following items: oils ( $k=0.572$ ,  $p>0.001$ ), spreads ( $k=0.658$ ,  $p<0.001$ ), bananas ( $k=0.584$ ,  $p<0.001$ ), eggs ( $k=0.540$ ,  $p>0.001$ ), and alcoholic beverages ( $0.885$ ,  $p<0.001$ ). For the other food items, low or no agreement was found.

**Conclusions:** The mean variety values seem relatively low (< 50%). Although there is correlation between the two instruments, there were differences when food items were considered individually. These differences are probably due to the fact that the two instruments were developed for different purposes and other conditions may have influenced data collection (seasonality, differences of time span/window of the instruments).

**Key Words:** Food variety, Food frequency questionnaire, Food assessment methodology, Portuguese elderly

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27/690. Nutrition and Healthy Lifestyle

**A study of the genetic and environmental influences on dietary restraint in adolescents: sex differences.**

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**Introduction:** In many studies dietary restraint has been shown to affect food intake and body weight and is thought to be risk factors for eating disorders in adolescents. However, we know little about factors that determine their origins.

**Objectives:** Our aim was to determine the proportion of genetic and environmental factors in dietary restraint on Spanish adolescents using twin models. We also examined if these genetic and environmental influences on dietary restraint differed in boys and girls.

**Method/Design:** We use a large population sample of 13-17 year old Spanish boys and girls twins (181 identical, 170 fraternal same-sex, and 175 fraternal opposite-sex twin pairs). Scores on the dietary restraint habit were obtained. Linear structural modeling was applied to investigate the proportion of genetic and environmental factors influences on dietary restraint.

**Results:** Univariate model-fitting analyses indicated significant genetic and individual environmental, but not shared (familial) environmental influences on dietary restraint. Additive genetic effects explained 48.0% (95% CI: 4.3-84.1%) of the variance in dietary restraint in boys and 68.4% (95% CI: 35.3-88.7%) in girls, and common environmental effects explained 52.0% (95% CI: 15.9-95.7%) of the variance in dietary restraint in boys and 31.6% (95% CI: 11.3-64.7%) in girls. The heritability of dietary restraint was therefore higher in girls than in boys.

**Conclusions:** Findings support that dietary restraint could be another component in a package of genetically influenced attitudes that regulate food intake and body weight. This relative influence of genetic factors on dietary restraint in adolescents differs by sex. However, the nature of these influences remains unknown.

**Key Words:** Adolescents; dietary restraint; sex; Spain; twin study.

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27/691. Nutrition and Healthy Lifestyle

**Investigating the effects of milk chocolate aroma on mood, appetite and food intake**

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**Introduction:** Research is emerging to demonstrate aroma of a food may impact on satiety and mood. Massorlt et al. (2010) found

eating and smelling 30g of dark chocolate impacted on satiety ratings and gut hormones signalling appetite status. The smell of chocolate has also been associated with reduced theta activity in the brain denoting increased relaxation (Martin, 1998).

**Objectives:** We investigated the impacts of olfactory stimulation (i.e. smelling) before consumption of a realistic quantity of commercially available milk chocolate (49g) on measures of mood, appetite and food intake.

**Method/Design:** The study used a within-subjects design, 30 females participated in two study sessions one month apart. Ninety minutes following a standardised breakfast, the preload chocolate was presented under one of two conditions; olfactory (OC) and no olfactory (NOC) stimulation in a balanced, randomised order for a defined time period. Volunteers were instructed to consume the chocolate according to a standardised protocol. Mood states and appetite ratings were assessed using computerised ratings and 100 mm visual analogue scales respectively. A standard ad libitum lunch was provided in excess, 1 hour after the preload, and food intake measured covertly.

**Results:** Under OC, adjusting for baseline, a trend in higher mean positive mood scores was observed across the morning ( $p=0.057$ ), which was significant immediately following the olfactory stimulation compared to NOC ( $p=0.029$ ). No significant differences were found for mean negative mood ( $p=0.585$ ) although some differences in underlying affective states were found. For the appetite ratings, some significant differences were found between the two conditions just before lunch. OC felt more 'satiated' ( $p=0.045$ ) and had lower 'prospective consumption' ( $p=0.028$ ) ratings than NOC. No differences were found in subsequent food or energy intake during the ad libitum test meal.

**Conclusions:** OC has a positive effect upon mood state and positive effects upon some appetite ratings.

**Key Words:** chocolate, aroma, mood, appetite, food intake

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## 27/695. Nutrition and Healthy Lifestyle

### **Stress and diet quality in European adolescents: The HELENA study**

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Dietetics, Harakopio University, Athens, Greece.

**Introduction:** Stress is hypothesized to influence dietary behavior. As the foundations of healthy dietary habits are laid down during

childhood and adolescence, investigation of the role of stress in this context is essential.

**Objectives:** Investigation of the relationship between perceived stress and diet quality in a multi-national sample of European adolescents.

**Method/Design:** Within the HELENA cross-sectional study, adolescents ( $n=749$ , aged 12 to 17 years) from several schools in five European centres (Ghent, Stockholm, Zaragoza, Athens, Vienna), completed a two-day 24h dietary recall assessment and the adolescent stress questionnaire. Height and weight was measured and the parental education level and diet status were assessed. With the dietary data, the Diet Quality Index for Adolescents (DQI-A) was calculated that comprises three components which reflect the dietary diversity, quality and equilibrium. Hierarchical linear models, with cities and schools as cluster units, were performed to investigate the relationship between the adolescents' level of perceived stress and the DQI-A and its components, controlling for relevant covariates (BMI z-score in boys and parental education in girls). Next, these models were additionally controlled for diet status.

**Results:** In both boys and girls, perceived stress was a significant negative predictor for their overall DQI-A. Whereas this was also found for all components (diversity, quality and equilibrium) in girls, it was only reflected in the equilibrium component in boys. When additionally adjusting for diet status, results were similar (and diet status on itself was no predictor), except for diversity in girls for which diet status was a negative predictor (those on a diet had less diversity) and attenuated the negative association with perceived stress.

**Conclusions:** In European adolescents, perceived stress was negatively associated with their diet quality, independent of their diet status, and this manifested on several components in girls while only on the dietary equilibrium in boys.

**Key Words:** perceived stress, adolescents, diet quality index

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## 27/699. Nutrition and Healthy Lifestyle

### **Nutrimenthe: The effect of diet on the mental performance of children**

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**Introduction:** Studies exist on the potential beneficial effects of long-chain polyunsaturated fatty acids (LC-PUFAs) and nutrient supplementation on the mental performance (MP) of infants and children. However, there is still a lack of clarity on their role. Nutrimenthe aims to address this for iron, zinc, folic acid, protein (in breast and formula milk) and especially LC-PUFAs.

**Objectives:** NUTRIMENTHE aims to improve scientific and public understanding of the effect of diet on mental performance, leading to the development of a set of clear and consistent pan-European dietary recommendations for pregnant women, infants and children.

**Method/Design:** a) epidemiological studies to analyse the long-term effects of pre- and early postnatal diet on MP in children; b)

follow up of randomised clinical intervention trials of specific nutrients introduced during pregnancy, infancy and childhood c) use of a standard neuropsychological battery for the assessment of MP of children in Europe.

#### Results:

a) Inadequate folic acid supplementation during early pregnancy is related to toddlers showing behavioural problems at 18 months.

b) Fish eating in pregnancy is beneficial for verbal IQ, when measured at age 8

c) Single nucleotide polymorphisms (SNPs) in the fatty acid desaturase (FADs) gene cluster effect how the body processes fatty acids

d) Iron supplementation may positively influence children's psychomotor development

e) Maternal thyroid function during pregnancy may be crucial for foetal brain development.

**Conclusions:** Results emerging from NUTRIMENTHE indicate that nutrition during pregnancy, infancy and childhood can influence mental performance, cognitive development and behaviour. With respect to LC-PUFAs, analysis of SNPs in the FADs gene cluster indicate that genetic factors play an important role in how the body processes fatty acids. This is likely to impact on the future development of dietary guidelines for European citizens as different sub-populations may have different dietary requirements.

**Key Words:** Mental performance, nutrition, fatty acids, cognition, SNPs, diet, nutrients,

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#### 27/701. Nutrition and Healthy Lifestyle

##### **Composition of diet at home, restaurants and work. Results from a European research project (HECTOR)\***

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**Introduction:** In the context of the EU-supported research project on "Eating out: Habits, Determinants, and Recommendations for Consumers and the European Catering Sector (HECTOR)" a database was created to combine harmonised dietary data collected between 1994 and 2006 in seven national and international studies undertaken in 11 European countries using single or multiple 24-hour dietary recalls or 7-day food diaries.

**Objectives:** To assess the nutrient energy contributions in food intakes at restaurants or at work and compare them with the at-home ones. To investigate the association of energy densities of dietary choices at restaurants or at work with the reported frequency of food intakes at these locations.

**Method/Design:** Data from the HECTOR database were retrieved. Eating at restaurants was defined to include foods and beverages consumed at restaurants, bars, cafeterias and fast-food outlets. Eating

at work was defined to include any eating or drinking occasion at the workplace. Mean contributions (%) of nutrients to daily energy intakes at home, at restaurants or at work were calculated by country or survey (if more surveys were available per country).

**Results:** When eating at restaurants, Europeans generally consumed less carbohydrate-rich foods and consumed more alcohol in comparison to eating at home or at work. Eating at work (including not only eating at the work canteen but also foods sourced from the household supplies) was associated with particularly high carbohydrate intakes and their energy contributions ranged from 49% (Germany) to 71% (Italy). In addition, the frequency of eating at work was positively associated with fat intake at work.

**Conclusions:** The out of home dietary choices of Europeans are different to the at-home ones and depend on the eating location. Governmental policies and actions addressing the eating out component of the daily diet and focusing on particular eating locations are needed.

**Key Words:** HECTOR, Diet, Eating Out, Eating At Work, Eating At Restaurants

\*Authors on behalf of the HECTOR Consortium. List of full HECTOR Consortium is available at [www.nut.uoa.gr/hector](http://www.nut.uoa.gr/hector).

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#### 27/703. Nutrition and Healthy Lifestyle

##### **A fibre rich product obtained from cocoa husk induces hypotensive and hypoglycaemic effects in moderately hypercholesterolemic humans**

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**Introduction:** The health benefits of dietary fibre and polyphenols in reducing cardiovascular risk have been evidenced. Cocoa husks are an excellent source of both components and a considerable byproduct.

**Objectives:** A fibre rich cocoa product (FRCP) has been produced from cocoa husks and this study assessed if its regular consumption may be a strategy to improve cardiovascular health status.

**Method/Design:** A free-living, two-month-long intervention was carried out in 21 volunteers who consumed two servings of FRCP, which provided 12g of dietary fibre and 283mg of soluble polyphenols, daily. Subjects were moderately hypercholesterolemic,

non-vegetarian, non-smoker, non-pregnant women or men, 18-55 y old, not suffering from any other chronic pathology, their body mass index was under 30 kg/m<sup>2</sup>. Blood samples were drawn and anthropometric measurements, systolic (SBP) and diastolic (DBP) blood pressure were evaluated at the beginning, at week 2, 4, and 8. Serum lipids, creatinine, uric acid, glucose and PCR levels were analyzed.

**Results:** Glucose (p=0.019), SBP (p=0.001), and DBP (p=0.001) decreased, HDL-cholesterol slightly increased, whereas the rest of the parameters remained similar.

**Conclusions:** FRCP may be considered part of a dietary approach or an ingredient for the functional food industry to improve cardiovascular health.

**Key Words:** Cocoa, cardiovascular health, hypertension, hypercholesterolemia, glucose

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#### 27/715. Nutrition and Healthy Lifestyle

### The sedative effect of Hop (*Humulus Lupulus*), a component of beer, in a stressed population

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**Introduction:** The hop (*Humulus lupulus* L.), as a component of beer, is a sedative plant which pharmacological activity is taken principally by its bitter acids, especially from component alpha acid: 2-Metil-3-buten-2-ol. The mechanism of action of the resin of hop consists of raising the levels of the neurotransmitter  $\alpha$ -amino butyric (GABA) inhibiting the central nervous system (CNS).

**Objectives:** To analyze in a stressed population, the sedative effect of hop, component of non alcoholic beer, in the sleep/wake rhythm.

**Method/Design:** The experimentation was tested with healthy female nurses (n=15), in rotating and/or night shift, and with a stressful job from the Hospital Infanta Cristina (SES), Badajoz. The parameters of night sleep and chronobiology were analyzed by actigraphy (Actiwatch®), after moderate ingestion of non alcoholic beer (333 ml of San Miguel 0,0 % alcohol®) during dinner and for 14 days (Biweekly Treatment), in comparison with the Control group without beer during the dinner.

**Results:** The results in actigraphy demonstrated the improvement of the most important parameters of the quality night sleep; the Sleep Latency (time consumed in initiating the sleep) diminished (p<0.05) in the Biweekly Treatment with San Miguel 0,0 % alcohol® (12.01 ± 1.19 min) with respect to the Control (20.50 ± 4.21 min). As well as the Total Activity which diminished (p<0.05) in this group with San Miguel 0,0 % alcohol® (Biweekly Treatment= 5284.78 ± 836.99 pulses of activity vs Control= 7258.78 ± 898.89 pulses of activity). In addition the chronobiological analysis in this Biweekly Treatment, with non alcoholic beer for 2 weeks, increased the Interday Stability (0,51 ± 0,03) in comparison with the Control group (0,45 ± 0,03).

**Conclusions:** To recommend the use of the non alcoholic beer, dues to its content in hop with sedative action, which increases the quality of night sleep.

**Key Words:** Hop, Nutrition, Sleep, Stress, Beer

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#### 27/720. Nutrition and Healthy Lifestyle

### Key-microorganisms in food quality / food safety of traditional dishes and drinks prioritised within basefood project

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**Introduction:** Preventive and therapeutic healthcare is closely associated with food safety and has recently become an important social and political issue.

**Objectives:** The plants and ready-to-eat prioritised traditional foods from Black Sea area countries have been analyzed for the presence of the microorganisms of three targeted groups: A ("beneficial" – for food processes and for the human health), B1 (contaminants from environmental sources – "epiphytic", air/soil/water originated) and B2 (human-relevant contaminants: food-borne and opportunistic pathogens).

**Method/Design:** Identification of isolated microorganisms was performed with complex biochemical and serological test systems.

**Results:** Group A was represented by Lactobacilli and Bifidobacterium spp. accompanied with enterococci, bacilli and Bacteroides. "Typical" environment originated microbiota (B1) included Xanthomonas spp., Pseudomonas spp. and Erwinia herbicola (Pantoea agglomerans). The etiological role of these "non-pathogenic" bacteria in human infectious diseases is noted. The compositions of "human originated" microflora (B2) dominantly contain representatives of Staphylococcus, Klebsiella, Enterobacter, Proteus, Streptococcus, Escherichia, Clostridium, Bacteroides Genera; Candida species and others microscopic fungi. E. coli (EPEC), E. coli O157:H7, Shigella dysenteriae, Listeria monocytogenes, Campylobacter jejuni were not detected. Shigella flexneri ABC and Salmonella typhi were obtained from sorrel (before) and potato (after) the washing procedure before cooking. This is an evidence for the human/water source of food microbial contamination. The most of ready-to-eat prioritized dishes were not contaminated or contaminated with very low amount (up to 100 CFU/ml) of Bacillus subtilis, Staphylococcus epidermidis, S. aureus, Enterobacter cloacae, Pantoea agglomerans.

**Conclusions:** The major key-microorganisms of traditional foods prioritised within the BaSeFood project have been defined. Microorganisms with beneficial properties will be further used as industrially potential strains in the development of functional foods (fermented products) based on original traditional foods plant compositions. The research leading to these results has received funding from the European Community's Seventh Framework Programme

(FP7/2007-2013) under grant agreement No 227118.

**Key Words:** Beneficial and detrimental microbes, food quality and safety, traditional foods, Black Sea region.

**27/735.** Nutrition and Healthy Lifestyle

**Assessment of intake of antioxidant nutrients by physically active women**

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**Introduction:** Currently, evidences have showed that the action of free radicals can result in tissue damage or production of toxic components to the tissues, a process called oxidative stress.

**Objectives:** Evaluate the intake of these nutrients in women who engage in regular physical activities in a Brazilian sports consultancy.

**Method/Design:** We included 33 physically active women in São Paulo city, Brazil. For assessing the intake of antioxidant nutrients, it was developed a food frequency questionnaire with the main food sources of vitamin C, vitamin A, vitamin E, beta carotene, zinc and selenium. For analysis of the antioxidant intakes, we performed a qualitative method for dietary assessment. From the measurement of nutrient intake in food frequency questionnaires, data were compared to values proposed by the Dietary Reference Intakes (2000).

**Results:** Anthropometric evaluation showed that most of women (86%) presented to eutrophic. It was observed that a high percentage of women with a antioxidant intake below the recommended intake (52% in relation to Vitamin C intake, 57% in relation to vitamin E intake, 52% in relation to vitamin A intake; 52% in relation to zinc intake and 24% in relation to selenium intake). Selenium is a nutrient analysis that showed the highest percentage of adequate intake (76%).

**Conclusions:** Because of the importance of these nutrients in human health, the prevention of oxidative stress and inflammatory process triggered by exercise, these results show that greater efforts by the nutrition team should be made to adjust the consumption of micronutrient antioxidants. In addition, more research is needed to evaluate the intake of these nutrients in other physically active populations, and nutritional strategies that can increase consumption.

**Key Words:** antioxidant, sports, nutrition

**27/739.** Nutrition and Healthy Lifestyle

**Vitamin D deficiency/insufficiency and its association with bone metabolism in elderly women living on Rio de Janeiro. Brazil**

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**Introduction:** Vitamin D insufficiency is common in elderly populations and different categories have been proposed to classify its status: vitamin D deficiency (<50 nmol/L) that leads to osteomalacia, with the ensuing histomorphometric changes; and, vitamin D insufficiency (50-80 nmol/L) that has an effect on calcium homeostasis, leading to secondary hyperparathyroidism.

**Objectives:** To evaluate the vitamin D deficiency/insufficiency and its association with bone metabolism in elderly women living on Rio de Janeiro (latitude south 22°:54:10S) – Brazil.

**Method/Design:** It was a cross-sectional study evaluated on spring with ambulatory elderly women over 60 years of age. Vitamin D (25(OH)D3), calcium, phosphorus and alkaline phosphatase activity plasma level were analyzed and vertebral density (L1-L4) was measured. Data were analyzed by linear regression (p<0.05) using GraphPad software version 5.0.

**Results:** In a total, were evaluated 30 women (69.4 ± 4.8 years of age) with vitamin D deficiency (40.4 ± 9.0 nmol/L of vitamin D) and 95 women (68.8 ± 5.6 years of age) with vitamin D insufficiency (66.0 ± 7.8 nmol/L of vitamin D). Calcium, phosphorus, alkaline phosphatase activity and vertebral (L1-L4) density did not show correlation with vitamin D deficiency (r2 = 0.011; 0.046; 0.002; 0.0004, respectively) and insufficiency (r2 = 0.017; 0.016; 0.0007; 0.001, respectively).

**Conclusions:** In this study were not observed correlation between vitamin D deficiency/insufficiency to calcium, phosphorus and alkaline phosphatase activity plasma level and vertebral (L1-L4) density in elderly women living on Rio de Janeiro - Brazil.

**Key Words:** Vitamin D, bone metabolism, elderly.

27/742. Nutrition and Healthy Lifestyle

**Regular consumption of a soluble cocoa product rich in dietary fibre increases hdl-cholesterol without inducing anthropometric changes in healthy and hypercholesterolemic subjects**

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**Introduction:** Dietary fibre lowers risk of heart disease, diabetes, colon cancer, etc. Soluble cocoa powder taken as a beverage is widely consumed in many countries, including Spain, and may be enriched with dietary fibre (SCP-DF).

**Objectives:** To assess the effects of regularly consuming SCP-DF, which contains 22.0% of non-starch polysaccharides (NSP), on cardiovascular health status and anthropometric parameters in healthy and hypercholesterolemic subjects.

**Method/Design:** A free-living, four-week-long intervention, was carried out in 24 healthy and 20 hypercholesterolemic (total cholesterol >200 mg/dL) subjects, who consumed two servings of SCP-F daily, which provided 6.6 g/d of NSP. Volunteers were non-vegetarian, non-smoker, men and non-pregnant women, 18-55 y old, who had not taken dietary supplements, laxatives, or antibiotics six months before the start and were not suffering from any other chronic pathology, their body mass index was under 30 kg/m<sup>2</sup>. At the beginning and at week 4, body weight, waist circumference, tricipital and subscapular skin folds were measured, blood samples were drawn to analyze serum lipid and glucose levels and dietary intake was evaluated using a 72-hour detailed food intake report.

**Results:** Dietary fibre (p<0.001) and carbohydrate (p<0.001) intake, and HDL-cholesterol (p=0.008) increased. The rest of the parameters did not show statistical differences.

**Conclusions:** Regularly consuming SCP-DF within a typical Spanish diet is an efficacious strategy to increase fibre intake to recommended levels and improve cardiovascular health in healthy and hypercholesterolemic individuals, without inducing changes in anthropometric measurements.

**Key Words:** Dietary fibre, cocoa, hypercholesterolemia, body weight, skin folds

27/751. Nutrition and Healthy Lifestyle

**Glycemic index and sleep quality: A pilot intervention study**

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**Introduction:** Sleep quality may be related to diet. Glycemic index (GI) is a measure of the effect of carbohydrates on postprandial blood glucose levels.

**Objectives:** The aim of this study was to evaluate the use of a biaxial accelerometer for the assessment of sleep quality and to investigate if meals with different GI affected sleep quality.

**Method/Design:** Nine volunteers (healthy, normal weight, 21-59 years old) were recruited in a pilot study. The study was planned during three non-consecutive evening/nights. On the first evening (control), volunteers were free to choose their normal dinner; the second and third evening volunteers were provided in random order dinners (iso-energetic and iso-nutritive with the control) characterised by a high (HGI) or low glycemic index (LGI). The sleep quality was measured by a SenseWear® Armband. Before the experiment, volunteers compiled a questionnaire related to sleep behaviours to exclude subjects with recognized sleep disorders.

**Results:** The length of sleep, expressed as percentage of total time spent in bed, was marginally but significantly higher after the HGI meal with respect to control (p = 0.020). Nocturnal awakening episodes were in the average shorter after the HGI meal (p<0.01), whereas none of the other measured variables resulted significantly different among the three meals.

**Conclusions:** This pilot study indicates a possible association between Glycemic Index of dinner and sleep quality. However, due to the low number of volunteers and to the small difference between the two GI-controlled meals, data are only suggestive of an effect of GI. The Armband seems able to measure sleep quality and could, in the future, be applied to monitor the effect of diet manipulation on sleep.

**Key Words:** glycemic index; sleep quality.

27/752. Nutrition and Healthy Lifestyle

### **Sociodemographic determinants of food consumption during pregnancy and lactation among Finnish women**

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**Introduction:** A range of sociodemographic factors are known to underlie maternal food choices during pregnancy among Finnish women while there are no data to date on what affects food choices during lactation. Previous studies elsewhere have suggested that the differences between sociodemographic classes narrow or diminish during the entry to motherhood.

**Objectives:** This study aimed to assess dietary behaviours of Finnish mothers during pregnancy and lactation, and to investigate the relationships between these behaviours and demographic characteristics.

**Method/Design:** The diet of mothers from the ongoing, prospective Finnish Type 1 Diabetes Prediction and Prevention Nutrition Study was studied during the 8th pregnancy month (n=4880) and 3rd lactation month (n=2943) using a validated, semiquantitative food frequency questionnaire. Sociodemographic characteristics were obtained from a structured questionnaire or birth registry. Food consumption was divided into categories that reflect recommended or undesired food groups: full grain cereals, vegetables, fruit and berries, fish, margarine, fat-free milk, coffee, tea, fatty foods, and sugar and sugary foods. Sociodemographic differences between categories were studied by Kruskal-Wallis test and differences between food intake during pregnancy and lactation by paired-samples t-test.

**Results:** There were significant differences between sociodemographic groups in all studied food groups. Higher maternal and paternal age and educational level reflected healthier food choices both during pregnancy and lactation. However, during lactation there were no clear trends between sociodemographic groups in the consumption of fatty and sugary foods, and the quality of the diet declined. Maternal smoking during pregnancy was related to poorer dietary habits overall.

**Conclusions:** Sociodemographic factors underlie food choices

both during pregnancy and lactation among Finnish women. Those with lower education, younger age and mothers who smoke may benefit from a more targeted approach in health care to ensure good nutrition in pregnancy. All mothers would benefit from nutrition counselling during lactation.

**Key Words:** sociodemographic, pregnancy, lactation, diet

27/756. Nutrition and Healthy Lifestyle

### **The sedative effects of hop (*Humulus lupulus*), a component of beer, in the rhythm of activity / rest**

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**Introduction:** The hop (*Humulus lupulus* L.), as a component of beer, is a sedative plant which pharmacological activity is taken principally by its bitter acids, especially from component alpha acid: 2-Metil-3-buten-2-ol. The mechanism of action of the resin of hop consists of raising the levels of the neurotransmitter  $\alpha$ -amino butyric (GABA) inhibiting the central nervous system (CNS).

**Objectives:** To analyze in an experimental animal model the sedative effect of hop, component of beer, in the activity/rest rhythm.

**Method/Design:** Experimentation was tested with common quail (*Coturnix coturnix*), isolated in methacrylate cages with of 25 x 25 x 25cm and supply and water ad libitum, in a room with artificial ventilation (22±1°C) and a light cycle of 12L/12D, (n=5). The doses of administration, similar to the content of non alcoholic beer, were: 1, 2 and 11mg extract of hop in capsule / day, at 18:00h for one week. The group control received capsules only with the excipient: metylcellulose, this way the basal group did not receive any treatment. Cronobiology analysis of the activity caught and acquired by the software DAS24, was realized by the software Ritme (Cosinor's methods).

**Results:** It was mainly observed, with the dose of 2mg, a reduction of the arithmetic mean of the night activity (23±3.0), statistically significant (p < 0.05), respecting to the control (38.1±3.0). This dose of 2mg (13mg/kg of body-weight), similar to the concentration in beer, was more effective opposite to other doses of 1 and 11mg, as well as preserving the circadian rhythm of activity/rest.

**Conclusions:** To indicate that the concentration of 2mg effectively decreases the activity in circadian rhythm at night. On the basis of this investigation the administration of non alcoholic beer is recommended due to its content in hop and its sedative action, which helps the night sleep.

**Key Words:** Hop, Nutrition, Sleep, Beer



**Effect of a high carbohydrate diet and exercise on oxidant/antioxidant status in muscle and serum**

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**Introduction:** Inadequate food intake, associated with a sedentary lifestyle, has caused the increase in overweight and obesity worldwide together with risk of chronic illnesses. These changes have moved research to evaluate the oxidant-antioxidant system of different diets in humans as well as in experimental models.

**Objectives:** To evaluate the effect of a high carbohydrate diet and exercise on muscular and serum oxidant-antioxidant system and on biochemical parameters in a murine model.

**Method/Design:** Three-week old male Balb/c mice were fed a high carbohydrate diet (HCD) with or without moderate exercise during 9 weeks. Protein (carbonyls) and unsaturated fatty acid (TBARS) as stress indicators, total antioxidant status (TAS) and catalase, glutathione peroxidase and superoxide dismutase activity were measured in soleum muscle homogenates and serum, and biochemical parameters.

**Results:** Muscular carbonyls ( $9.90 \pm 1.16$  nmol/mg) and TBARS ( $3.87 \pm 0.50$  nmol/mg protein) were higher ( $F=45.29$   $p<0.001$  and  $F=402.04$   $p<0.001$  respectively) in the HCD compared to all groups. The highest TAS value was found in the HCD with exercise ( $451.90 \pm 84.6$  nmol/mg protein) ( $F=3.59$   $p=0.026$ ); in groups with exercise, all antioxidant enzymes were significantly higher compared to others. Serum carbonyls ( $9.66 \pm 0.95$  nmol/mg) and TBARS ( $25.96 \pm 2.90$  nmol/mg protein) were higher in controls compared to all experimental groups ( $F=130.74$   $p<0.001$  and  $F=51.17$   $p<0.001$  respectively). The highest TAS value was found in the HCD ( $1580 \pm 210$  nmol/mg protein) ( $F=37.03$   $p<0.001$ ); in the experimental groups, all antioxidant enzymes were significantly lower compared to control. The lowest concentrations of glucose, triacylglyceroles and cholesterol were in the HCD with exercise ( $148.0 \pm 39.1$  mg/dL,  $131.9 \pm 49.9$  mg/dL and  $81.2 \pm 29.7$  mg/dL respectively).

**Conclusions:** The high carbohydrate diet caused an oxidative response in muscle. The trained group showed an improvement of biochemical and oxidation parameters and increased levels of muscular non-enzymatic antioxidants as opposed to serum

**Key Words:** Diet, carbohydrates, exercise, oxidative stress, antioxidant system

**Effect of energy density on food quantity estimatives**

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**Introduction:** The perception of the amount contained in food portions influences food consumption and justifies the importance of understanding the factors that affect an individual's ability to estimate quantities of food portioned.

**Objectives:** To analyze the influence of food's energy density (ED) and estimator's body weight (BW) in the estimates of quantities in food portions.

**Method/Design:** The study was developed with students of a public university, of both genders. Participants were divided into two groups: eutrophic (EG, BMI: 18.5 to 24.9 kg/m<sup>2</sup>) and overweight (OG; BMI > 25kg/m<sup>2</sup>). Fifteen foods and preparations were organized into four meals, and the visual estimate was made (in g or ml). Underestimation was considered when the estimated quantity (EQ) was less than 90% of the real quantity (RQ) and overestimation when the ratio EQ / RQ was over 110%.

**Results:** We studied 156 subjects, 77 of EG. There was no difference in age between the groups (EG:  $22.5 \pm 6.5$  and OG:  $23.4 \pm 6.6$  years). For EG, of 1163 assessments, 42.5% were overestimated and 38.9% were underestimated. For the OG, of 1121 assessments, 36.5% were overestimated and 45.0% were underestimated. It was found positive and significant correlations between ED and the values of EQ / RQ in the EG ( $r = 0.69$ ,  $p = 0.003$ ) and OG ( $r = 0.72$ ,  $p = 0.002$ ). There was no correlation between the BW and the EQ / RQ's ratios for evaluated food.

**Conclusions:** The results show a low percentage of acceptable estimates of the samples investigated and the influence of food's energy density in the estimates of food quantity.

**Key Words:** Energy Density, food portions, estimates

### **Descriptive analysis of lifestyle in adult women and older women.**

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**Introduction:** According to the World Health Organization (WHO), in 2015 a total of 41 million people will die as a result of chronic disease, which will monopolize 80 percent of global health spending over the next 10 years. The WHO attributes the proliferation of these conditions to a "poor diet, consumption of tobacco and lack of physical activity". It is considered that eating habits along with physical activity are crucial parts of people's lifestyle. Toral & Slater (2007) indicate that the practice of sport and physical activity influences other health behaviors such as eating a balanced diet.

**Objectives:** Therefore our aim is to validate the questionnaire EdVS and make a first approximation describing the lifestyle of 102 adult and elderly women with a mean age of 59.53 years ( $\pm 11.4$ ) in the city of Cáceres through the questionnaire EdVS (Style Healthy Living).

**Method/Design:** This questionnaire consists of three factors, the obtained internal consistency Cronbach Alpha values of .870 for the tobacco, .891 for the rest and .730 with respect to the timing of meals and balanced diet. This questionnaire was administered to women of different groups of fitness in the city of Cáceres.

**Results:** The results showed that the consumption of tobacco in the sample was low ( $1.33 \pm 0.81$ ), half rest ( $3.47 \pm 1.28$ ), and in respect of mealtimes and balanced diet, high ( $4.19 \pm 0.67$ ).

**Conclusions:** The questionnaire EdVS is valid and reliable to measure the EdVS of the elderly women. In the future, we will implement a program of exercise training and nutritional education to improve the health of their lifestyles.

**Key Words:** healthy lifestyle, eating habits, physical activity.

### **Motivation and healthy lifestyle in adults and older women**

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**Introduction:** The Self-Determination Theory suggests that motivation is a continuum characterized by different levels of self-determination, ranging from the most intrinsic motivation to lack of motivation (demotivation), through extrinsic motivation. It is important to develop activities that encourage intrinsic motivation developing motivational strategies which enable the basic psychological mediators of the self-determination theory : autonomy, competence and social relations, according to Wilson et al. (2006) and Moreno, et al., (2008). If intrinsic motivation is enhanced with a repertoire of healthy behaviors, that improves overall health (Jiménez, Cervello, García, Santos-Rosa & Del Villar, 2007).

**Objectives:** It would therefore be interesting to see how they relate to different levels of self-determination with healthy lifestyle.

**Method/Design:** A sample of 102 adult and elderly women from the city of Cáceres was used. The sample had a mean age of 59.53 ( $\pm 11.4$ ) and all exercised regularly and maintained a level of fitness. The instruments used were the questionnaire BREQ-2 (Scale of regulating behavior in physical exercise, Markland and Tobin, 2004), and the questionnaire EdVS (Healthy Lifestyles) (Jimenez and Leyton, 2011).

**Results:** The results showed a negative correlation between the consumption of tobacco and the intrinsic and identified regulation ( $r = -.233, p < .05$ ), a positive correlation between rest and external regulation ( $r = .229, p < .05$ ), and a positive correlation between intrinsic and identified regulation with respect to timing of meals and balanced diet ( $r = .364, p < .01$ ).

**Conclusions:** It was found that the higher the level of self-determination, the healthier will be the person's lifestyle. In the future it is intended to apply an intervention program to increase intrinsic motivation thus achieving improvements in lifestyle and ultimately in health.

**Key Words:** Self-determination theory, motivation, healthy lifestyle, physical activity.

27/771. Nutrition and Healthy Lifestyle

### **Food and gadgets: no evidence of association with caloric intake in an ad libitum study**

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**Introduction:** Inclusion of gadgets, usually toys in food packages is a common marketing practice which is suspected of promoting obesogenic behaviours.

**Objectives:** To understand if toys packaged with food are indeed increasing the amount eaten by children.

**Method/Design:** 240 children (balanced according to gender and age groups 3-6 and 7-10 years old) have been randomized in a school facility in France, German, Italy and United Kingdom, to either be exposed, in an experimental setting, to food (snacks) alone or to food associated with toys. All children received the same meal during lunch time.

The product chosen were packages where chocolate is associated with toys, usually in an egg form but not necessarily. Children were asked to eat at libitum, during the afternoon break, for a time of 20 minutes. During that time, children were in addition randomized to be exposed to a movie cartoon, with three increasing levels of exposure to commercial spots (1, 2 or 3 spots during the session time).

Total K-calories eaten are for:

NoToy-group: overall mean:189.0105 (SD:142.82839) [NoFilmNoSpot mean:219.5215 (SD:142.38243), FilmNoSpot mean:189.2512 (SD:190.37098), FilmLowSpot mean:172.2654 (SD:129.64636), FilmMediumSpot mean:180.9400 (SD:121.46830), FilmHighSpot mean:183.0746 (SD:126.89440)].

Toy-group: overall mean:183.6196 (SD:96.01594) [NoFilmNoSpot mean:201.5592 (SD:153.40014), FilmNoSpot mean:177.7381 (SD:108.36659), FilmLowSpot mean:183.6423 (SD:152.41451), FilmMediumSpot mean:193.3388 (SD:121.06952), FilmHighSpot mean:187.9796 (SD:126.46871)].

Overall: overall mean:201.5705 (SD:121.49592) [NoFilmNoSpot mean:195.4052 (SD:171.14074), FilmNoSpot mean:175.0018 (SD:118.23559), FilmLowSpot mean:182.2911 (SD:136.34565), FilmMediumSpot mean:188.2067 (SD:122.79932), FilmHighSpot mean:188.4951 (SD:134.61527)].

**Results:** No significant differences emerges between “toys” and “no toys” groups ( $p=0.95$ ). Commercials, neither alone ( $p=0.88$ ) or in association with gadgets ( $p=0.89$ ) shown a significant effect toward promoting an increase of calories eaten.

**Conclusions:** The inclusion of toys in food packages is per se not showing evidence of an increase of caloric intake in children.

**Key Words:** Child obesity; commercials; TV viewing; overeating; gadgets in food.

27/772. Nutrition and Healthy Lifestyle

### **A soya diet does not increase life span**

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**Introduction:** Soya consumption is said to be one of the causes of high longevity found in some Asian populations, such as the Okinawa. Soya isoflavones are structurally similar to oestrogens which act as up-regulators of some age-associated genes. However, the role played by soya isoflavones in longevity is currently controversial.

**Objectives:** Effect of phytoestrogens (genistein) on the expression of antioxidant genes and average and maximum life span potential in *Drosophila* and mice.

**Method/Design:** We performed longevity curves in *Drosophila* and in OF1 male mice housed at clean conditions. *Drosophila*: Three groups of fifty males per each experimental condition (control and soya) were used for longevity curves. Dead flies were counted everyday. Fifteen flies per condition were collected at the beginning of the curve, when the average life span had been reached and when the survival was 10%. OF1 male mice: a control group fed with soy-free diet and another group fed with a soy rich diet were used. Weight and food intake were controlled weekly. Five mice of each group were sacrificed at the age corresponding with 100%, 80%, 50% and 10% of the survival curve to obtain blood and organs to measure parameters of oxidative stress such as, hepatic mitochondrial peroxide production, lipid peroxidation (MDA) and carbonylated proteins, and the expression of longevity related genes.

**Results:** *Drosophila*: Life span decreases when *Drosophila* is fed with a rich genistein diet. A dose dependent effect is observed. Mice: Our results showed that neither mean life span nor maximum life span, were different between control group and group fed soy-rich diet. Also we did not find any significant difference in oxidative stress parameters.

**Conclusions:** Soya intake does not prolong life span and not protect against oxidative stress under optimal conditions of life, showing a neutral effect in mice and even decreasing life span in *Drosophila*.

**Key Words:** Life Span, Soya, Genistein, Antioxidant Enzymes

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27/779. Nutrition and Healthy Lifestyle

### **The right to food and public policy: Brazilian state protection of human's right.**

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**Introduction:** Several international legal instruments guarantees the right to food, as Universal Declaration of Human Rights 1948, International Covenant on Economic, Social and Cultural Rights of 1966 and World Food Summit, 1996. Is estimated that approximately one sixth of humanity is not fed in a dignified way.

**Objectives:** The present paper reflects about the Human Right to Food as a fundamental guarantee of every human being inserted into the contemporary debate on Human Rights.

**Method/Design:** This is a descriptive and explanatory study. A systematical review was made from national and international literature, with a survey of different papers, books, periodicals, texts and electronic documents.

**Results:** In Brazil, the Right to Food is written in Article 6 of Federal Constitution and in the law 11.346/06, the Organic Law of Food and Nutritional Security. The "Zero Hunger Program" is the realization of that legal determination, developing actions such as transfer income, access to food, income generation and family farming incentive. Recent research shows significant reduction in poverty in Brazil. About 5 million people went out of extreme poverty between 1990 and 2005, most after implementation of Zero Hunger. High value food consumption was increased in families included in the program. Despite severe poverty continues, with millions of people living in precarious conditions, the actions taken by the program has brought major changes in national scene.

**Conclusions:** The approval of the constitutional amendment inserted food in the list of social rights and gave humans right force in the country, which means that food security is no longer a question of government spending to become a demand of the State. This ensures actions continuation preventing setbacks. Brazilian State have the responsibility to ensure the Right to Food to the population and that "Zero Hunger Program" catalyzes actions that promote food and nutrition security in Brazil.

**Key Words:** Human Right to Food, Food Security And Nutrition, Public Policy, Brazil's Zero Hunger Program.

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27/780. Nutrition and Healthy Lifestyle

### **Prevalence of obesity in preschool children**

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**Introduction:** Obesity in children is a well-known health problem. Obese children often have health problems in later life. Nutritional status monitoring in children is essential for planning preventive measures against obesity.

**Objectives:** The aim of this study was to investigate the prevalence of overweight, obesity and dietary habits in children aged 6-7 years.

**Method/Design:** Our study included 541 children (273 boys and 268 girls), aged 6-7 years, from urban and rural areas of South-East Serbia. The children were measured in light clothes and barefoot. We measured body height (to the nearest 0.5 cm) and body weight (to the nearest 0.1 kg) and then calculated body mass index. Software available on the website of the Centers for Disease Control and Prevention was used to calculate body mass index-for-age percentile. Overweight and obesity were diagnosed in children whose body mass index-for-age percentiles were from 85th to less than the 95th and equal to or greater than the 95th percentile, respectively.

**Results:** The prevalence of obesity was significantly higher in urban when compared to rural boys, and we found statistical significance for the girls. No significant differences in anthropometric parameters were found between boys and girls in both areas. We found that urban children spent more time watching television ( $1.77 \pm 1.56$  h/day), compared to children in rural areas ( $0.53 \pm 0.98$  h/day) ( $p < 0.05$ ).

**Conclusions:** Urban children have higher values of body weight when compared to rural children. Watching television and playing computer games (TV commercials promoting fat and sugar and reduced physical activity) are also considered to be important risk factors. In urban areas we found 6.3 % boys and 3.8 % girls to be obese, and 1.1 % in boys and 3.3 % in girls in rural areas. The difference in the prevalence of obesity in urban boys compared to rural boys was significant.

**Key Words:** obesity, children, nutrition, diet.

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27/786. Nutrition and Healthy Lifestyle

### **Development of micronutrient requirements: the EURRECA experience**

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**Introduction:** In Europe, micronutrient recommendations have been established by (inter)national committees of experts and are used by public health policy decision-makers to monitor and assess the adequacy of the diets of population groups. The approaches by which requirements for micronutrients are derived, as well as the reference values themselves, vary considerably across countries and thus far no science-based reason has been identified for this variation.

**Objectives:** Development of a micronutrient requirement flow chart which aims to facilitate the scientific alignment of micronutrient recommendations.

**Method/Design:** Originally nutrient requirements are based

on the minimum amount of a nutrient needed by an individual to avoid deficiency, and is defined by the body's physiological needs. Currently the requirement is defined as the intake at which health is optimal, including the prevention of chronic diet-related diseases.

**Results:** To estimate these requirements, two different types of study were used: the biological/association or physiological/factorial models. Key challenges include the absence of good methodologies and lack of data to measure intake and status, biomarkers of health and/or early risk of disease, limited information on bioavailability from the whole diet for several micronutrients, and very little knowledge about intra-individual variation and the effects of genotype on micronutrient metabolism and hence requirements. The work of EURRECA has resulted in the development of a generic framework which aims to facilitate the scientific alignment of micronutrient recommendations.

**Conclusions:** To facilitate the derivation of dietary reference values EURRECA developed a flow chart to guide nutrient requirement setting bodies through the process of setting dietary reference values and aims to facilitate the scientific alignment of these values.

**Key Words:** EURRECA, micronutrients, requirements, recommendations

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#### 27/787. Nutrition and Healthy Lifestyle

### Supplements of polyunsaturated omega-3 fatty acids decrease oxidative stress and atherosclerosis progression in metabolic syndrome patients

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**Introduction:** A number of clinical trials reported an important role of PUFA omega-3 on reducing the risk of cardiovascular events, by decreasing the circulating levels of triglycerides (TGs) and TG-rich lipoproteins and by inhibition of platelet aggregation.

**Objectives:** The objective of this study was to assess the impact of 1 year administration of  $\omega$ -3 PUFA supplements on oxidative stress and atherosclerosis progression.

**Method/Design:** A total of 210 patients with metabolic syndrome, aged  $65 \pm 6.7$  years, without clinical evidence of atherosclerosis were allocated to 2 groups, matched by sex and age: group A (110 patients) – diet according to ESC/EASD recommendations; group B (100 patients) – the same diet + capsules of fish oil (1g eicosapentanoic acid, 1g docosahexanoic acid, 0,1g  $\alpha$ -tocopherol acetate). Body fat mass (BFM) and body fat percent (%BF) were measured by bioimpedance analysis. Oxidative stress was assessed using FormOx systems monitor on a blood drop. For progression of atherosclerosis, intima-media thickness (IMT) at commune carotid artery (ACC) was measured. Patients were evaluated at baseline, after 6 months and 1 year.

**Results:** After 1 year, all the parameters were significantly improved in group B compared with group A: Total cholesterol (mg/

dl) -  $189 \pm 18.3$  vs  $223 \pm 18.6$  ( $P < 0.002$ ); HDL-cholesterol (mg/dl) -  $58 \pm 12$  vs  $44 \pm 11$  ( $P < 0.05$ ); Triglycerides (mg/dl) -  $126 \pm 44$  vs  $146 \pm 56$  ( $P = 0.002$ ); Fasting Plasma Glucose (mg/dl) -  $107 \pm 12$  vs  $121 \pm 14$  ( $P < 0.0001$ ); IMT – left ACC -  $0.609 \pm 0.07$  vs  $0.618 \pm 0.07$  ( $P = 0.016$ ); IMT – right ACC -  $0.592 \pm 0.049$  vs  $0.604 \pm 0.073$  ( $P < 0.05$ ); FormOx (Fort Units) -  $255 \pm 45$  vs  $269 \pm 78$  ( $P < 0.0001$ ).

**Conclusions:** One year administrations of omega-3 PUFA enriched diets reduces cardiovascular risk of metabolic syndrome patients, resulting in a significant decrease of oxidative stress and atherosclerosis progression.

**Key Words:** PUFA-omega 3, oxidative stress, metabolic syndrome

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#### 27/788. Nutrition and Healthy Lifestyle

### Prevalence of malnutrition in a rehabilitation center of Tuscany

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**Introduction:** The Region of Tuscany provides that public and private health facilities by the end of this year, will be able to assess the nutritional risk of patients and to correct eventual default malnutrition.

**Objectives:** Our structure, in this context, is conducting a study to assess the prevalence of malnutrition in the hospitalized patients in order to be able to satisfy as soon as possible the criteria for regional accreditation.

**Method/Design:** We enrolled 200 patients (99F-101M; average age  $74,9 \pm 6,7$  years). The assessment of nutritional risk was performed using the MUST (Malnutrition Universal Screening Tool). We had considered also the biochemical parameters found to be most related to the assessment of nutritional status and of the extent to plasma albumin, blood lymphocyte counts and transferrin.

**Results:** 70% of the sample was at risk of malnutrition respectively presenting MUST=1 the 24%; MUST> 2 the 46%; the remaining 30% had MUST=0.

**Conclusions:** The percentage of malnutrition in hospital described in the literature is about 30%; our patients, coming mostly from 7 to 30 days of hospitalization in surgical wards of hospitals in Tuscany, are as expected for 46% of cases of malnutrition.

The correction of the condition of risk or ascertained malnutrition is required for our structure not only for ethical reasons but also because rehabilitation is not possible without the assumption of an adequate nutritional status. Despite the attempt to fix the state of malnutrition is already the subject of our work, with the current study we decided to implement the knowledge of the existing problem in our structure to organize significant target nutritional interventions through invol-

vement of all professionals employed in the rehabilitation process.  
Primary Funding Source: Ente Cassa di Risparmio di Firenze  
**Key Words:** Malnutrition, Must, Nutritional Risk, Rehabilitation

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### 27/791. Nutrition and Healthy Lifestyle

#### **Frail patients with a risk for an impaired nutritional status – is the who - BMI – classification the right identification – tool?**

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**Introduction:** Nutritional status is frequently impaired in frail patients, which is associated with changes in body composition. Although disregarding changes in body composition, the BMI (Body Mass Index) is commonly used to identify the nutritional status of frail patients. According to the International Classification of the WHO the BMI is used to classify underweight, overweight and obesity. As the bioelectrical impedance analysis (BIA) is a simple and convenient technique for measuring body composition, it was used in the introduced study for evaluating the validity of the WHO-BMI-Classification in older patients.

**Objectives:** To evaluate with BIA-technique, whether the WHO-BMI-Classification is a valid marker for identifying frail patients being at risk for an impaired nutritional status.

**Method/Design:** A cross-sectional study. BMI was taken from the medical report of the nursing home and bioelectrical impedance was measured with Bodystat 1500@MDD in a multi-frequency (5/50kHz) technique on the right side of the body in supine position.

**Results:** According to the WHO-BMI-Classification 4% were underweight, 44% were in the normal range, 31% were overweight and 21% were obese. According to BIA-technique, body fat mass was 42.4% in the underweight, 41.5% in the normal range, 44.4% in the overweight and 47.4% in the obese. Lean body mass was 25.8% in the underweight, 32.3% in the normal range, 39.4% in the overweight and 46.1% in the obese. Generally phase angle was low (2.4° in the underweight, 3.2° in the normal range, 3.5° in the overweight and 3.7° in the obese), which is associated with an impaired nutritional status.

**Conclusions:** The BMI-evaluation with BIA-technique indicated that the WHO-BMI-Classification is not a valid marker for identifying older patients with a risk for an impaired nutritional status.

**Key Words:** Who-Bmi-Classification; Bia; Frail Patients and Nutritional-Status

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### 27/806. Nutrition and Healthy Lifestyle

#### **Proteins and lipids content in cheese breads vending in a campus college**

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**Introduction:** The cheese bread (CB) is a tradicional food of brazilian cook, being consumed nationally for people of lots of ages and social classes. The CB is often sold by street vendors, which may represent a risk of food insecurity to consumers, because usually street foods have an inappropriate composition and a greater probability of food contamination. **OBJECTIVE:** To analyse the protein and lipids content of CB samples taken of diferent vendors.

**Objectives:** To analyse the protein and lipids content of CB samples taken of diferent vendors.

**Method/Design:** The research was realized in Uberlândia-MG-Brazil, between february-march of 2011. That was taken four samples of CB roast and ready for consumption: A-industrialized;B-home-made;C-vending from street-foods vendors;D-vending in a college snack bar. The samples were collected, packed in plastic bags and imediatly send to the labor for crush, homogenyze, wheight, and, realize the analysis(INSTITUTO ADOLFO LUTZ,1995). Statistical analysis were made from the Tukey test in level of 5% of probability.

**Results:** In avarege terms obtained 8,35 g/100g of protein, being A-7,99±0,65ab; B-6,35±2,91b; C-8,90±2,26ab; D-10,16±1,13a; and avarege of 11,66 g/100g of lipids (g/100g), being A-10,50±0,18b; B-16,51±3,52a; C-10,64±2,42b; D-8,99±2,17b. These study shows that was no statistical diference between the samples of protein. The absolute value of lipid in B sample was higher, but there was no statistical diference among the other samples.

**Conclusions:** this study shows that there is no diference between the contents of protein and lipids present in home made CB and in the CB market in the streets. In addition, this study shows that consumption of food away from home can be an effective alternative nutrition with respect to the lipid content. The CB marketed near a college campus had lower amounts of lipids compared those prepared at home

**Key Words:** protein content, lipids content, cheese bread, nutrition, health lifestyle

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### 27/825. Nutrition and Healthy Lifestyle

#### **Impact of ageing and obesity on the metabolic profile in a rat model**

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**Introduction:** Obesity is a nutritional disorder associated with a low-grade chronic inflammation involving white adipose tissue (WAT). Our previous studies have demonstrated that obese rats show premature immunosenescence and an impairment of redox state; however the impact of obesity on metabolic homeostasis and its age-related changes are unclear.

**Objectives:** Investigation of the metabolic profile in young and adult genetically obese rats

**Method/Design:** Male Zucker ("lean" fa/+ and obese "fa/fa") rats at two (young) or six (adult) months of age were used. The metabolic profiles of WAT, liver and heart were acquired by NMR followed by multivariate statistics.

**Results:** The livers of lean rats contained higher levels of betaine and lower levels of hypotaurine compared to obese animals. Both groups showed a decrease in the levels of acetate with age. Glutathione concentrations were higher in lean adult and obese rats compared to young lean animals.

Hearts from young lean rats contained relatively higher levels of lactate and scyllo-inositol compared to other groups, whereas fumarate increased with ageing. Hearts from fa/fa rats contained higher levels of taurine compared to young lean rats. Taurine decreased with age in obese rats.

WAT from fa/fa rats contained high levels of hypotaurine at both ages, while young fa/fa rats displayed higher taurine concentration decreasing with age.

**Conclusions:** The high levels of hypotaurine in obese rats are suggestive of macrophage infiltration in the WAT and the liver, whereas high levels of glutathione and taurine in young obese rats may indicate compensation of an oxidative stress at this early age. Therefore, these results indicate that early metabolic changes related to oxidative stress might contribute to development of premature oxidative ageing in obese rats, supporting the oxi-inflamm-ageing theory.

Support: MCINN (BFU2008-04336), Research Group of UCM (910379ENEROINN), RETICEF (RD06/0013/0003) (ISCIII).

**Key Words:** Obesity, metabonomics, ageing, nuclear magnetic resonance (NMR) spectroscopy

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## 27/828. Nutrition and Healthy Lifestyle

### **Lymphocyte proliferation and natural killer activity in young genetically obese mice**

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**Introduction:** Obesity is characterized by an inflammatory state of white adipose tissue which predisposes to develop many diseases such as diabetes, atherosclerosis, non-alcoholic fatty liver disease, as well as cancer. Preliminary results have shown an impairment of several immune functions in adult genetically obese rats; however the

impact of obesity on immune function at early ages in mice is not well known.

**Objectives:** To study two key immune function parameters such as the lymphoproliferation in response to mitogens and natural killer activity in young (two months) genetically obese mice.

**Method/Design:** Peritoneal leucocytes were obtained from young female genetically obese mice (BKS.Cg- + Leprdb/+ Leprdb/OlaHsd), lean heterozygotic mice (BKS.Cg-m +/- Leprdb/OlaHsd) and wild type mice (BKS.Cg-m +/- +/OlaHsd). The lymphoproliferation in response to lipopolysaccharide (LPS) and natural killer activity (lysis of a murine lymphoma cell line) were analysed.

**Results:** The results showed that natural killer activity is similar in all studied animal groups. However, lymphocytes from obese mice showed a decrease in their proliferative response to LPS with respect to the wild type mice.

**Conclusions:** The impairment of the lymphoproliferative response in obese mice at two months of age seems to show a premature immunosenescence in those animals at this early age. Since this function is a marker of biological age and predictor of longevity, genetically obese mice could be predisposed to a shorter lifespan.

Support: MCINN (BFU2008-04336), Research Group of UCM (910379ENEROINN), RETICEF (RD06/0013/0003) (ISCIII).

**Key Words:** Genetically obese mice, immune system, lymphoproliferation, natural killer activity

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## 27/833. Nutrition and Healthy Lifestyle

### **Body composition and cardiovascular risk factors in healthy adults following a low glycemic index diet**

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**Introduction:** Glycemic index (GI) provides a numeric classification of carbohydrate foods mostly useful in situations in which

glucose tolerance is impaired. Evidence indicates a direct association between GI and increased risk of diabetes, cardiovascular diseases and obesity.

**Objectives:** To assess the effect of high or low glycemic index (HGI and LGI) diets on body composition and cardiovascular risk of healthy University students.

**Method/Design:** A randomized, cross-over controlled trial of two periods (21 days) with a 10 days washout period was conducted to assess mean changes of the defined parameters. 44 subjects (18 to 40 years) were randomly assigned to follow a diet with bakery products (bread and muffins) with HGI and LGI. Measurements on anthropometry (body mass index (BMI), circumferences and skinfold thickness) and serum cardiovascular risk profiles (total cholesterol (TC), triacylglycerols, LDL cholesterol and HDL cholesterol) were obtained at baseline, and at 21 days, after consumption of both HGI and LGI diets.

**Results:** Bicipital and thigh skinfolds ( $p=0.024$ ;  $p=0.045$ ) and waist and hip circumference ( $p=0.0001$ ;  $p=0.004$ ) respectively, significantly decreased in participants following a LGI diet. Lipid profile changes were observed in TC and LDL cholesterol in both, HGI and LGI diets ( $p=0.0000$ ;  $p=0.025$  and  $p=0.0000$ ;  $p=0.033$ ; respectively). No differences in BMI, triacylglycerols and HDL-cholesterol were observed in either group.

**Conclusions:** These preliminary results, suggest that daily consumption of a LGI using bakery products can be integrated into a healthy, varied and well-balanced diet, as significant changes in body composition and cardiovascular risk profile were observed following consumption of both HGI and LGI diets.

**Key Words:** Glycemic Index, Obesity, Cardiovascular Disease Risk, Prevention, Adolescents.

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#### 27/834. Nutrition and Healthy Lifestyle

### Physical activity and energy expenditure of students of medical college at the Jagiellonian university in comparison to energy value of their diets.

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**Introduction:** Regular physical activity is considered as an essential factor to reduce the risk of obesity, cardiovascular and metabolic diseases. It is recommended either to perform physical exercise at least 30 minutes every day or to do 10.000 steps per day. In addition to an adequate level of physical activity, balancing the amount of energy and nutrients from diet to real energy and nutrients requirements is important as well. The Sense Wear Armband can be used to monitor energy demand and expenditure, sleep length, physical activity and lifestyle.

**Objectives:** 34 female students of medicine from Medical College at the Jagiellonian University in age  $22\pm 0.5$  were under examination.

**Method/Design:** Daily energy expenditure, duration and intensity of physical activity, number of steps and sleep length were measured with Sense Wear Armband. The level of physical activity was determined by METs (Metabolic Equivalents). Energetic value of daily diets was calculated from 24 hour dietary recall which was carried out for the day in which Sense Wear Armband was used.

**Results:** Average BMI was  $20.5\pm 2.3$ , MET:  $2.48\pm 0.66$ , daily energy expenditure was  $2220\pm 315$ kcal, whereas energy intake from diet was  $1774\pm 142$ kcal. In all women the duration of physical activity at a medium level (MET 3.0-5.9) was  $156\pm 21$  minutes and the average number of steps was  $14280\pm 1224$ . High physical activity (MET>9) was not stated for any of them. In 70% of examined female students the energy uptaken from diet was inadequate to total energy expenditure and it was lower than needed. An excess of energy from diet was noted in 6% of examined women

**Conclusions:** In examined women dietary energy intake was below the total energy expenditure. Duration of physical activity was consistent with the recommendations.

**Key Words:** students of medicine, physical activity, energy intake, metabolic equivalent

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#### 27/837. Nutrition and Healthy Lifestyle

### Healthy nutrition situation in Georgian population

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**Introduction:** With the support of WHO has been held epidemiological survey in 5 regions of Georgia (Tbilisi, Kakheti, Imereti, Achara and Mtskheta-Mtianeti) in September 2005.

**Objectives:** 1. Studying nutritional habits. 2. Studying healthy nutritional informative level. 3. Evaluating household budget level and its distribution on food products purchase.

**Method/Design:** Epidemiological study, using: a) cluster sampling epidemiological method (about 30% of population in each region was involved in this study); b) 24 hours recall method; and c) 7 days household nutrition observation method has been used for this study.

**Results:** In the observed region for the nutritional structure is typical low level of consumed meat, fish and milk products.

From the given food groups:

1. Only 8% consumed the WHO recommended portions of meat, poultry, fish, eggs, and legume (less -58%, more - 34%)
2. Only 22% consumed recommended portions of vegetable (38% - more, 40% - less)
3. Only 30% consumed the recommended portions of fruits (25% consumed more, 45%-less)
4. The rate of sweet consuming is very high. Only 8% consumed the recommended portions (75%- more, 17% - less)
5. Only 12% consumed grains in recommended portions (70% - more, 18% -less). It is clearly seen from the studies that energetically



value is mainly fill with bread and cereals.

6. Only 15% consumed fats in the recommended portions (56% - more, 29% -less)

7. Only 10% consumed the recommended portions of diary products (25% -more, 65%-less).

The fact that meal hours and menu is not distributed in the right way. For examples, there have been noticed families, which have dinner meals instead of breakfast etc.

**Conclusions:** In chosen regions food habits and abilities are very different from each other. Nutrition principles are not fulfilling among majority of questioned respondents. This can be explained by the fact, that it's in fact impossible for the majority of people to get regularly necessary food, because of the high prices and for their low availability and also there is a low level of population being informed about the healthy nutrition. Also, household budgets are not distributed in the right way, so the population (consumer of food) doesn't know exactly to which products give preference while buying them.

**Key Words:** Nutrition, Food, Budget

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#### 27/838. Nutrition and Healthy Lifestyle

### **Dioxins and related compounds a threat to Polish consumers and the assesment of daily intake among Polish students based on food frequency questionnaire**

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**Introduction:** Heath problems related to food contamination are becoming more and more worrying for world public opinion. Diseases caused by dioxins and related compounds found in food were spreading among Taiwanese and Japanese people between 1978 and 1980. In Europe scandals caused by food contaminated with these substances broke out: Belgian in 1998, Irish, 2008 and German in 2010/2011

**Objectives:** Estimation of the threat to polish consumer caused by imported food contaminated with dioxins and related compounds, assessment of dioxins and related compounds intake from food among students in Krakow

**Method/Design:** Food frequency questionnaire was conducted among 101 polish students. For each food category toxic equivalent values (WHO-TEQ) were taken. Students general awareness about these substances was assessed with survey method as well

**Results:** The daily intake assessed from food frequency questionnaire for men was 1,51 pg WHO-TEQ/kg of body weight, but during summer holidays it raises by 50% and reaches 2,16 pg WHO-TEQ /kg body weight. Average intake of dioxins and related compounds amid women was about 0,3 pg WHO-TEQ /kg body weight lower in comparison to men, both in holydays season and during the rest of the year

**Conclusions:** There is a connection between daily intake and the way of nutrition. Questionnaire results indicate that this method is a

good choice for daily intake estimation and TCDD/F risk assessment. Scandals connected with dioxins contamination are evidence of a need to improve the supervising system, food quality and will increase the sense of security among society.

**Key Words:** dioxins, food frequency questionnaire

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#### 27/843. Nutrition and Healthy Lifestyle

### **Eating habits in relation to the Body Mass Index (BMI) in group of Polish adolescents from selected primary schools.**

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<sup>1</sup>PhD; <sup>2</sup>MSC.

**Introduction:** The primary determinant of the proper diet of a children is to develop appropriate eating habits. The prevalence of overweight among children and adolescents has dramatically increased. Less healthy dietary habits and poor food choices may be responsible for this high prevalence.

**Objectives:** The aim of the study was to present dietary habits of school age children and to examine the relation of dietary habits with the body mass index (BMI).

**Method/Design:** The study was conducted in the 2009/2010 school year in five randomly selected schools in Warsaw (Poland). Total of 382 students from fifth and sixth grades of primary schools were examined. Anthropometric measurements (height and weight) and questionnaire about eating behaviors were performed on the children.

**Results:** It was found that children eating at least 3 meals a day ( $p < 0.001$ , ANOVA) as well as eating meals with the family at least 5-6 times a week ( $p < 0.001$ ) have significantly lower BMI. Consumption of fruits and vegetables at least 1-2 times per day significantly decreases BMI value. Stronger association was found if the consumption of fruits and vegetables was 3-5 times a day ( $p = 0.001$ ). The group consuming sweet drinks every day has significantly higher BMI than the others ( $p = 0.001$ ).

**Conclusions:** Selected eating habits appear to be associated with anthropometric characteristics in Polish primary school children. Prevention of overweight and obesity in children should include wide-ranging educational activities in schools as well as nutrition education of parents.

**Key Words:** Adolescents, Eating Habits, Body Mass Index, Nutrition

### Stability and bioaccessibility of different forms of carotenoids and Vitamin A during in vitro digestion

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**Introduction:** Vitamin A deficiency (defined as plasma retinol concentration  $<0.70\mu\text{mol/L}$ ) is a public health issue in numerous countries and affects an estimated 190 million preschool-age children and 19.1 million pregnant women around the world. Promoting rich provitamin A carotenoid diet is a promising strategy but those molecules present in many fruits and vegetables are reputed sensitive and poorly bioaccessible. Food fortification with retinyl esters represents another frequent alternative but their digestive stability and solubility in intestinal micelles have not been widely investigated.

**Objectives:** This study evaluated the stability and bioaccessibility during in vitro digestion (IVD) of carotenoids and retinoids from standards without food matrix, carrot juice, raw and cooked spinach and fortified infant flour.

**Method/Design:** Samples were subjected in vitro digestion. Carotenoids and retinoids stability was assessed by dosing total contents after oral, gastric or intestinal phase. Moreover, their bioaccessibility represented the final micellar fraction after centrifugation ( $\sim 4000\text{g}$ ) and filtration ( $0.45\mu\text{m}$ ) of digestates. HPLC-DAD was used for identification and quantification of analytes.

**Results:** Pure molecules were generally unstable whereas vitamin A from fortified flour and dietary carotenoids were generally better protected by the food matrix. Hydrothermal cooking decreased spinach carotenoid contents from 34% for  $\beta$ -carotene to 97% for violaxanthin. However, it did not affect their digestive stability and even significantly enhanced their bioaccessibility from 15 to 72 fold for  $\beta$ -carotene and lutein respectively. Carrot juice provided the greatest amount of bioaccessible provitamin A carotenoids with  $1847\mu\text{g}/100\text{g DM}$  compared to 792 and  $82\mu\text{g}/100\text{g DM}$  in cooked and raw spinach respectively

**Conclusions:** All carotenoids exhibited very distinct behaviours. Dietary matrices influenced their stability through IVD and bioaccessibility according to their composition and physical state. These results support fruits and vegetables and also fortified flour as reliable vectors of bioaccessible carotenoids and vitamin A for human gut absorption.

**Key Words:** Carotenoids, Retinoids, Fortification, Food matrix, Heat Treatments.

### Clustering of multiple lifestyle behaviours and its relationship to gender, age and physical fitness.

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#### Introduction:

**Objectives:** To identify the clustering of different lifestyle behaviours, and to assess its relationship with gender, age and physical fitness

**Method/Design:** The study comprised a total of 2,456 adolescents aged 12.5–17.5 years (54% girls) participating in the Healthy Lifestyle in Europe by Nutrition in Adolescence (HELENA) study. Three lifestyle behaviours, assessed by self-administered questionnaires, entered in the cluster analysis: Time devoted to moderate-vigorous physical activity (MVPA), sedentary behaviours (time dedicated to study/homework or screen viewing) and healthy diet quality (assessed by the diet quality index, DQI). Health-related physical fitness (aerobic capacity, muscular strength, speed-agility and body composition) was measured by standard field tests.

**Results:** Participants were grouped according to z-score of MVPA (active: medium z-score or very active: high z-score), sedentary activity (non-sedentary: low-medium z-score in study/homework and screen viewing; sedentary due to study: high z-score in study/homework or sedentary due to screen use: screen viewing), and DQI (high, medium or low z-score). Five subgroups emerged from the cluster analysis: Cluster-1 (Medium Healthy: medium MVPA, non-sedentary, high DQI); cluster-2 (Academic: active, sedentary due to study/homework, high DQI); cluster-3 (Sporty: very active, non-sedentary, medium DQI); cluster-4 (Screen users: active, sedentary due to screen use, medium DQI); cluster-5 (Low Healthy: active, non-sedentary, low DQI). Cluster 1 and 2 were represented by most of the

adolescents (58%). Cluster 3, 4 and 5 included a higher percentage of boys. Younger compared to older adolescents had more presence in cluster 3 and less presence in cluster 5. Cluster 3 was associated to higher aerobic capacity, strength and speed/agility in adolescents. Clusters 1 and 5 only differed in DQI but boys from cluster 1 presented higher aerobic capacity than boys from cluster 5.

**Conclusions:** Clustering of different lifestyle behaviours can be observed in European adolescents. These behaviours are associated with gender, age and physical fitness.

**Key Words:** Cluster, physical activity, sedentary behaviours, healthy diet quality, adolescents.

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## 27/853. Nutrition and Healthy Lifestyle

### **Analysis of nutritional intake in obese and gestational diabetic pregnant women participants in the PREOBE project**

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**Introduction:** A balanced diet is needed during pregnancy to get an adequate fetal growth & development and optimal pregnancy outcome and lactation. Nutrient deficiencies will have an effect on "fetal obesity programming". 93 pregnant women participants in the PREOBE Project, between 19-38y were recruited. They were assigned to 3 groups depending on their pre-pregnancy body mass index (BMI) and the presence gestational diabetes (GD): 46 healthy pregnant women (CG: control group) (18<BMI<25), 19 overweight/obese (Ob) (BMI>25) & 28 with gestational diabetes (GD). Declared nutritional intake at 34 wks of pregnancy to evaluate their compliance respect to recommended dietary allowances (RDA) and to detect differences between groups was studied. At 34 wks a seven days diet records (SDDR) was given to the mothers. A trained dietician explained them how to record the SDDR and to encourage writing as much details of foods as possible (97650 records were obtained). Validated Spanish food tables (CESNID) were used for nutrients and energy intake calculation. ANOVA, Bonferroni & Dunnet post-hoc corrections through the SPSS 16.0 were used. The SDDR data showed that almost all pregnant women did not achieved RDA for third trimester of pregnancy. The Ob mothers shown lower dietary intake of fiber (CG, Ob, GD, RDA: 72.37±17.11, 62.07±25.48\*, 80.33±27.63, 72.66±23.14 \*p<0.001) & folic acid (CG, Ob, GD,

RDA: 63.43±17.59, 52.02±21.02\*, 69.74±22.54, 63.01±20.63, \*p<0.001). Ob group also demonstrated significant lower intake of calcium, potassium, magnesium & the % of energy from vegetable protein than GD. Carbohydrate, sugar and calcium intake were lower in overweight/obese mothers vs healthy pregnant women. These results demonstrate the need to evaluate individually dietary intake during pregnancy & to provide extra amount of some nutrients in overweight/obese pregnant women. It is also suggested that education & intervention in obese women population before to become pregnant will be very useful.

**Key Words:** pregnancy, obesity, diabetes, nutrition, programming

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## 27/854. Nutrition and Healthy Lifestyle

### **Does 'morningness' correlate with breakfast eating frequency in a national UK sample?**

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**Introduction:** 'Morningness' has been found to be related to mental and physical health, to career success and breakfast behaviour. As part of an earlier experimental study we observed a moderate correlation between morningness and breakfast eating frequency, indicating that those who are morning-active are more likely to eat breakfast. However to date there have been no studies that have investigated breakfast consumption in relation to morningness in a large, representative sample.

**Objectives:** To test the hypothesis that morningness statistically predicts breakfasting frequency and to explore the role of mental health, personality characteristics and 'breakfast beliefs' as possible correlates of breakfasting in a large UK sample.

**Method/Design:** A UK representative, web-based survey of 1,068 adults was conducted combining standardised scales and self-designed questionnaire statements. The Composite Morningness Questionnaire was used to assess personal preferences for morningness and eveningness respectively. The measure is used as an indicator of individual circadian rhythms. Wellbeing was assessed using the WHO-5 Wellbeing scale. Non-parametric statistical correlations and logistic regressions were run.

**Results:** Morningness correlates with breakfasting frequency ( $r = 0.24$ ). Morningness also correlates with conscientiousness ( $r = 0.21$ ), wellbeing ( $r = 0.32$ ; all  $p$ -values  $< 0.001$ ) and BMI ( $r = 0.15$ ;  $p < 0.01$ ). Logistic regression analysis compared those who never breakfast with those who eat breakfast every day. Gender ( $o-r = 0.998$ ) and socio-economic status ( $o-r = 1.001$ ) did not reach significance, but morningness ( $o-r = 0.938$ ), time spent watching TV ( $o-r = 1.003$ ) and age ( $o-r = 0.969$ ) were identified as significant predictors of breakfast frequency ( $p < 0.05$ ).

**Conclusions:** Individuals who have more of a morning preference are more likely to eat breakfast, as are older people. Hours

watching TV as an indirect measure of physical activity levels has a negative effect on breakfast frequency: those watching more TV are more likely to fast in the morning.

**Key Words:** Breakfast, depression, morningness, personality, physical activity

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### 27/857. Nutrition and Healthy Lifestyle

#### **Adherence to the Mediterranean diet in Italian children: Association with having lunch at school**

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**Introduction:** Few data from studies in pediatric samples exploring adherence to the Mediterranean Diet (MD) are available. Children spend approximately half of their waking hours in school. Schools provide 1 to 2 meals daily and are a natural setting for education about healthy food choices.

**Objectives:** The aim of this study was to investigate the association of adherence to the MD with having lunch provided by the school.

**Method/Design:** A cluster sample of 1740 school children, 8-9 years old, selected in Italy was investigated (ZOOM8 study). Parents were given two self-administered questionnaires: a semi-quantitative FFQ and a questionnaire on their child's lifestyle and physical activity. Body weight and height were measured by standardized personnel. Adherence to the MD was assessed by the KIDMED index.

**Results:** 5.1 % of the sample was classified as "high" adherers of MD, while 61.1% and 33.9% had an "average" and a "poor" score respectively. When considering the geographical area a higher frequency of "high" adherence to the MD was observed in the northern regions (6.0%) compared with the central (4.9%) and the southern (4.2%) ones. When children had lunch at school "average" adherence increased up to 63.7% and "poor" adherence decreased to 31.7%. Lunch was provided to 61.4% of the children by the school. Most schools in the southern regions involved in the study did not supply any lunch for lack of facilities. 62.9% of the children eating lunch at school liked it. When associating "like lunch" with adherence a further slight increase of "high" (5.4%) and "average" (65.5%) was noticed, "low" adherence decreased further to 29.0%.

**Conclusions:** Low adherence rates to the MD were observed in Italian children. Schools with the provision of lunch could play an important role in encouraging the adoption of the MD with its benefits so further investigation is desirable.

**Key Words:** Mediterranean Diet, School and, Lunch

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### 27/862. Nutrition and Healthy Lifestyle

#### **Dietary habits and lifestyle among university students in Serbia**

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**Introduction:** Adequate nutrition and the lifestyle have important role in providing optimal nutritional status and prevention of nutritive risk factors. Acquiring and maintaining healthy dietary and lifestyle behaviors in University students are important factors in preventing the risk of developing chronic diseases.

**Objectives:** The objective of this study has been to determine dietary habits and life style among the students of the Faculty of Pharmacy in Serbia.

**Method/Design:** A validated questionnaire was adapted for the Serbian population and used within sample of 537(117 males and 420 females) Pharmacy students age 18 to 30 year from three different Universities in Serbia. The survey consisted of questions assessing dietary habits, knowledge and behaviors, factors affecting food choices and physical activity

**Results:** Results showed that 62.9% of students consumed chocolate one to six times a week and soft drinks once (49.7%) or twice (43.0%) a day. All together 22.61% of students reported not eating vegetables, while 24.7% of students reported not eating fruit. Only 3.2% of students reported daily vegetable consumption, while 9.7% reported consuming fruit every day. Out of 537 students 72.3% reported having physical activity for at least 1 and up to 3.5 hours on a weekly basis. The study showed 83.8% of male and 85.1% of female participants were smokers and 22.2% of males and 31.0% of females consumed alcohol

**Conclusions:** In this study we have noticed that many students who are training to become health professionals demonstrate unhealthy lifestyle behaviors and eating patterns. Educational interventions should be planned to decrease the health risks attributable to their behavior.

**Key Words:** Students, Dietary Habits, Lifestyle

**An investigation into the association between energy and macronutrient intake and the financial status of Coventry University students**

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**Introduction:** University Students (US) with part-time jobs, have induced stress, less time for studying and underestimate the cost of food. Previous research demonstrated that they spend less on fruit and vegetables compared to sources of saturated fat and sugar, and are more vulnerable to obesity-related diseases and cancer. However, limited research exists on food budget and annual income of US in relation with energy and macronutrient intake.

**Objectives:** The objective of this study was to investigate whether an association exists between the energy and macronutrient intake and the financial status of US of Coventry.

**Method/Design:** A non-experimental observational study recruited 319 students using convenient-sampling; 113 budgeted for food and 122 had a part-time job. An interview style questionnaire assessed financial status (defined as the annual income (£) of students with part-time jobs and the amount of money (£) budgeted on food per week). Energy and macronutrient intake was assessed using a diet history and a food frequency questionnaire that was validated by a 7-day weighed intake method in a subsample of the population. The dietary intakes were analysed using DietPlan6 dietary analysis software, and data was analysed Using SPSS 17.0 software

**Results:** The weak positive relationships between the amount of money spent per week and energy ( $r = 0.110$ ), fat ( $r = 0.077$ ), carbohydrate ( $r = 0.094$ ) and protein ( $r = 0.136$ ) intake was not statistically significant ( $P > 0.05$ ). No statistical significance was found between the annual income of a part-time job and energy ( $r = -0.071$ ), fat ( $r = -0.039$ ), carbohydrate ( $r = -0.104$ ) and protein ( $r = -0.071$ ) intake.

**Conclusions:** No relationship exists between the energy and macronutrient intake and financial status of Coventry US. Further research is required to explore whether financial status is associated with macro and micronutrients intake in a representative sample of US of the United Kingdom.

**Key Words:** Energy, Nutrient, Income, Budget, Student.

**Improvement of total antioxidant capacity, cortisol and anxiety levels in elderly individuals after tryptophan-enriched cereal ingestion**

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**Introduction:** Tryptophan is an essential amino acid precursor of serotonin and melatonin. These amines exert direct actions on mood, well-being, and antioxidant capacity. With aging, the levels of both serotonin and melatonin decrease. This coincides with impaired capacity to cope with stressful situations and lowered tissue levels of antioxidants.

**Objectives:** To examine whether supplementing the diet with tryptophan may influence cortisol levels and the production of free radicals in elderly individuals.

**Method/Design:** 40 volunteers aged 55-75 yr participated in the study. The control week participants consumed tryptophan-enriched cereals (22.5 mg tryptophan/30 g cereals) at breakfast and dinner; the treatment week, cereals enriched with a higher dose of tryptophan (60 mg tryptophan/30 g cereals) were eaten at both breakfast and dinner; the post-treatment week volunteers consumed their usual diet. Urines at 07:00 am and 21:00 pm were collected throughout the study and urinary cortisol and antioxidant capacity levels were determined by commercial ELISA kits (DRG© and Cayman Chemical Company© respectively). Participants were given the State Trait Anxiety Inventory (STAI) and the Beck Depression Inventory to test for significant changes in anxiety or depression, respectively, before the beginning of the study and at the end of each experimental week.

**Results:** Tryptophan-enriched cereal ingestion resulted in increased neutralization of free radicals ( $6.3 \pm \text{SEM}: 2.31 \%$ ) and a diminution of anxiety state (Basal: percentile  $36.16 \pm 5.42$  vs. Treatment: percentile  $16.83 \pm 3.33$ ) and depression (Basal:  $30.00 \pm \text{SEM}: 1.52$  vs. Treatment:  $24.24 \pm \text{SEM}: 0.85$ ;  $p < 0.05$ ). However, no changes in cortisol levels were observed.

**Conclusions:** Chrononutrition applied with tryptophan-enriched cereals may help elderly individuals cope better with daily situations and challenges.

**Key Words:** Chrononutrition, Tryptophan, Elderly, Antioxidant Capacity, Mood.

### **Does dietary habits and anthropometric measurements differ according to residential settings amongst university students?**

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**Introduction:** Previous studies demonstrated that university students (US) may be at higher risk of obesogenic dietary and lifestyle changes, and consequently weight gain. It is plausible that this may be due to residential setting induced dietary behaviour changes. This however has not previously been investigated.

**Objectives:** To identify the differences in dietary habits and anthropometric measurements of US within different accommodation types.

**Method/Design:** US (n=318) were recruited to participate in a non-experimental observational study. Dietary habits were assessed through diet history and a food frequency questionnaire, which was validated in a sub-sample of the population (n= 50) through a 7-day weighed food diary. Anthropometric measurements were measured using OMRON 510 body analyser scale and tape measure. Dietary analysis was conducted using Dietplan-6 software (Forestfield Software, Horsham, UK). Accommodation types were categorised as living at home with parents (HP), halls of residence (HR), rented accommodation (RA) and own home (OH). A one-way ANOVA with post-hoc Tukeys test was used to analyse data. Significance was accepted at P<0.05.

**Results:** Participants in RA had significantly higher (P<0.05) intakes of energy and most macronutrients compared with OH (energy: 2105 vs. 1647kcal/day; total fat: 79 vs. 53 g/day; carbohydrates: 269 vs. 219g/day; salt: 7.0 vs. 5.5g/day, respectively). Protein was significantly higher (P<0.05) in RA (85g/day) compared with HP (70g/day), HR (71 g/day) and OH (64 g/day). There were no significant differences in weight gain between participants in different accommodations types, but mean % body fat (%BF) was significantly higher (P<0.05) for OH (31%), compared with RA (24%) and HP (25%); whereas participants in HR had a significantly higher %BF compared to RA.

**Conclusions:** US living in RA presented unhealthier obesogenic dietary habits compared to OH only. However, US living in OH presented the highest %BF compared to other accommodation types.

**Key Words:** Weight, Accommodation, Energy, Macronutrients, Obesogenic

### **Folate content in protected geographical status and slow food presidia vegetables and legumes**

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**Introduction:** Vegetables and legumes are very good sources of folates and are strongly recommended to improve folate status at population level and reduce the incidence of Neural Tube Defects.

Nowadays, in planning nutritional campaigns it can be useful to enlarge the scope, not simply recommending the use of this or that foodstuff but also considering emerging topics, i.e. how agricultural biodiversity can play a role in improving and moderating nutritional and health problems.

At present, Italy boasts more than 200 Protected Geographical Status (PGS) products and about 300 Slow Food Presidia. PGS is a legal framework defined in European Union law to protect the names of regional foods; Slow Food Presidia are small-scale sustainable farms, supported by Slow Food, a non-profit organization focused on protecting food biodiversity and tradition.

**Objectives:** In the framework of a program founded by the Ministry of Health, a study on the folate content of Italian artichokes, asparagus and legumes of Protected Designation of Origin (PGO), Protected Geographical Indication (PGI) and Slow Food Presidia (SFP) was carried out.

**Method/Design:** Samples of artichokes, asparagus and legumes were purchased directly from the local consortia and analysed according to seasonality. For comparison, samples of artichokes, asparagus and legumes were also collected from supermarkets and wholesalers for the same period. Folate content was evaluated by a microbiological method using *Lactobacillus rhamnosus* as microorganism.

**Results:** Great variation in folate content among the PGO, PGI and SFP asparagus, artichokes and legumes was shown in comparison to the other samples. Particularly high amounts were detected in some ecotypes of asparagus.

**Conclusions:** These results suggest that local biodiversity, including traditional Italian products, could be utilised in the future to promote sustainable, locally-sourced and readily-available sources of folates in Italy.

**Key Words:** vegetables, legumes, food biodiversity, folate content

### **Biodiversity as a tool for improving folate intake**

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**Introduction:** Attention to the importance of a folate-rich diet and folic acid in prevention of congenital anomalies began relatively recently in Italy. In 2004 the “Italian Network for Folic Acid Promotion for the Primary Prevention of Birth Defects” was established with the aim of making recommendations regarding folic acid supplementation. The Network brings together public research institutions, patient organizations, scientific groups, universities, doctors, journalists, publishers, health workers and others in order to promote collaboration and share action strategies. The other principal objective of the Network is to promote proper dietary intake of folates.

This aim is firmly supported by Italian nutritionists and doctors, who believe that high folate intake through the consumption of fruit and vegetables represents the foundation of primary prevention, as well as improving the general state of health, these food being very rich in other vitamins and bioactive compounds.

To promote vegetable, legume and fruit consumption in a stimulating way, research institutions in the Network are exploring new opportunities.

In this context a research program funded by the Ministry of Health is aiming to explore how biodiversity can offer a new opportunity to increase folate intake and to disseminate the importance of consumption of local foods in accordance with a sustainable diet (food cost, CO<sub>2</sub> emission).

The first phase foresees the study of folate content in some vegetables, legumes and fruit of Protected Geographical Origin, Protected Geographical Indication (PGI) and Slow Food Presidia.

The second phase foresees the planning of nutritional intervention and campaigns, including the creation of simple, practical recipes based on local products and tradition, and initiatives like Folate Watch, a model which suggests appropriate local and seasonal foods for consumption over the day on the basis of the user’s location, in order to encourage a return to a traditional healthy Mediterranean lifestyle.

**Key Words:** Folates, Vegetables, Fruit And Legumes Promotion and Biodiversity

### **Impact of maternal weight and weight gain over pregnancy on breast milk bioactive factors and microbiota composition**

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**Introduction:** Industrialized countries worldwide are experiencing progressive increase of immune and metabolic diseases, and the velocity of propagation is particularly outstanding in infants. There is evidence that obesity may be programmed by environmental and nutritional experiences early in life. Breast milk is considered the optimal infant source of nutrition and contains bioactive components and microbes which support the infant immune system development and microbial colonization. We hypothesize here that breast milk composition may depend on maternal health and nutritional status in pregnancy.

**Objectives:** To assess the impact of mother’s weight and weight gain over pregnancy on breast milk composition during first six months of breastfeeding.

**Method/Design:** Mothers (n=56) were selected from an ongoing prospective study according to their Body Mass Index (BMI $\leq$ 25 Kg/m<sup>2</sup> for normal and BMI $>$ 25 for overweight). Breast milk samples were taken following delivery and 1 and 6 months after delivery for the analysis of TGF- $\beta$ 2, soluble CD14, cytokines and microbiota composition.

**Results:** The concentration of TGF- $\beta$ 2 and sCD14 tended to be lower in overweight than normal weight mothers. The predominant microbiota comprised bifidobacteria and lactobacilli. Overweight mothers showed significant lower Bifidobacterium group and higher levels of Staphylococcus group bacteria than those on normal weight mothers. Similar results were found in mothers manifesting excessive weight gains during pregnancy. Higher levels of sCD14 related with higher levels of Bifidobacterium while Staphylococcus group, and also, *St. aureus* were related with higher levels of IL6. Furthermore, higher levels of IL6 in colostrums were related to higher levels of Staphylococcus group in normal weight mothers and lower levels of Bifidobacterium group in excessive weight women over pregnancy.

**Conclusions:** Complex interactions of microbiota and cytokines in breast milk guide the microbiological, immunological, and metabolic programming of child health. Our data may provide an additional mechanism for increased risk of later obesity development in infants of overweight mothers.

**Key Words:** Breast milk, cytokines, microbiota, infant, overweight, obesity

### **Olive oil matrix of tomato sauce affects plasma phenolic concentrations and systemic inflammatory biomarkers related to atherosclerosis.**

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**Introduction:** The combination of tomatoes with olive oil in food preparation is a typical dietary habit in Mediterranean countries, and tomato sauce, the most extensively consumed tomato product worldwide, is commonly elaborated and commercialized both as an oil-free and oil-enriched product. The combination with a lipid matrix may favor the extractability and bioaccessibility of tomato carotenoids and polyphenols, increasing the functionality of tomato bioactive components.

**Objectives:** We examined the effect of olive oil addition in tomato sauce on plasma phenolic concentration and inflammatory biomarkers related to atherosclerosis

**Method/Design:** We carried out a randomized controlled cross-over study administering to 5 healthy men (mean age 29.6±3.75 years; mean BMI 24.46±1.85 kg/m<sup>2</sup>) a single dose of tomato sauce without oil (OO-F) and tomato sauce elaborated with the addition of virgin olive oil (VOO-E) or refined olive oil (ROO-E) during processing. Phenolic were measured in plasma by LC/MS/MS after a SPE extraction. Cellular and serum inflammatory biomarkers were measured using a FACSCalibur flow cytometer and standard ELISA assays, respectively.

**Results:** Differences in the plasma pharmacokinetic profile of naringenin glucuronides were observed after ingestion of the oil-enriched tomato sauces, suggesting that the occurrence of re-absorption events by enterohepatic circulation was particularly stimulated by the lipid matrix added during sauce. After intervention with VOO-E, a significant reduction in the expression of CD11b, CD49 and CD15 in monocytes and lymphocytes, and CD40 and CD11a in monocytes were observed, as well as a significant reduction of serum IL-1 $\alpha$ , IL-6 and MCP-1, compared to their counterparts .

**Conclusions:** Food matrix influences in the functional response of the bioactive compounds. Olive oil addition affects positively to the bioavailability of phenolic compounds and reduces the inflammatory response expression in peripheral blood cells (monocytes and lymphocytes) as well as serum inflammatory biomarkers related to atherosclerosis.

**Key Words:** Tomato, Matrix Effect, Olive Oil, Polyphenol, Inflammatory Biomarkers

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**27/892.** Nutrition and Healthy Lifestyle

## **Evaluation of the cabbage and cucumber juices as substrate for the development of lactobacillus acidophilus**

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**Introduction:** The nutritional potential of vegetables is remarkable, so the production of lactic acid fermented juices seem to be an alternative for the lactose-intolerant persons or vegetarians, and in the same time for the persons concerned by the own healthy.

**Objectives:** The ability of the juice obtained from cucumber, white and red cabbage respectively to represent a substrate for the growth of *Lactobacillus acidophilus*, in order to obtain probiotic products, was investigated.

**Method/Design:** The vegetable juices heat-treated to 80°C for 10 minutes and cooled to the optimum temperature were inoculated with *Lb. acidophilus* (Chr. Hansen). During 48h the pH values, the titratable acidity, the reducing sugar content and the viable cells count were followed. The experimental data were analyzed using SPSS Statistics 19.

**Results:** *Lb. acidophilus* was very well adapted to the cabbage as new substrate, because in the first 2h the pH has declined by one unit, while the microbial population has increased almost 100 times. After 48h the decrease of the reducing sugar ranged between 1.16 to 1.54 g/100ml and the lactic acid content was increased about 13 times. *Lb. acidophilus* was faster accommodated in cucumber juice, the maximum rate of acidification  $v_{max}$  (dpH/dt) being achieved in 2h (9.33x10<sup>-3</sup> units/min). If some differences were established referring to time to reach pH 5.0 (more than 2h in the case of the red cabbage), the time to complete the fermentation (tpH 4.2, hours) was for all the batches about 6h. A good survival rate of bacteria was determined in refrigeration conditions, a count by 10<sup>6</sup>/ml being viable after one month.

**Conclusions:** Although some differences between the development curves of *Lactobacillus acidophilus* were determined, the cabbage and the cucumber are suitable for obtaining lacto-fermented juices with probiotic characteristics and a higher self-life.

**Key Words:** lactic acid fermentation, vegetable juice, *Lactobacillus acidophilus*, probiotic.

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**27/904.** Nutrition and Healthy Lifestyle

## **Microbicide capacity decreased in peritoneal leucocytes from diet-obese mice due to an unbalanced redox state**

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**Introduction:** Obesity is associated with an oxidative stress situation, which can affect the function of immune cells. Microbicide capacity needs free radicals such as the superoxide anion, but an increase in the levels of this oxidant can produce oxidative damage.

**Objectives:** To investigate the microbicide capacity and the redox balance in leucocytes from obese mice after being fed a high fat diet during short and long periods.

**Method/Design:** Adult female ICR-CD1 mice were used. Animals at 14 weeks of age were divided into two groups: 1) Mice were fed an adjusted calories diet with 60% of total calories coming from fat (60/fat) (Harlan) (obese mice: OM) and 2) mice were fed a standard diet (Harlan) (control mice: CM). After 6 and 16 weeks of the ingestion of these diets the peritoneal leucocytes were obtained and the microbicide capacity (intracellular superoxide anion levels) as well as xantin oxidase (XO) (an oxidant) and catalase (CAT) (an antioxidant defence) activities were analysed.

**Results:** After 6 weeks of the ingestion of the 60/fat diet, mice showed higher weight and superoxide anion levels than CM, whereas no changes in XO and CAT were observed. After 16 weeks, the leucocytes from OM showed a decrease in the microbicide activity, together with a significant increase in CAT and a decrease in XO activities.

**Conclusions:** Diet-obese mice showed a deterioration of microbicide capacity as consequence of the increase in oxidant levels at the start of obesity, which produces a compensatory increase in CAT activity and consequently a decrease in XO activity. The alteration in the redox balance after a long period of established obesity seems to produce an impairment of the immune function.

**Key Words:** Obesity, intracellular superoxide anion, catalase, xantine oxidase

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## 27/905. Nutrition and Healthy Lifestyle

### Adult diet-obese mice show a premature senescence in natural killer activity

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**Introduction:** Obesity, a new pandemic disease, is associated with a chronic grade of oxi-inflammation, which is related to the immunosenescence phenomenon. This impairment of the immune function could be one the reasons of the obesity-related increase of rate of aging, morbidity and risk of death. Preliminary results have

shown a premature immunosenescence in genetically obese rats. An age-related decrease of the natural killer (NK) activity has been observed, this function being a marker of health, biological age (rate of ageing) and longevity.

**Objectives:** To investigate if there is a change in the NK activity against tumoural cells in obese mice submitted to a high-fat diet compared with control animals.

**Method/Design:** Female ICR-CD1 mice of 30 weeks of age (adult) were used. Animals at 14 weeks of age were fed an adjusted calories diet with 60% of total calories coming from fat (60/fat) (Harlan) (obese mice: OM). Mice fed a standard diet (Harlan) were used as controls (control mice: CM). After 16 weeks of the ingestion of these diets the peritoneal leucocytes were obtained and their natural killer (NK) activity (percentage of lysis of a murine tumoural cell line) was analysed.

**Results:** Leucocytes from obese mice showed a statistically significant decrease in the NK activity ( $p < 0.05$ ) in comparison with controls.

**Conclusions:** The ingestion of a hypercaloric diet, rich in fat, for 16 weeks in mice produces obesity with a clear impairment of a key immune function such as NK activity, which could predispose a high risk of infections and tumours. Moreover, the decrease of NK activity represents a higher biological age, and, consequently, the adult obese animals show a premature ageing.

**Key Words:** Obesity by diet, immunosenescence, NK activity, mice.

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## 27/906. Nutrition and Healthy Lifestyle

### Study of the allergenicity of extensively hydrolyzed formula

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**Introduction:** The hydrolyzed formulae used in the prevention of the allergy of cow's milk, are gotten by enzymatic hydrolysis of the bovine milk. But, it seems at the present time that no hydrolysate is deprived completely of intact proteins immunoréactives.

**Objectives:** Aim of work; study the allergenicity of the extensively hydrolyzed formula (standard formula, from an animal model (Balb/c) mice, made sensitive with the major allergenic protein of cow's milk ( $\beta$ -Lg).

**Method/Design:** female mice Balb/c ( $22,50 \pm 0,27g$ ), 48 mice immunized with native ( $\beta$ -Lg) and 12 female mice Balb/c receiving no treatment. Samples from, extensively hydrolyzed formula, standard formula "first age" and native bovine whey are used in this study and characterized on the biochemical plan by dosage of the total proteins (Lowry method). The allergenicity of formulae is studied in Ussing chamber, by tests of provocation done on jejunal fragments of Balb/c mice, sensitized by parenteral way with  $\beta$ -lactoglobulin ( $\beta$ -Lg). The

local anaphylactic response is evaluated by the measure of the electro-physiologic parameters of tissue: short circuit current (Isc,  $\mu\text{A}/\text{cm}^2$ ) and conductance (G, mmho).

**Results:** the obtained results show that the amount of proteins of both, standard and extensively hydrolyzed formulae is close to the amount found in human milk. On the plan of the allergenicity, the extensively hydrolyzed formula stimulates the current of short circuit (Isc), translating local anaphylactic reaction. This reaction is comparable to the one gotten with the sensitizing protein ( $\beta$ -Lg), the native bovine whey, and the standard infantile milk.

**Conclusions:** the peptides of low molecular weights of the extensively hydrolyzed formula are endowed with an allergenic power to Balb/c mice.

**Key Words:** Proteins hydrolysate Infant formulae, Milk formulae Allergenicity of hydrolysats and Human milk  $\beta$ -Lg

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### 27/907. Nutrition and Healthy Lifestyle

#### Assessment of sodium intake with daily diets by adolescents

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**Introduction:** Sodium is an essential element for human organism; however excessive intake of this mineral in the daily diet may lead to increased risk of hypertension, cardiovascular and kidney diseases.

**Objectives:** The aim of the study was to assess sodium intake with daily diets by adolescents (aged 10–18) living in Malopolska Region, Poland.

**Method/Design:** The subjects were 568 respondents divided into three age categories: 10-12 years (80 boys and 95 girls), 13-15 years (114 boys and 103 girls) and 16-18 years (50 boys and 126 girls). Daily sodium intake was estimated by 24-h dietary recall and calculated using 'Diet 2.0' computer software. Obtained results were compared to the Adequate Intake (AI) and Tolerable Upper Intake Levels (UL).

**Results:** The results obtained showed that boys had a significantly higher intake of sodium than girls in each studied age group. It was found that the AI value was exceeded for all respondents. Daily intake of Na among boys aged 10-12 was 3114.0 mg and among girls 2678.0 mg, on average. In the age group of 13-15, the intake was 4006.8 mg and 2762.2 for boys and girls, respectively. Daily diets of pupils 16-18 aged contained 4759.0 mg (for boys) and 2902.0 mg (for girls) sodium. Intake of sodium by about 84% of examined subpopulations was above UL.

**Conclusions:** The excessive intake of sodium among adolescents was observed. Integrated action directed towards young people edu-

cation, involving families, school and industry is necessary.

**Key Words:** Adolescents, Sodium Intake, Daily Diet

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### 27/908. Nutrition and Healthy Lifestyle

#### Effects of a high-protein diet on the cuadriceps's nitrogen content of rats following resistance training

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**Introduction:** Exercise can reverse the metabolic adverse effect of high-whey protein diet consumption. Moreover, anabolic steroids may help to fix more nitrogen (protein) to the muscle.

**Objectives:** We aimed to analyse the effects of high-protein diet, steroids and resistance training on the protein content on quadriceps' rats.

**Method/Design:** A total of 80 adult male Wistar rats were randomly distributed in 8 experimental groups (n=10): high-protein diet or normal protein diet, with or without steroids and with or without resistance training. Diets were based on commercial hydrolyzate of whey. The exercised groups following a training protocol previously described by Aparicio et al. (2010). Once a week, nandrolone was injected to the animals from the steroid's group. Total nitrogen content was determined according to the Kjeldhal method. Crude protein was calculated as N x 6.25. Plasmatic urea was measured using a HITA-CHI Roche p800 autoanalyser.

**Results:** Anabolic steroids and high-whey protein increased the quadriceps's weight ( $0.763 \pm 0.01$  g/100g rat  $P \leq 0.01$ ). The higher plasma concentrations of urea found in the high-proteins groups against with the normal-whey protein group (-37.1% vs. -9.9% mg/dl  $P = 0.01$ , respectively) might explain, which is the highest. Furthermore, we have observed an interaction training-diet, where exercise combined with a high protein diet decreased the levels of urea ( $P = 0.003$ ). We did not find differences in the quadriceps' nitrogen and water content, except for the group of steroids, normal-protein diet and sedentary when compared with the group of normal-protein diet, sedentary and without steroids ( $75.1 \pm 0.5$  vs.  $73.4 \pm 0.4$ , respectively,  $P = 0.05$ ).

**Conclusions:** We have not observed differences in the nitrogen content on quadriceps' rats consuming a high-protein diet or with or without anabolic steroids injection. On the other hand, resistance training decreased the concentration of plasmatic urea (metabolic acidosis marker) suggesting that all the excess of protein was metabolized.

**Key Words:** Quadriceps, resistance exercise, anabolic steroids, high-whey protein, plasmatic urea.

27/911. Nutrition and Healthy Lifestyle

### **Fish oil-supplementation in 9-18 month-old infants affects heart rate and attention in a free play-test**

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**Introduction:** Intake of marine n-3 polyunsaturated fatty acids (n-3 LCPUFA) has been shown to improve perinatal development of the central nervous system (CNS) and to reduce risk of cardiovascular dysfunction late in life.

**Objectives:** to examine if fish oil-supplementation in late infancy modifies heart rate (HR) and score on a free play-test and to see if these are related.

**Method/Design:** In a 2x2-intervention, 83 healthy Danish infants were randomized to  $\pm$ fish oil (FO) (3.4 $\pm$ 1.1 mL/d) and cow's milk or formula from 9 to 12 months of age. At 9 and 12 months, 63 of the infants successfully completed the free play-test, 57 the 0.5-h ECG recordings and 39 had both set of data. Erythrocyte (RBC) eicosapentaenoic acid (EPA) was used as a compliance-marker. The milk intervention did not affect any of the outcomes.

**Results:** Fish oil-supplementation raised RBC-EPA ( $p < 0.001$ ). Most of the free play-scores differed significantly with age and gender, but the only score difference that was observed between the groups was a increase in the number of episodes with quite inattention in +FO relative to a decrease in -FO ( $p = 0.002$ ). Furthermore, the increase in RBC-EPA was associated with an increase in quite inattention during the intervention ( $r = 0.349$ ,  $p = 0.040$ ,  $n = 35$ ). A significant group differences in HR, was seen only among boys, who in the +FO-group had 6% longer mean RR-interval than the -FO boys ( $p < 0.007$ ). There was also a positive association between the 9-18 month-changes in RR-interval and RBC-EPA ( $r = 0.711$ ,  $p < 0.001$ ,  $n = 30$ ). The changes in mean RR-interval and in number of quite inattentive episodes were close to significantly correlated ( $r = 0.312$ ,  $p = 0.053$ ).

**Conclusions:** As both CNS-regulated functions are affected in parallel, this may imply that the "cognitive" and the "cardiovascular" effects of n-3 LCPUFA are related. The results furthermore show that n-3 LCPUFA also in late infancy influence CNS-development.

**Key Words:** Long-chain n-3 polyunsaturated fatty acid, central nervous system, cognitive development, heart rhythm, infant nutrition

27/914. Nutrition and Healthy Lifestyle

### **Assessment of food consumption pattern of school children (aged 10-12)**

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of Agriculture in Krakow. Balicka 122. 30-149 Krakow. Poland.

**Introduction:** Properly balanced daily diet supplying all nutrients is one of the most important factor influencing development of a human being and promoting health. During adolescence underfeeding and overfeeding may affect the health in the future.

**Method/Design:** Data for analysis were obtained by 24-hour dietary recalls collected in spring and autumn 2006, for 3 days per week (Tuesday, Friday and Sunday), from primary school children in Krakow (69) and Skawina (100), the Malopolska Region, Poland. Based on the obtained data about food products, the daily diets were reconstructed in laboratory. After cooking, the material was homogenized. Vitamin C content was determined in fresh material, according to Tillman's method modified by Pijanowski. In freeze-dried materials concentrations of protein (Dumas method), total fat (CO<sub>2</sub> in supercritical state), calcium, iron, zinc and copper (AAS) were measured. The level of total carbohydrates was calculated. Obtained results were compared to the value of the recommended daily intake (RDA).

**Results:** It was found that seasonality had no significant effect on the most analyzed nutrients. Chemical analysis showed, that content of protein in daily diets exceed RDA value about 45% in both seasons. The content of fat and carbohydrates did not meet requirements (respectively 47-86% of RDA and 30-51% of RDA). Intake of vitamin C (60-81% of RDA), calcium (54-56% of RDA), iron (48-98% of RDA), zinc (59-95% of RDA) and copper (25-55% of RDA), in both seasons, also did not meet requirements.

**Conclusions:** Results, presented in this study, indicate considerable feeding way mistakes among the children aged 10-12.

**Key Words:** Nutritional Pattern, Children, Energy, Nutrients

27/917. Nutrition and Healthy Lifestyle

### **An investigation of dietary patterns in the Irish adult population.**

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**Introduction:** In recent years, nutrition research has moved towards using techniques such as dietary pattern analysis, to analyse dietary intakes associated with groups of foods.

**Objectives:** The aim of this research was to identify dietary patterns in a representative sample of Irish adults, using cluster analysis, where patterns are based on differences in dietary intakes amongst individuals.

**Method/Design:** The Irish National Adult Nutrition Survey (NANS) which consists of food intake data for 1500 adults, aged 18+ years, was used for this analysis. In the NANS, a semi-weighted

four day food diary was used to collect information on all foods and beverages consumed. For this analysis, food intake data was reduced to 33 food groups. For each subject, their food group intakes were expressed as the percentage contribution to total energy intake (%TE) and corresponding z-scores were calculated. K-means cluster analysis was conducted on these standardised variables to derive patterns of dietary intake.

**Results:** Cluster analysis identified six distinct clusters. Cluster 1 was characterised by a higher energy contribution from red meat dishes, confectionary and savoury snacks. Cluster 2 was characterised by a higher energy contribution from white bread, butters and sugars, whole milk and a lower energy contribution from alcoholic beverages. Cluster 3 was characterised by a higher energy contribution from red meat, potatoes and low fat spreads and a lower energy contribution from confectionary. Cluster 4 was characterised by a higher energy contribution from poultry dishes and rice and pasta. Cluster 5 was characterised by a higher energy contribution from alcoholic and high energy beverages, meat products, savouries, chips and processed potatoes, and a lower energy contribution from breakfast cereals and biscuits. Cluster 6 was characterised by a higher energy contribution from fruits and vegetables, fish, poultry and yogurts.

**Conclusions:** Six different patterns of similar food intake were identified in this population. Further research should consider how the clusters should be interpreted and whether dietary patterns identified differ according to age and gender.

This study was funded by the Irish Department of Agriculture, Fisheries and Food under the Food for Health Research Initiative (2007-2012).

**Key Words:** Dietary patterns, Irish adults, cluster analysis.

## 27/918. Nutrition and Healthy Lifestyle

### Assessment of folate intake with daily diets by adolescents

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**Introduction:** Inappropriate intake of folate may increase risk of diseases such as cardiovascular diseases, some carcinomas, and neural tube defects.

**Objectives:** The purpose of this study was to assess intake of folate with daily diets by 568 adolescents from selected schools in Malopolska Region, Poland.

**Method/Design:** The subjects were 568 respondents divided into three age groups: 10-12 years (80 boys and 95 girls), 13-15 years (114 boys and 103 girls) and 16-18 years (50 boys and 126 girls). The assessment was performed by 24-h dietary recalls and by using 'Diet 2.0' computer software. The results obtained were compared to the Estimated Average Requirement (EAR).

**Results:** It was found that all the results gained was considerably lower than the EAR value. Daily diets of boys had significantly higher content of folate in comparison with girls in each age group. Mean folate intake among boys and girls aged 10-12 was 182,0 µg and 163,0 µg, respectively. Diets of pupils aged 13-15 contained 229,6 µg (for boys) and 174,6 µg (for girls). In the age group of 16-18, the intake was 313,2 µg and 214,7 µg, respectively. Adolescents at risk of inadequate folate intake (<EAR) were about 95% in the age of 10-12, 94% for 13-15-years old pupils, and 86% for the age group of 16-18.

**Conclusions:** It was found that most of all adolescents did not meet requirements for folate. Nutritional education should be continued in order to increase the consumption of such sources of folate as green leafy vegetables.

**Key Words:** Folate Intake, Adolescents, Daily Diet

**Fluid intake habits of undergraduate university students in the United Kingdom: an observational study**

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**Introduction:** During the university scholastic period, students undergo consecutive years of learning and assessment, which requires optimal cognitive functioning. Hypohydration has previously been shown to impair cognitive function. Anecdotal evidence suggests undergraduate university students (US) may not be meeting national hydration guidelines, presenting a chronic state of mild hypohydration.

**Objectives:** To investigate fluid intake habits (quantity and quality) of US, midway through an academic semester, where optimal cognitive function is crucial.

**Method/Design:** After local ethical approval, US (n=319) were recruited to participate in a non-experimental observational study, comprised of a comprehensive structured interview that assessed dietary-lifestyle characteristics. Daily fluid intake (quantity and quality) was determined through a current dietary history and food frequency questionnaire; which was validated against a 7-day weighted food/fluid record in a subsample (n=50), and analysed by Dietplan6 dietary analysis software. Data was analysed using a one-way ANOVA and independent-sample t-test. Significance was accepted at  $P<0.05$ .

**Results:** Average total water ingestion from food and fluid (excluding alcohol containing beverages) sources was 1621ml/day (range: 249-3554ml/day), of which fruit juice (+equivalents) contributed 7%, coffee 8%, soft drink (+equivalents) 13%, teas 16%, milk (+alternatives) 17%, while drinking and food water contributed 39%. Total water ingestion was significantly higher in male US ( $1758\pm 729$ ml/day) compared with female US ( $1484\pm 707$ ml/day;  $P<0.01$ ). No significant difference in total water intake was observed between US accommodation type ( $P=0.279$ ). While, US reporting being highly physically active had higher total water ingestion ( $1916\pm 769$ ml/day), compared with US reporting being moderately physically active ( $1560\pm 718$ ml/day) and inactive ( $1593\pm 707$ ml/day;  $P<0.05$ ).

**Conclusions:** Fluid ingestion habits of US appear not to meet the national fluid intake guidelines for hydration. This may possibly contribute to sub-optimal cognitive functioning during periods of cognitive necessity. Further investigations are still required to assess the hydration status of US, and the effects of hypohydration on cognitive function in US.

**Key Words:** Hydration, Drinking, Lifestyle, Cognitive, Dietary.

**Examination of eating locations in a representative sample of Irish adults**

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**Introduction:** The influence of eating location on the diets of Irish children has been previously examined with poorer nutrient intakes being associated with foods consumed outside of the home.

**Objectives:** Using data from the Irish National Adult Nutrition Survey (NANS, 2010), the aim of the present work was to characterise the eating locations where Irish adults consume food and beverages, and the extent to which the various locations contribute to dietary energy intake.

**Method/Design:** Participants recorded all food and beverages consumed during a 4-day period using a semi-weighed food diary as part of the NANS. The 'eating location' was also recorded; this was classed as the location where the food prepared. Overall, there were 133,068 eating occasions in the NANS dataset, from which 17 different eating location categories were identified. These eating location categories were collapsed in to 7 groups for the current analysis.

**Results:** The majority of meals consumed by Irish adults were prepared at home (78% of all eating occasions); however, a large proportion of the population (80%) ate at least one meal outside the home (which accounted for 19% of all eating occasions). Restaurants (7%) and work (6%) were the most common eating places outside of the home. Amongst those people who ate 'outside of the home', food and drink eaten at work contributed the highest percentage to dietary energy (19%), followed by foods consumed in restaurants (14%).

**Conclusions:** These results suggest that the home should be the main focus for anti-obesity and healthy eating campaigns in Irish adults; however, workplaces and restaurants should also be considered. Further work will be completed to explore the macro- and micronutrient intakes at each location.

**Key Words:** Eating location, Irish adults, dietary energy intake.

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27/924. Nutrition and Healthy Lifestyle

**Daily nutrient intake influence on urinary lipid oxidation biomarkers in healthy human: a pilot study**

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**Introduction:** Oxidative stress is related to an imbalance between the production of reactive species and the antioxidant defenses. Dietary factors that may limit or encourage lipid damage triggered by radicals is important for optimization of nutrient intake, therefore reducing the risk of development of modern degenerative diseases.

**Objectives:** The aim of our study was to examine the influence of daily nutrient intake, as positive and negative factors, on urinary levels of malondialdehyde (MDA) and 4-hydroxy-2-nonenal (4HNE) in healthy human.

**Method/Design:** This pilot nutritional study was undertaken using the food diary weighing method for 15 days. Nutrient intake was assessed with Prodi 5.7 computer nutritional programme. Next day morning urine samples were used for lipid oxidation marker analysis, therefore levels were normalized with creatinine value. MDA and 4HNE were analysed by GC/MS system. Results were statistically evaluated by using PASW Statistics 18 programme.

**Results:** Average MDA and 4HNE levels were  $25,85 \pm 9,51$  and  $0,31 \pm 0,30$  ng/mg creatinine, respectively. Results showed weak correlation between urinary MDA and 4HNE, but it was not statistically significant. All positive factors such as antioxidant vitamins, total dietary fiber and  $\beta$ -carotene showed no influence on MDA, nor 4HNE, therefore no statistically significant correlation was found. However there was a statistically significant correlation between PUFAs and 4HNE ( $r=0,534$ ) compared to MDA, where correlation was not found. Moreover there was also correlation between linoleic acid, as major precursor for lipid oxidation, and 4HNE urinary excretion ( $p=0,034$ ).

**Conclusions:** The results indicate that average daily macronutrient intake in terms of energy caloric profile was sufficient and in compliance with DACH Reference for Nutrient Intake. Intake of PUFAs and linoleic acid as a substrate for lipid oxidation had influence on urinary excretion of 4HNE, but not on MDA. Moreover none of the positive factors showed significant effect on analyzed biomarkers.

**Key Words:** nutrition, nutrient intake, healthy human, urinary lipid peroxidation markers

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27/926. Nutrition and Healthy Lifestyle

**Effect of dietary fats on the fatty acid composition of meat in chickens**

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**Introduction:** As a mean of increasing the low consumption n-3 PUFA by humans consuming western diets, there has been some interest in the enrichment of poultry meat with these beneficial and healthy acids.

**Objectives:** To investigate the effect of feeding different sources of dietary fat on fatty acid composition of meat in broiler chickens.

**Method/Design:** A total 20 one-day-old male Ross 308 chicks were fed the same basal diet for 21 d. Then, broilers were fed for 33 d on one of four wheat-soyabean meal based diets, five birds per treatment. These diets were fish oil, algal biomass, echium oil and linseed oil. The echium oil was used as a source of SDA, the algal biomass as a source of DHA, the fish oil as a source of EPA+DHA and the linseed oil as a source of  $\alpha$ -linolenic acid. Chickens were sacrificed between 41 and 43 d of age and tissue samples were collected and analysed for fatty acid profile by gas chromatography.

**Results:** the source of n-3 PUFA determined the pattern of fatty acid incorporation in meat of broilers, especially for the individual PUFA such as EPA, DPA, DHA and  $\alpha$ -linolenic acid, as well as the total amount of n-3 and n-6 fatty acids. Feeding diet rich in FO significantly increased EPA, DPA and DHA while feeding linseed oil significantly increased  $\alpha$ -linolenic acid. Feeding algal biomass increased the incorporation of DHA and feeding echium oil increased the incorporation of EPA.

**Conclusions:** Human consumption of n-3 PUFA can be increased by enrichment of poultry meat with these fatty acids. Algal biomass is as efficient as FO in elevating DHA proportions in chickens.

**Key Words:** n-3 PUFA (polyunsaturated fatty acids), n-6 PUFA, EPA (Eicosapentaenoic acid), DPA (Docosapentaenoic acid), DHA (Docosahexaenoic acid)

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27/928. Nutrition and Healthy Lifestyle

**Patterns of overweight and obesity in Irish adults**

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**Introduction:** The prevalence of overweight and obesity has increased dramatically on a global scale over the past decade in both developing and developed countries. A body mass index (BMI) equal to or greater than 25kg/m<sup>2</sup> defines overweight, while a BMI equal to or over 30kg/m<sup>2</sup> defines obesity, according to the World Health Organisation (WHO).

**Objectives:** The purpose of this research was to explore trends in overweight and obesity in adults in the Republic of Ireland over the

last twenty years.

**Method/Design:** Anthropometric data from the Irish National Nutrition Survey (INNS, 1990), the North South Ireland Food Consumption Survey (NSIFCS, 2001) and the National Adult Nutrition Survey (NANS, 2011) were merged and BMI was determined as weight (kg) divided by height (m) squared, with cut-offs defined according to the WHO.

**Results:** The prevalence of obesity in Irish adults has increased approximately 2.2 fold, from 10.7% to 23.5%, over the last twenty years. This trend was observed in both men (3.3 fold increase) and women (1.7 fold increase). In contrast, the prevalence of normal weight has decreased approximately 11%, between 1990 (INNS) and 2011 (NANS) for the total population and for both men and women. Significant changes in the proportion of the population classified as overweight were also observed.

**Conclusions:** These results highlight the growing prevalence of obesity in Irish adults. Effective treatment and prevention strategies are needed to avoid further increases in the next decade.

**Key Words:** Obesity; Prevalence; Ireland

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## 27/932. Nutrition and Healthy Lifestyle

### **Associations between breakfast skipping and weight status in seven European countries: the energy-project**

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**Introduction:** Overweight and obesity are important determinants for health. Eating breakfast is one of the energy related balance behaviors assessed in the ENERGY project (European Energy balance Research to prevent excessive weight Gain among Youth), and can be important to target in public health policies across Europe.

**Objectives:** The objective of the present study is to assess the associations between breakfast skipping and weight status across and within seven European countries.

**Method/Design:** A school-based survey was conducted in Belgium, Greece, Hungary, the Netherlands, Norway, Slovenia and Spain. Approximately 1000 children were included from each country, giving a total study sample of 7234 children. Weight and height were measured by trained staff, and weight status (normal weight vs. overweight/obesity) was based on the International Obesity Task Force criteria. Breakfast eating was self-reported in a questionnaire by frequency measures assessing number of breakfasts eaten per week and by a recall question asking whether they ate breakfast yesterday or not. All measurements and data handling were standardized across the participating countries.

**Results:** Preliminary descriptive results show that there was an

association between eating breakfast and weight status across the participating countries, and within most of the countries; those skipping breakfast were more often overweight than those not skipping breakfast. The data will be further analyzed and more detailed data will be presented.

**Conclusions:** It appears that eating breakfast is related to weight status for adolescents aged 10-12 year olds across, and within, several European countries.

**Key Words:** Breakfast, Overweight, Europe, Energy-Project

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## 27/937. Nutrition and Healthy Lifestyle

### **Evaluation of obesity and motivation in a group of children and adolescents conflict.**

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**Introduction:** The number of cases of child and adolescent obesity in recent years have doubled, and problematic adolescent those with poor school performance and bad behaviour. In this study we establish a relationship by studying the psychological variables to obesity appear related that, either inside or complications of STIs pathogenesis of the disease.

**Objectives:** To study the relationship between overweight and low self-esteem in the adolescent's conflict.

**Method/Design:** We analyze the results of interviews with the adolescents conflict between the years 2007-2010, about their eating habits, psychological characteristics and disruptive behaviours.

**Results:** Our data confirm the Relationship Between obesity in adolescents and vulnerability have that show low self-esteem. These 35% of adolescents are overweight the conflict or obese including. More Than 50% admit to not feeling good about them-selves. Another that has been studied variable is the style of the behavioural obese adolescents, the result being that they all exhibit disruptive or antisocial behaviors.

**Conclusions:** In This Regard Concluded That it is the parents of These subjects report to greater number of behavioural problems, lack of academic failure and school motivation. This mean that you approach the disorder is viewed from a biopsychosocial perspective, shedding light of which allows the impact that obesity have on the psychosocial adaptation and psychological development of the adolescent.

**Key Words:** Overweight, adolescence, antisocial behaviour, school motivation.

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**27/940.** Nutrition and Healthy Lifestyle  
**Development and testing of an obesity prevention program for young children at risk, and their parents.**

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**Introduction:** Prevalence of obesity is increasing worldwide and Switzerland is not spared. As school-based prevention interventions have shown limited impact, experts recommend focusing action on young children and their parents. Our program aims to improve the current offer in primary prevention with an intervention focusing on families at risk: parental obesity, gestational diabetes, low birth weight, rapid growth of the new born, low socio-economic status.

**Objectives:** To conceptualize and test a program aiming to prevent the development of excess weight in young children (3 to 4 years old) at risk, by developing competences for a healthy lifestyle.

**Method/Design:** Dietitians developed the curriculum and the material for the workshops and documentation for parents. This work was based on literature review, current recommendations and concepts from behavioural change theories.

**Results:** The program consisted of 3 workshops, with parents and children having separate activities and one cooking task and tasting together. Parents discussed topics as feeding responsibilities, healthy eating for children, taste development, neophobia, and physical activity recommendations. Discussions were oriented to practical advices and to improve self efficacy. Children played games with fruits and vegetables (lotto, memory), read books around hunger and satiety feelings, and fulfilled tasks to improve fruit and vegetables recognition.

The program was tested with 6 families. Activities revealed feasible and adapted to children age. Parents reported a great satisfaction. A before-after recognition task and spontaneously tasting of fruits and vegetables showed positive trends in children.

**Conclusions:** This program reveals feasible and very adapted to the public. The mean difficulty encountered was the family identification. Recommendations for the future include a strong collaboration with paediatrician to improve at risk families identification.

**Key Words:** Obesity, Prevention, Children, Healthy eating.

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**27/945.** Nutrition and Healthy Lifestyle  
**Inflammatory marker correlate with blood pressure values in obese adolescents.**

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**Introduction:** Many studies have aimed at establishing a relationship between serum levels of biomolecules such as leptin, ceruloplasmin, lipoprotein (a), nutritional status and levels of systolic and diastolic blood pressure in overweight or obese subjects, in many cases without obtaining conclusive data.

**Objectives:** The purpose of this study was to investigate a possible correlation between the levels of circulating ceruloplasmin, leptin and lipoprotein (a) and the nutritional status (BMI) of subjects with overweight problems and their association with systolic and diastolic blood pressure values.

**Method/Design:** The study sample consisted of 26 adolescents between 12 and 16 years old who underwent an assessment of nutritional status by anthropometry. The analyzed variables were weight, height and thus, the BMI. Then we proceeded to the assessment of serum leptin, ceruloplasmin and lipoprotein (a) levels, as well as systolic and diastolic blood pressure.

**Results:** The results of this study confirm the presence of a statistically significant association ( $p < 0.01$ ) between serum levels of these biomolecules, nutritional status of subjects and levels of systolic and diastolic blood pressure.

**Conclusions:** The results show that the assessment of serum concentrations of these biomolecules might be an important tool for identifying obese individuals with a high risk for cardiovascular disease.

**Key Words:** Leptin, lipoprotein, ceruloplasmin, cardiovascular, adolescents.

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**27/946.** Nutrition and Healthy Lifestyle  
**Ceruloplasmin levels as a surrogate marker of the inflammatory state in a population of obese schoolchildren of Granada (Spain)**

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**Introduction:** Ceruloplasmin is an inflammation-sensitive protein, whose main function is to transport copper in the blood. It is also considered a predictive indicator of cardiovascular risk in overweight and obese patients, but very little is known about its relationship with obesity in children and adolescents.

**Objectives:** To assess the existence of a significant association between plasma levels of ceruloplasmin and the scores of certain anthropometric parameters.

**Method/Design:** The sample consisted of 30 adolescents aged between 12 and 16 years old from a high-school in Granada (Spain). Prior to the study of blood ceruloplasmin levels, we performed an assessment of the nutritional status of all participating subjects by anthropometry. Two groups were evaluated, one group with normal weight and another group with overweight and obesity.

**Results:** The results of this study show a significant association between the nutritional status of subjects and levels of circulating ceruloplasmin. The values of Pearson's correlation coefficient between the scores of body mass index (BMI) and ceruloplasmin, were in all cases statistically significant ( $p < 0.001$ ). On this basis, we conclude that the results obtained in our study confirm the existence of a significant correlation between levels of ceruloplasmin and the nutritional status of children and adolescents.

**Key Words:** Overweight, obesity, levels of ceruloplasmin.

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#### 27/949. Nutrition and Healthy Lifestyle

### **Maternal nutrition during pregnancy. Risk factor for prematurity and low birth weight.**

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**Introduction:** The low birth weight (LBW), infants weighing less than 2500 grams, is the main determinant of infant mortality, especially in the neonate increasing the risk of developing neonatal neurological and developmental disorder, increasing health spending of neonatal intensive care services and changing patterns of family behaviour. Maternal factors of LBW are: mothers fewer than 20 and over age 40 years, Smokers, women with BMI below 20, pregnancy

complication, etc.

**Objectives:** Assess maternal nutrition during pregnancy as a prognosis factor of prematurity and low birth weight.

**Method/Design:** We performed an epidemiological, observational, cross sectional and correlational study. The data collection was simple random probability and population size. The sample was comprised of women whose deliveries were attended in the Hospital Universitario San Cecilio (Granada) in the period between April and December 2010. The sample was completely random. An interview was conducted with different variables, which we obtained information concerning the type of breastfeeding during pregnancy through a comprehensive nutritional survey prepared by the expert group.

**Results:** 89, 47 % of mothers with LBW infants had complications during pregnancy, highlighting the anaemia, rupture of membranes and eclampsia. 63.2% were aged between 25 and 33 years, 68.4% had a pregestational BMI of less than 85 percentile, and 57.9% did not increase more than 10kg during pregnancy. The maternal diet during pregnancy was poor consumption of fish, vegetables, pasta, rice, pulses and dairy products. Did not perform well the number of meals and consumed a lower amount of water recommended.

**Key Words:** Low birth weight, neonatal mortality, maternal diet.

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#### 27/950. Nutrition and Healthy Lifestyle

### **Adolescence and stress. Prognostic factor for early cessation of breastfeeding.**

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**Introduction:** Stress occurs when we are sad, tired and unsure of our chances. These thoughts can inhibit the hormone oxytocin, which is responsible for myoepithelial cells to contract around the acini, leading to the expulsion of milk. In a natural way, that reflection occurs when the child starts sucking and the mother thinks of something related to her baby. An unpaired case-control study was carried out, where cases represented the totality of postpartum adolescents and the control group a random sample of 50% of non adolescents

**Objectives:** Identify maternal stress as a prognosis factor of early cessation of breastfeeding.

**Method/Design:** The human material and study group object of this work consists of 100 adolescent nursing mothers who had their babies admitted to the neonatal unit. The control group consisted of healthy women who were admitted to the postpartum unit in the same hospital. All women were assessed before the birth, at the time and subsequently to childbirth. We studied the stress levels in these three moments and the appearance of symptoms of lactogenesis.

**Results:** In mothers in the control group, salivary cortisol decreases significantly on the 15 to 17 hours post-partum. In the study group of adolescent mothers, who are separated from their babies, cortisol decreased slowly, which might be an indicator of delayed lactogenesis. The different results indicate that primiparity, the separation of the baby from the mother, and being less than 20 years-old can be considered as risk factors for delayed lactogenesis. It is recommended that women with these characteristics have a special tracking guide of breastfeeding in the postpartum period.

**Conclusions:** In mothers in the control group, salivary cortisol decreases significantly on the 15 to 17 hours post-partum. In the study group of adolescent mothers, who are separated from their babies, cortisol decreased slowly, which might be an indicator of delayed lactogenesis. The different results indicate that primiparity, the separation of the baby from the mother, and being less than 20 years-old can be considered as risk factors for delayed lactogenesis. It is recommended that women with these characteristics have a special tracking guide of breastfeeding in the postpartum period.

**Key Words:** Adolescence, stress, breastfeeding

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#### 27/952. Nutrition and Healthy Lifestyle

##### **Nutritional evaluation of children with autism spectrum.**

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**Introduction:** The autism spectrum disorders, in spite of their different etiologies, are characterized by deficiency in many functional areas that cause delay and differentiation in normal development processes. One of the most affected areas is the eating disorder and the nutrition. The most common abnormal practices found in these children express themselves in different ways, such as the late introduction of solid and new foods or the chewing difficulty. All of this has biological and psychological consequences, affecting the physical development and family dynamics.

**Objectives:** The condition and the main nutritional problems of children with autism spectrum disorders.

**Method/Design:** The survey has been validated in 40 children with autism spectrum disorders, which allows the nutritional habits, characteristics and problems in their alimentation to be known. We record information of three different days in a typical week (two weekdays and one weekend). The survey has been made with different variables: family history, personal history, birth data and most common disorder related with the actual alimentation.

**Results:** We obtained a classification of the type of alimentation that these children ate and the main problems which family have to

face, related with the characteristics linked with the psychological processes of children with autism spectrum are: hypersensitivity to changes, sensory disturbances, opposition to change, routines need, etc. This means that there are a lot of alimentation and, above all, textures, which are forbidden in the feeding of these children, limiting the variety of products and preparation methods.

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**Key Words:** Autistic children, nutrition.

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#### 27/955. Nutrition and Healthy Lifestyle

##### **Different postprandial response of cardiostrophin-1 to a high-carbohydrate and a high-fat test meal**

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**Introduction:** Circulating cardiostrophin-1 (CT-1) levels are upregulated in patients with metabolic syndrome. Moreover, it has been shown that glucose upregulates CT-1 expression in cultured adipocytes.

**Objectives:** The aim of the study was to investigate the postprandial regulation of CT-1 after a high-carbohydrate or a high-fat test meal.

**Method/Design:** Lean and obese subjects were randomized to a high-carbohydrate (HCD) or a high-fat test meal (HFD) (n=6 for lean and n=9 for obese in each postprandial test). Serum samples were obtained at baseline and at 30, 60, 90, 120, 150 and 180 min over the postprandial period. Glucose, triglycerides (TG) and free fatty acid acids (FFA) plasma levels were measured by an Autoanalyzer. Serum levels of insulin and CT-1 were determined by ELISA.

**Results:** Multiple stepwise linear regression analyses demonstrated that TG levels were the only significant (p<0.05) predictor of baseline CT-1 concentrations independently of body weight, BMI, % body fat, glucose, insulin and FFA. CT-1 circulating levels were higher (p<0.01) in obese subjects at baseline and over the two postprandial periods. As expected, HCD induced an increase in glucose (p<0.001) and insulin (p<0.0001) plasma levels in lean and obese subjects. However, CT-1 levels were not significantly modified from baseline during the postprandial period in both groups. Even postprandial changes in glucose were negatively (p<0.001) correlated

with changes in CT-1 levels. In contrast, the postprandial increase in FFA and TG levels after the HFD was accompanied by a postprandial increase in CT-1 ( $P<0.01$ ) in both groups. Moreover, a positive correlation ( $P<0.05$ ) was observed between the postprandial changes in FFA and CT-1 levels.

**Conclusions:** Our data suggest that CT-1 is likely to be a nutritionally regulated cytokine and that FFA rather than glucose seems to modulate postprandial CT-1 response.

**Key Words:** CT-1, Obesity and Postprandial.

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#### 27/956. Nutrition and Healthy Lifestyle

### Older people in the Basque Country. Do they have a healthy life style and nutrition? The BASA Study

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**Introduction:** Life expectancy at birth has largely increased in the developed countries throughout the XX century. Nutrition and life style are being reported as very important factors to promote healthy ageing. The BASA study is part of the Estudio Longitudinal Envejecer en España, (ELES) in which the Basque Country's population has been over-represented. This study is funded by the Basque and Spanish Governments.

#### Objectives:

**Method/Design:** 373 community-dwelling adults between 50 and 98 years of age ( $X=65.75$   $sd=10.34$ ) were randomly and representatively selected in the Basque Country and stratified by age, sex and area of residence type (rural or urban). They were asked about their life style and nutrition habits using an ad hoc questionnaire including a Food Frequency Questionnaire.

**Results:** 90.68% reported that they exercise more than 10 minutes at least once a week. People from 50 to 69, are used to practicing intense physical activity and those from 70 to 98 are used to practicing non-intense physical activity such as walking.

Regarding smoking habits, 12.9% smoke, being the youngest ones the group with more smokers. Nevertheless, the 27.81% used to smoke in the past.

26% of the population consumes only wine during week days, and 65.15% do not drink any kind of alcohol during the week.

The population follows in different degrees the recommendations of the SENC in 2004 on foods of daily (44.05%), weekly (17.57%) and occasional (3.78%) consumption. No significant differences have been found between age groups on daily ( $p=0.613$ ), weekly ( $p=0.699$ ) and occasional ( $p=0.166$ ) recommended food consumption.

**Conclusions:** These data show that the old population of the Basque Country has a healthy life style regarding physical activity, smoking and alcohol consumption. Nevertheless, nutritional habits could be improved in order to meet the SENC recommendations. These data

will be updated every two years within the next 20 years.

**Key Words:** Nutrition, Healthy lifestyle, Longitudinal

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#### 27/957. Nutrition and Healthy Lifestyle

### Obesity linked to RS17782313 SNP near MC4R gene in the elderly: the Sun Cohort

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**Introduction:** Genome-wide association studies have identified the rs17782313 SNP as a risk marker for obesity. This loci is located near the melanocortin 4 receptor (MC4R) gene and the C allele of this variant seems to increase the risk of obesity in children and in adults.

**Objectives:** The aim of this study was to analyze the relationship between the rs17782313 variant located downstream the MC4R gene and the risk of obesity in a subgroup of older subjects of the SUN (Seguimiento Universidad de Navarra) prospective cohort study.

**Method/Design:** Subjects ( $n=962$ ) aged 57 to 91 were recruited from the SUN prospective cohort study (70% male) and provided saliva specimens for genotyping. 58% of our population had a BMI higher than 25 kg/m<sup>2</sup>. Lifestyle and dietary data were collected by validated self-reported questionnaires. Individuals were genotyped for the rs17782313 SNP located near the MC4R gene by RT-PCR followed by allele discrimination. Unconditional logistic regression was performed after adjustment for sex, age, total energy intake and physical activity.

**Results:** The C frequency of the rs17782313 variant in this population was 0.21. Differences in the prevalence of the mutation between normoweight and overweight/obese subjects were only apparent among men with a high CHO (carbohydrates) intake ( $p=0.058$ ). Our results show that in this population, men carrying the C allele and with a high CHO intake had a higher risk for overweight/obesity (OR 1.584, 95% CI 1.004-2.499,  $p=0.048$ ) although the p value for CHO\*gene interaction was not statistically significant ( $p=0.93$ ).

**Conclusions:** In this elderly population from the SUN study the C allele of the rs17782313 SNP located near the MC4R gene seems to be a risk of overweight/obesity through an apparent association in men with a higher CHO intake.

**Key Words:** MC4R, rs17782313, overweight/obesity

### **Prenatal stress intensifies diet-induced obesity in the adult female rats**

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**Introduction:** Stress during pregnancy can influence the offspring's phenotype in the adulthood, which could induce metabolic disorders such as obesity and type 2 diabetes.

**Objectives:** To analyze the differential response to a High-fat-sucrose (HFS) diet during adulthood in female offspring affected by a prenatal stress.

**Method/Design:** Half of pregnant female Wistar rats (n=9) were exposed to a chronic-mild-stress paradigm during the third week of gestation, whereas control dams (n=8) were undisturbed. Adult female offspring were fed a standard-chow (Control group, n= 8, Stress group, n=8) or a HFS diet (HFS group, n=8, HFS-Stress group, n=8) for 10 weeks. After the sacrifice changes in adiposity, serum biochemical profile and expression of different hypothalamic genes were analyzed.

**Results:** HFS induced a significant increase in glucose levels (p<0.01) and a decrease in the lipid profile (p<0.05), without changes due to stress. The obesogenic diet also increased insulin resistance markers such as serum insulin levels (p<0.05) and the HOMA index (p<0.05) being reduced these values in the Stressed-groups (p<0.01). A statistical significant interaction between the stress paradigm and the HFS intake was observed (p<0.05) when adiposity was analyzed, particularly in visceral WAT depots, with a higher increase of weight in stressed, HFS-fed animals comparing to non-stressed ones (p<0.05). Hypothalamic gene expression analysis revealed that DAT (Dopamine Transporter) was decreased by HFS diet, POMC (Proopiomelanocortin) was increased due to the diet and partially reversed by stress, and CHR (Corticotropin Releasing Hormone) was not modified neither by diet nor by the stress paradigm.

**Conclusions:** These results suggest that the exposure of the dams to a chronic-mild-stress during the critical period of the pregnancy exacerbates in female rats the obesity-like condition induced by a HFS diet in the adulthood, which is accompanied by changes in hypothalamic mRNA expression.

**Key Words:** Obesity, Pregnancy, Stress, Rat, High-fat-sucrose diet.

### **DNA methylation patterns may predict weight loss in obese adolescents**

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**Introduction:** Recent reports have shown that gene expression regulation is mediated by DNA methylation. This process influences metabolic diseases such as diabetes and obesity. In this context, adolescence has been demonstrated to be one of the main epigenetic windows during lifetime.

**Objectives:** To find epigenetic biomarkers that could predict or bear witness to weight loss according to differences in DNA methylation patterns between high and low responders of a multidisciplinary intervention program in a population of obese/overweight (OB/OW) Spanish adolescents.

**Method/Design:** Study subjects consisted of 24 OB/OW adolescents (14.5±1.2 years) undergoing a 3 month multidisciplinary weight-loss intervention program: EVASYON ([www.evasyon.org](http://www.evasyon.org)). 12 of them were high responders, losing more than 8% of their baseline weight and 12 were low responders, losing less than 1% of their initial body weight. DNA methylation levels were assessed using a methylation assay (HumanMethylation27 BeadChip; Illumina, San Diego, CA, USA), covering 27,578 CpG dinucleotides in 14,495 genes.

**Results:** 33 CpGs sites were hypomethylated and 62 were hypermethylated in high responders compared with low responders before the treatment. Among hypermethylated CpGs, a site on ADPN (Adiponutrin) gene showed the largest differences. Moreover, as a result of the intervention, low responders showed a significant hypermethylation (more than 10% of change) in three CpGs located on DAPK1 (Death-associated protein kinase 1), ENPP3 (Ectonucleotide pyrophosphatase/phosphodiesterase family member 3) and ZFP41 (Zinc finger protein 41 homolog), whereas in high responders, the intervention significantly induced the hypermethylation of 13 sites.

**Conclusions:** DNA methylation patterns at baseline may be used as biomarkers for weight loss in obese and overweight adolescent populations. Among these biomarkers, hypermethylation of ADPN gene seemed to be involved in predicting a better response to a weight lowering treatment.

**Key Words:** Epigenetics, adolescence, obesity, weight loss, adiponutrin

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27/960. Nutrition and Healthy Lifestyle

**Effect of a weight loss diet with proteins mostly eaten at dinner**

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**Introduction:** Different types of weight lowering diets are becoming popular; however many of them have no scientific basis. In these sense, there are different popular theories about the benefits on weight loss of consuming proteins and carbohydrates, separately.

**Objectives:** To evaluate the effects of a weight loss diet with proteins eaten mostly at dinner on anthropometric, hunger/satiety and biochemical parameters as compared to a conventional low-calorie diet where proteins were consumed equally at lunch and dinner.

**Method/Design:** Eighteen participants (Age 35±5; BMI=31.5±2.7kg/m<sup>2</sup>) were randomly assigned to experimental (protein eaten mostly at dinner) or control low-calorie diets for 8 weeks. On day 0 and 56 anthropometric variables, blood samples and hunger scores were collected.

**Results:** Both diets induced significant weight and fat mass losses as well as a waist circumference reduction without differences between groups (p>0.05). Regarding biochemical variables, the experimental diet produced significant increases in glucose, insulin, HOMA and HDL cholesterol, while the conventional diet significantly improved total and LDL-cholesterol. Hunger and satiety scores did not show statistical differences during nutritional intervention.

**Conclusions:** A circadian dietary manipulation of protein and carbohydrate balanced distribution did not show any additional benefit comparing to a conventional diet. Indeed, the consumption of proteins through day seemed to be more beneficial than the consumption of proteins mostly at dinner.

**Key Words:** dissociated diet, caloric restriction, weight loss, lipid profile, proteins

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27/961. Nutrition and Healthy Lifestyle

**The daily intake of a sheep-milk derived product maintains anthropometric and biochemical markers in adults**

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**Introduction:** Dairy products are highly consumed in western diets, mainly processed from cow milk. Sheep-milk curds are pro-

ducts commonly present in the Spanish diet, although some concerns have been raised about their consumption due to the fat content.

**Objectives:** To study the effects of the daily consumption of a sheep-milk curd compared to a control group, on some nutritional variables, with emphasis on lipid and glucose metabolism biomarkers.

**Method/Design:** Randomised 6-week longitudinal nutritional intervention with two parallel groups. A total of 40 volunteers started the study, and were randomly assigned to control group (n = 20) and experimental group (n=20). No differences in the drop out rate were found between both groups. The nutritional intervention consisted on following an isocaloric diet during 6 weeks, consuming a sheep-milk dessert per day in the experimental group or not consuming fermented dairy products in the control group. At the beginning and the end of the nutritional intervention body weight, fat mass, fat-free mass, lipid profile and glucose profile were analysed.

**Results:** All variables measured were maintained during the nutritional intervention. Body weight, fat mass, fat-free mass, total cholesterol, LDL-cholesterol, HDL-cholesterol, triglycerides, glucose and insulin remained stable during the 6 weeks without differences between the control and the experimental groups.

**Conclusions:** The daily consumption of a sheep-milk curd in the context of a nutritionally balanced, isocaloric diet in healthy adults does not affect body weight, fat mass and biochemical markers when compared to a diet without fermented dairy products.

**Key Words:** Sheep-milk products; body weight; fat mass; lipid profile; glucose metabolism.

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27/962. Nutrition and Healthy Lifestyle

**Parallel changes in the lipid accumulation product (lap) and homa-ir after calorie restriction in obese children**

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**Introduction:** Obese and overweight children and adolescents are one of the most important current public health concerns. Weight lowering treatments tend to reduce obesity-related diseases. Recent investigations show that the lipid accumulation product (LAP) could help to assess risk to develop cardiovascular disease and type 2 diabetes in obese adults. However no information is still available for LAP in children and adolescents after obesity treatment.

**Objectives:** The aim of this study was to analyze changes in LAP after a caloric restriction treatment and also its relationship with insulin resistance indicators in a children and adolescent population.

**Method/Design:** Forty four children and adolescents (mean age

11.5±2.6 years, mean BMI z-score 4.1±0.3, 64% males) were involved in an intervention program including a calorie-restricted diet (10-40%, depending on obesity degree) during 10 weeks. Subjects who lost ≥3.5% of their basal weight were considered high responders, whereas those who lost <3.5% of their initial weight were considered low responders to the dietary intervention. LAP is based on a combination of waist circumference (WC) and fasting concentration of circulating triglycerides (TG), and was calculated using Spanish reference data for minimum WC (percentile 3) according to sex and age, with the following formula: (WC [cm] – WC P3) × (TG concentration [mmol/L]).

**Results:** High responders lost more body fat and weight than low responders after 10 week of treatment (p=0.005 and p<0.001, respectively). In high responders waist to hip ratio (p<0.001), total serum cholesterol (p=0.002), triglycerides (p=0.044), LDL-cholesterol levels (p=0.013) and HOMA-IR (p=0.002) significantly decreased. In addition, LAP was significantly lower in high responders (p=0.002) as compared to low responders. The decrease in LAP seems to be a strong predictor of HOMA-IR reduction (p=0.374, p=0.022) in obese children and adolescent after the intervention.

**Conclusions:** LAP could be a useful and valuable predictor for insulin resistance improvement in children and adolescents after obesity treatment.

**Key Words:** Lipid Accumulation Product, childhood obesity, insulin resistance

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#### 27/964. Nutrition and Healthy Lifestyle

### Effects of increasing dietary fibre on psychological wellbeing

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**Introduction:** The benefits of dietary fibre consumption on gastro-intestinal function and health are well recognised. However, few people meet the Recommended Daily Allowance of 24g fibre. The perception that increasing dietary fibre can have effects on gastrointestinal function (e.g. flatulence and bloating) could act as a barrier to compliance with a higher fibre diet. However, such effects, if they occur, tend to be shortlived and can be mitigated by increasing hydration. However, the psychological impact of increasing dietary fibre intake has received less attention.

**Objectives:** The present study aimed to investigate the effects of a high wheatbran fibre dietary intervention using breakfast cereal and cereal based snacks on physiological and psychological wellbeing.

**Method/Design:** Female (N=23) low-fibre consumers (<20g/day) completed an online Wellbeing Questionnaire every evening for 3-weeks. The questionnaire included ratings of gastrointestinal function, mood, self-esteem, body-image, alertness and hunger. A pre-post design was employed with a 1-week baseline period (with no dietary alteration) followed by a 2-week intervention period in which participants consumed 2 high-fibre snacks and/or portions of breakfast cereal per day.

**Results:** By week 3, almost all participants were consuming 8-14g/d fibre from the study foods provided. DINE fibre scores increased significantly (p<0.01) from pre (mean = 23, sd=4.66) to post intervention (mean=31.1, sd=8.12). Ratings indicated significant improvements in stress, mental and physical tiredness, difficulty concentrating, hunger, craving unhealthy food, sluggishness with trends for reduction of feeling fat and bloating. In all cases, ratings were lower during the intervention than during the baseline week. Quantity of fibre consumed was also positively correlated with feeling slim and feeling content with body shape.

**Conclusions:** Encouraging consumption of wheatbran based breakfast cereals and snacks offers an acceptable strategy to increase fibre intake in females and can produce modest improvements in psychological wellbeing in a relatively short period (2 weeks).

**Key Words:** Dietary Fibre, Psychological Wellbeing, Snacking, Breakfast.

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#### 27/970. Nutrition and Healthy Lifestyle

### Modification of expression of lipolysis-regulating genes during multi-phase dietary intervention in obese women

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**Introduction:** Mobilization of fatty acids from adipose tissue plays a key role in providing energy substrate and in regulation of re-modelling of adipose tissue

**Objectives:** The aim of this study was to investigate the time-course of the expression of key lipolysis-regulating genes in adipose tissue during different phases of the 6 months' dietary intervention (DI).

**Method/Design:** 16 women underwent a 6 months' DI consisting of 1 month very-low-calorie diet (VLCD), subsequent 2 months' low-calorie diet (LCD) and 3 months' weight maintenance diet (WM). Samples of subcutaneous abdominal adipose tissue (SCAT) and blood were obtained at each phase of DI and expression of mRNA of key lipolysis-regulating genes in SCAT was determined

**Results:** mRNA levels of adrenergic beta2-receptor (ADRB2) increased and alpha2-receptor (ADRA2A) decreased at VLCD and returned back to pre-diet values at WM. Adipose triglyceride lipase (ATGL) mRNA showed the same pattern as ADRA2A while hormone-sensitive lipase (HSL) and phosphodiesterase-3B (PDE3B) and Gi-protein (Gi) did not show changes throughout DI.

**Conclusions:** Results suggest that the pattern of regulation of lipolysis during a multi-phase dietary intervention differs in respect to the dietary phase, i.e. the status of energy balance. This pattern might be a feature of an energy-preserving mechanism in periods with low energy supply.

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**Key Words:** lipolysis, adipose tissue, hypocaloric diet, mRNA expression

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**27/973. Nutrition and Healthy Lifestyle**  
**Socioeconomic level and nutritional status follow-up study in young adults**

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**Introduction:** Chile has experienced rapid economic growth and poverty reduction which has led to changes in lifestyles and in the nutritional problems

**Objectives:** To determine the 10 years changes in socioeconomic level (SEL) and its effects on nutritional status in young adults in Chile

**Method/Design:** A cohort born between 1974 and 1978 in Lima was followed concurrently since 2000 and is presently being reassessed. This report corresponds to a sample of 200 subjects randomly selected from the whole cohort. SEL was evaluated through a matrix that combines the participant's education and occupation. Nutritional status was estimated through body mass index (BMI) and waist circumference (WC).

**Results:** In 2000 the cohort was categorized in terms of SEL into low (15%), middle-low (60%), and medium-high (25%). After 10 years a 4% decrease in the lower stratum and 17% increase in the highest level were observed. In 2000 mean (SD) BMI was 25 (3.3) in men and 26.2 (3.9) in women. After 10 years it increased by 2.4 points (2.4) in men and 3.4 (3.4) ( $p < 0.01$ ) in women. The WC for males was 84.7 cm in 2000 increasing by 7.7 cm (6.1) in 2010 ( $p < 0.001$ ). In women it was 82.3 cm and it increased 10.1 cm. (10.5) ( $p < 0.0001$ ). The delta ( $\Delta$ ) of BMI for women of low SES had an increase of 8.47% ( $p=0.034$ ) compared with those of mid-level. In men the increase of BMI and WC does not show differences by SEL.

**Conclusions:** Young women of low SEL consistently show highest levels of BMI and WC. After 10 years the follow-up their increase in these indexes was higher in relation to other groups. To implement strategies for prevention and control of excess of weight, this group should be a high priority in countries like Chile

**Key Words:** nutritional status, socioeconomic level, young adults

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**27/974. Nutrition and Healthy Lifestyle**  
**Calcium intake by age groups of individuals living in two regions of São Paulo, Brazil**

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**Introduction:** In the human body, calcium (Ca) is found making multiple functions; it composes body tissues, intra and extra-cellular fluids and it's extremely important for bone metabolism support. Studies show that adequate intake of this mineral is vital at all stages of life

**Objectives:** This study aimed to examine the dietary Ca intake by people from 13 to 70 years of age according to current recommendations for this nutrient

**Method/Design:** Three alternate days were chosen for food intake analysis through retrospective dietary questionnaires. Information on household measures were converted into grams of food to concentration of nutrients estimate. The total sample (n=233) were grouped according to gender, age group and the macronutrients results were compared to WHO recommendations (2003) while Ca intake were compared with Estimated Average Requirements (DRIs,2011).

**Results:** It was evaluated 117 men (50,2%) and 116 women (49,8%). Males had an average consumption of 489,15 mg /day in the age group from 13 to 30 years and average intake of 585,84 mg/day in the range of 31 to 70 years while females showed average consumption of 497,81 mg/day and 514,59 mg/day respectively, showing that none of the groups presented satisfactory results in relation to the nutrients recommendations and the amount of Ca ingested were much below than recommended levels.

**Conclusions:** Having knowing about the consequences that low calcium intake can have on the health of individuals, it was concluded that it's necessary to stimulate new approaches to nutrition education about the food intake of this nutrient to population groups and gives attention to studies about this nutrient supplementation.

**Key Words:** Calcium intake, Nutritional requirements, Food consumption.

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**27/976. Nutrition and Healthy Lifestyle**  
**Evaluate the students body perception of health courses from a private university in the city of São Paulo, Brazil**

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Universidade Presbiteriana Mackenzie. São Paulo. Brazil;

**Introduction:** Body image is the perception formed in the individualmind, how the body presents itself to itself.

**Objectives:** Evaluate the students body perception of health

courses from a private university.

**Method/Design:** Cross sectional study with 119 students of both genders between the ages of 17 to 39 years, in which was collected individual data (age, gender) and a question about the satisfaction with the body image. To evaluate the concern with the body image, it has been used a questionnaire consisted by 34 multiple choice questions (Body Shape Questionnaire -BSQ) validated in the Portuguese version. After the application of the questionnaire, the sum of points obtained was categorized into levels: of no concern ( $\leq 80$  points); light (81 to 110 points); moderated (111 to 140 points); severe ( $\geq 140$  points).

**Results:** The average age of the students was 20.72 years ( $SD \pm 3.2$ ). The medium score of the BSQ was 68.7 points ( $SD \pm 28.8$ ) reflecting a slight concern with body image. There was a connection between the varieties of satisfaction and BSQ. The highest satisfaction is among the individuals with lowest BSQ ( $P = 0.013$ ). Concerning the degree of satisfaction, there were no differences between ages ( $P = 0.421$ ) and between courses ( $P = 0.370$ ). As for that same degree, while 33,3% of men declared themselves unsatisfied with their image, in women this proportion rose to 60,3%, showing dependency between degrees of satisfaction and sex ( $P=0,012$ ). Proportionately, more women showed moderate to severe dissatisfaction in relation to men (18,4% vs. 3,1%,  $P = 0.039$ ). Regarding the age group, there was no dependence with the BSQ ( $P=0,763$ ), being that the proportions of moderate and severe dissatisfaction was similar between the ages of 17 to 19 years (15,4%) and 20 and more (13,4%).

**Conclusions:** The results reinforce the ideal of a thin body among the young's, even though those are students from the health care.

**Key Words:** Body image, health care, Body Shape Questionnaire

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#### 27/984. Nutrition and Healthy Lifestyle

### **Cheese does not increase serum cholesterol concentrations compared to butter: a cross-over intervention**

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**Introduction:** Despite the high content of saturated fat, small intervention studies in human have shown that a diet rich in cheese has a neutral effect on plasma total- and LDL-cholesterol concentrations when compared to a diet rich in butter with equal fat content. We wanted to confirm these findings in a larger intervention.

**Objectives:** To compare the effects of a diet rich in hard cheese to a diet rich in butter on fasting serum blood lipids, C-reactive protein, glucose, insulin and blood pressure.

**Method/Design:** A controlled randomized 2x6 weeks cross-over dietary intervention study after a fourteen days run-in period on habitual diet, including 49 men and women who daily replaced part of their habitual dietary fat intake with approximately 13 energy percent (E%) from cheese or butter.

**Results:** Cheese resulted in lower serum total, LDL and HDL cho-

lesterol concentrations and higher glucose concentrations compared to butter ( $P<0.0001$ ,  $P<0.001$ ,  $P<0.0005$  and  $P<0.01$ , respectively). No difference was observed on triacylglycerol, C-reactive protein, insulin, the ratio total:HDL cholesterol and blood pressure.

**Conclusions:** When consuming cheese or butter with equal fat content, cheese was less LDL cholesterol increasing than butter in adults with normal or moderately elevated serum cholesterol.

**Key Words:** Cheese, blood lipids, dairy and blood cholesterol

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#### 27/997. Nutrition in the Prevention on Non-Communicable Diseases

### **Is nutritional education a good strategy to fight against overweight and obesity?**

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**Introduction:** The communication and nutritional education in the adolescence are important strategies to promote healthy lifestyle and to prevent some diseases produced by inadequate food consumption.

**Objectives:** The aim of the study was to improve knowledge about nutrition and to encourage changes in food habits and lifestyle of adolescents.

**Method/Design:** A nutritional intervention study was conducted during three years in a sample of 604 students attending 5 High School from Old Havana municipality of Havana city. At the beginning a nutritional diagnosis was carry on. It includes surveys of nutrition knowledge, food preferences and habits, frequency of food consumption, anthropometric assessment and body image. A participation program of nutritional education was developed. At the beginning they received food and nutrition knowledge through animation techniques, panels and interactive work. Later they created many activities like songs, dances, theatre performances, games, and competitions. They learned to prepare menus with vegetables they never eat before. The program efficiency was measured by repeating the surveys at the end of the study.

**Results:** During the intervention period the adolescents learned about healthy eating, and the importance of physical activity. The adolescents had an enthusiastic participation, and improved their knowledge significantly. Nevertheless, an increasing trend in overweight and obesity was found at the end of the study. This increase shows that eating habits do not change easily, because they are mediated also by socio-economic components related to the consumption of food. The body image at the end of the study shows that the perception of the body still does not correspond to reality, they consider to be thinner than they really are, especially those who are overweight.

**Conclusions:** There is no awareness of the health risks of overweight and adiposity. This is part of the of Cuban idiosyncrasy and can be a factor that interferes with the success of programs against obesity.

**Key Words:** Obesity, Adolescence and Nutritional Education.



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27/999. Nutrition and Healthy Lifestyle

**High fat meal increase of il-17 is prevented by ingestion of fruit juice drink in healthy overweight subjects.**

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**Introduction:** An emerging role of IL-17 in the inflammatory response associated with pathogenesis of cardiovascular diseases has been recently suggested. However, though diet represents a key factor in the modulation of inflammatory processes, evidence is not currently available on the nutritional regulation of IL-17 in humans.

**Objectives:** Investigate the effect of a dietary stressor (High Fat Meal) with and without a fruit juice drink (FJD) composed of pineapple, blackcurrant and plum juices on IL-17 plasma levels in healthy overweight humans.

**Method/Design:** The dietary ingestion trial followed a double blind, placebo controlled, randomized crossover design involving healthy, overweight, non-smokers volunteers (n=14).

**Results:** Ingestion of HFM with a placebo beverage induced an inflammatory response mediated by TNF- $\alpha$  (p<0.001), IL-6 (p<0.001) and IL-17 (p<0.01). When the HFM was consumed with FJD, significant inhibition of TNF- $\alpha$  (p<0.01), IL-6 (p<0.05) and IL-17 (p<0.05) production was observed compared to the HFM with placebo.

**Conclusions:** We provided, for the first time, evidence for the modulating effect of diet on IL-17 production in healthy overweight subjects. Our findings should not be perceived as a "free pass" to consume high stressor meals in association with fruit juices but represent a novel contribution to unraveling the potential role of diet in modulating the inflammatory response associated with high energy meals.

**Key Words:** Postprandial Stress, Fruit Juice, IL-17, Human and Cytokines.

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27/1027. Nutrition and Healthy Lifestyle

**Does socioeconomic status influence the dietary habits of undergraduate university students in the United Kingdom?**

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**Introduction:** A predominant influential factor that contributes to selective dietary practices is socioeconomic status (SES). Evidence suggests that individuals of lower SES have nutritionally poorer diets than those of higher SES. Research assessing the influence of SES on

dietary habits is absent among university students (US) as a population group.

**Objectives:** To investigate if dietary intakes of undergraduate US differ in accordance with parental SES.

**Method/Design:** After local ethical approval, US (n=319) were recruited to participate in a non-experimental observational study. The study comprised of an interview-administered questionnaire that assessed SES and dietary habits. Dietary history and food frequency questionnaires were collected, and validated through a 7-day weighted food/fluid record in a sub-sample (n=50), and analysed by Dietplan6 dietary analysis software program. SES of US was established through combined parental annual income and educational level. SES through income was defined as low (LI: £0-£34,999), medium (MI: £35,000-£69,999) and high (HI:  $\geq$ £70,000). SES through education was defined as low (LE: secondary education), medium (ME: undergraduate degree) and high (HE: postgraduate degree). Data was analysed using a one-way ANOVA. Significance was accepted at P<0.05.

**Results:** No significant differences were observed between income levels in all dietary variables (overall mean $\pm$ SD: fruit & vegetables 3.4 $\pm$ 2.0portions/day; energy 2118 $\pm$ 742kcal/day; total fat 78 $\pm$ 37g/day; saturated fat 31 $\pm$ 19g/day; sugar 122 $\pm$ 69g/day; fibre 15 $\pm$ 7g/day; salt 6.7 $\pm$ 2.9g/day). In addition, no significant differences were observed between education level for daily intakes of all dietary variables, except salt intakes. A significantly higher salt intake was observed in HE-US (8.2 $\pm$ 4.0g/day) compared with LE-US (6.3 $\pm$ 2.6g/day; P<0.05).

**Conclusions:** The results indicate that current dietary habits of US do not differ in accordance with parental SES. The previous reported relationship between SES and dietary habits appear not to apply with regards to the university lifestyle environment, since US present similar dietary habits irrespective of parental SES

**Key Words:** Income, Social, Education, Inequalities, Nutrition.

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27/1030. Nutrition and Healthy Lifestyle

**Relationship between self-reported and estimated physical activity level and body mass index among female students**

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**Introduction:** Sedentary lifestyle is considered to be a risk factor of many diseases, including obesity, osteoporosis, cancers, etc. Low physical activity is prevalent among young Poles.

**Objectives:** To assess the relationship between self-reported and estimated physical activity level (PAL) and body mass index (BMI) among women.

**Method/Design:** : A cross-sectional study among 176 healthy female students aged 19–26 years was conducted. All participants were volunteers. Data on demographic, life-style factors (including self-reported activity) and nutritional habits were collected by means

of questionnaire method. Daily energy expenditure (DEE) was measured by the 4-day physical activity records. PAL was calculated by the formula DEE/BMR (basal metabolic rate). BMI was computed on the basis of measured as well as self-reported weight and height.

**Results:** Average DEE was 2227±340 kcal/day. The average PAL was low (1.64±0.16) and for only 20% of individuals was above recommended 1.75. There was rather weak relationship between self-reported and estimated physical activity level. However, leisure time spent in active way (i.e. walking, swimming, riding a bicycle, etc.) was significantly higher in women who perceived their physical activity as high when compared to those with low and moderate self-reported physical activity. Women limiting intake of some products i.e. salt, alcohol, fatty and frying foods were significantly more physically active than women with neutral attitude to the diet. The average BMI was 21.2±2.4 kg/m<sup>2</sup>. The majority of subjects (84.7%) were within the normal range of BMI, 8.5% were underweight and 6.8% overweight. BMIs calculated on measured and self-reported weight and height were strongly correlated ( $r=0.91$ ;  $p<0.0001$ ).

**Conclusions:** Young women who in majority had normal weight gave the correct data on their weight/height but they tended to overestimate their physical activity in comparison to the 4-day record. Information on self-reported physical activity level should be verified by more accurate methods.

**Key Words:** total energy expenditure, physical activity level, BMI, women

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### 27/1038. Nutrition and Healthy Lifestyle

#### **Twelve month outcomes of the feeding healthy food to kids randomised controlled trial**

*K. Duncanson; T. Burrows; C. Collins.*

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**Introduction:** Parents' child feeding practices and their overall parenting style are perceived to be closely related. The aim of this systematic review was to explore this relationship, and compare findings with child feeding and parenting outcomes in the Feeding Health Foods to Kids Randomised Control Trial (FHFKRCT).

#### **Objectives:**

**Method/Design:** Parents (n=146) of two-to-five year olds were recruited and randomised to intervention or 12-month wait-list control groups. The intervention parents were provided with interactive nutrition resources on CD and DVD. Parents reported on their child's dietary intake using the Australian Child and Adolescent Eating Survey, a validated food frequency questionnaire. Outcomes measurements were assessed at baseline, three and 12 months.

**Results:** At baseline, mean child age was 4.0 ± 1.0 years. Dietary intake measures were 2754 ± 627 kcal/day, 3.5 ± 2.0 fruit serves/day, 3.8 ± 1.6 vegetable serves/day and 4.3 ± 1.5 serves of energy-dense, nutrient-poor foods/day, suggesting overfeeding of both core and non-core foods. At 12 months follow-up, a significant reduction in daily

energy consumption ( $p=0.032$ ) in the intervention group (-1204kcal/day) compared to control group (+38kcal/day). The intervention group (n=68) significantly reduced total energy-dense nutrient-poor foods by 0.48 serves ( $p=0.026$ ). A reduction of white bread consumption (-0.5 serves/day), increased reduced fat milk (+0.30 serves/day) and decreased full cream milk (-0.39 serves/day) were clinically important but not statistically significant. Adequate micronutrient, fruit and vegetable consumption were maintained.

**Conclusions:** Self-directed nutrition and parenting resources provide a promising avenue for improving child feeding practices of rural Australian parents and the dietary intake of their children. A cost-effectiveness analysis of providing interactive CD and DVD nutrition resources to parents at a population level is warranted.

**Key Words:** child/ren, feeding, nutrition, resources, parent

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### 27/1039. Nutrition and Healthy Lifestyle

#### **Associations between child feeding practices and parenting style**

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School Of Health Sciences. Faculty Of Health. University Of Newcastle. Callaghan. Australia.

**Introduction:** Parents' child feeding practices and their overall parenting style are perceived to be closely related. The aim of this systematic review was to explore this relationship, and compare findings with child feeding and parenting outcomes in the Feeding Health Foods to Kids Randomised Control Trial (FHFKRCT).

#### **Objectives:**

**Method/Design:** A review of English language articles published between 1975-2010 in seven health databases was conducted. Inclusion criteria were: included parents or caregivers of children aged two to 12 years; assessed both parenting and child feeding practices and; reported the relationship between the two measures. Child feeding and parenting associations were compared between studies and with the baseline measures from the FHFKRCT study in which parents (n=146) of two-to-five year old children reported on their child feeding practices using the Child Feeding Questionnaire, and parenting practices from a Nationally representative parent sample.

**Results:** Five studies were included in the review. All identified associations between child feeding domains and parenting style. Two studies found that a less demanding parenting style is associated with less; monitoring of food intake, pressure to eat or restriction of child intake, while less responsive parenting is associated with pressure to influence child eating. Associations identified in single studies included; more responsive and demanding parenting styles with use of monitoring and restriction to control child food consumption. Positive correlations in the FHFKRCT between parenting and child feeding measures were: hostility and restriction (0.22,  $p<0.001$ ), Inductive reasoning and monitoring (0.59,  $p<0.001$ ). Child perceived weight correlated negatively with pressure to eat (-0.26,  $p<0.05$ ).

**Conclusions:** This review indicates that associations between parenting styles and child feeding domains exist. Evaluation of the

application of this knowledge to interventions aimed at changing the way parents feed their children is warranted. Relationships in the FHFRCRT were consistent with published literature. The limited number of studies highlights the need for further research.

**Key Words:** parenting styles; child/ren; feeding practices

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27/1047. Nutrition and Healthy Lifestyle

### **Does caffeine ingestion influence dietary habits of undergraduate university students in the United Kingdom?**

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**Introduction:** Caffeine is a psychoactive stimulant with research suggesting its consumption is a popular practice amongst young adults. Anecdotal evidence suggested the transition from home to the university setting promotes dietary-lifestyle changes, and subsequent anthropometrical changes, possibly induced by alterations in caffeine intake practices. However, the relationship between caffeine intake (CI), dietary habits, and university students (US) has not been investigated.

**Objectives:** To investigate the relationship between CI and dietary habits amongst US.

**Method/Design:** After local ethical approval, US (n=319) were recruited to participate in a non-experimental observational study. This comprised of an interview-administered questionnaire assessing dietary habits and CI. Participants also provided a current diet history (+ food-frequency questionnaire), validated in a sub-sample of the population (n= 50) through a 7-day weighed food/fluid record, and analysed using Dietplan-6 dietary analysis software. Anthropometrical measures were determined through a body analyser and tape measure. Low caffeine group (LCG) was defined consuming 0-130mgCI/day; medium caffeine group (MCG) 131-300mgCI/day; and high caffeine group (HCG) >301mgCI/day. Data was analysed using a one-way ANOVA and independent-sample t-test. Significance was accepted at P<0.05.

**Results:** No significant difference CI was observed between male and female US (Mean: 121mgCI/day, and 150mgCI/day, respectively). A significantly higher energy intake was observed in LCG (2088±764kcal/day) compared with MCG (1883±678kcal/day; P<0.05). While, a significantly higher fat intake was observed in LCG (78±37g/day) compared with HCG (63±33g/day; P<0.05). Furthermore, a significantly higher combined biscuit and chocolate consumption was observed in MCG (1.4portions/day) compared with LCG (1.0portions/day; P<0.05). No significant difference was observed for other dietary variable or anthropometrical measurements.

**Conclusions:** Current most dietary habits of US do not substantially differ in accordance with caffeine intake. The results suggest that other dietary-lifestyle or environmental factors may be contributing to the observational reports of change in dietary patterns and anthropometrics associate with studying at university.

**Key Words:** Drinks, Energy, Stimulant, Anthropometrics, Lifestyle.

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27/1049. Nutrition and Healthy Lifestyle

### **Do anthropometrical measures and dietary-lifestyle habits amongst vegetarian and non-vegetarian undergraduate university students differ?**

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**Introduction:** The university environment may lead students to adopt unhealthy dietary habits, reduced physical activity levels, and consequently increase obesogenic behaviours. Previous research has reported lower anthropometrical measures and healthier dietary practices amongst individuals consuming a vegetarian diet. This relationship has not been investigated in the university student (US) population group.

**Objectives:** To establish whether anthropometrics measurements, dietary habits, and physical activity (PA) levels differ amongst vegetarian (V) and non-vegetarian (NV) US.

**Method/Design:** After local ethical approval, US (n=187; V=32; NV=155) were recruited to participate in a non-experimental observational study, comprising of an interview-administered questionnaire that assessed dietary-lifestyle habits. Anthropometric measurements were determined using a body analyser and tape measure. A current dietary history and food-frequency questionnaire was obtained, and validated through a 7-day weighted food/fluid record (n=26), and analysed by Dietplan6 dietary analysis software program. Additionally, vegetarian sub-groups were defined as lacto-vegetarian (LV), ovo-lacto-vegetarian (OLV), and ovo-lacto-pesci-vegetarian (OLPV). Data was analysed using a one-way ANOVA and independent-sample t-test. Significance was accepted at P<0.05.

**Results:** Body mass index (BMI) was significantly lower in V-US (mean±SD: 21.3±2.3kg/m<sup>2</sup>) compared with NV-US (23.6±3.5kg/m<sup>2</sup>; P<0.01). No significant differences in waist circumference (WC) and body fat percentage (%BF) were observed between V-US and NV-US. V-US had significantly lower intake of protein (mean: 61g/day), omega 3 (0.33g/day), trans fats (1.42g/day), salt (5.3g/day), a lower consumption of pasta (0.2portions/day), a higher consumption of pulses (0.3portions/day), and a higher PA (217min/week), compared with NV-US (P<0.05). There were no significant differences in anthropometrical measures, dietary variables, or PA level between the vegetarian sub-groups.

**Conclusions:** V-US appear to have a lower BMI and engage in more PA compared with NV-US, but do not differ in WC or %BF. Obesogenic dietary behaviours appear to be more pronounced in NV-US. Whilst, different vegetarian groups have similar anthropometrical measures, and dietary-lifestyle habits.

**Key Words:** Obesity, Weight, Exercise, Diet, Vegetarianism.

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## 27/1056. Nutrition and Healthy Lifestyle

### The relationship between eating patterns and weight among health care providers

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**Introduction:** Nutrition is considered as an important key lifestyle contributor in preventing or reducing most of non-communicable chronic diseases.

**Objectives:** The aim of this study was to assess eating patterns in relation to body mass index (BMI) in 200 health care specialists (women aged 25-35 years) of medical services in Pleven region, Bulgaria, survey conducted in 2009–2011.

**Method/Design:** Participants completed a standardized Food frequency questionnaire (FFQ) containing questions related to demographics, socio-economic factors, comorbidities and lifestyle, as well as eleven additional qualitative questions to investigate dietary habits. Food items were divided into sixteen groups. Medical consultations were performed and anthropometric and nutritional status was evaluated. BMI, body fat (BF) percentage and fat free mass (FFM) percentage values were measured by using Tanita Body Composition Analyzer. SPSS Statistics 17.0 for Windows were applied for all participants, after adjustment for potential confounding factors.

**Results:** Based upon BMI, the percentage of women who were overweight and obese was 15%. The percentage of women who showed low BMI was 3,7%. In addition, 81.3% women showed normal BMI. Our data indicated that a healthy dietary pattern includes consumption of food products, rich in essential nutrients, yogurt and other low fat dairy products, variety of fruits and vegetables, home-made regular breakfast and lack of preferences for “junk food”. This eating pattern was related to normal BMI in medical health care specialists ( $t=26,2$ ;  $p=0.001$ ). Women with low and normal BMI consumed significantly a higher amount and variety of fruits than those who showed overweight and obesity ( $t=12,5$ ;  $p=0.014$ ). No significant differences were found in daily vegetable consumption or meal frequency between women with normal BMI and overweight women. Skipping breakfast participants showed higher BMI than home-made regular breakfast consumers ( $p=0.04$ ).

**Conclusions:** The results of this study may be used as a part of a complex approach to positive eating behaviour and lifestyle factors associated with healthy weight for other occupational and age groups.

**Key Words:** Eating patterns, BMI and Health Care Specialists

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## 27/1060. Nutrition and Healthy Lifestyle

### Daily intake of apples decrease total cholesterol

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**Introduction:** Regular consumption of fruits and vegetables is associated with reduced risks of certain cancers, cardiovascular diseases, stroke, Alzheimer's disease etc.

**Objectives:** In this project, we focused on apples as a model fruit for some of this research due to its high contents of soluble and insoluble fibers, flavonoids and phenolic acids and because of the high intakes of apples in northern parts of Europe.

**Method/Design:** A series of 4-16 w rat feeding studies with fresh whole apples, dried apple, apple puree, clear and cloudy apple juices, apple pomace, and apple pectins have been conducted. A human cross-over dietary intervention study in 24 healthy volunteers with apple and apple products has also been performed. They supplemented a polyphenol and pectin restricted diet with whole apples, apple pomace, cloudy or clear apple juices or nothing for 4 weeks.

**Results:** Feeding rats with 10g apple/d reduced plasma total, HDL cholesterol, and VLDL cholesterol at 4w and 16w without significantly affecting cholesterol ratios, plasma triacylglycerols, or gastrointestinal transit times. Screening the genes coding for 16s RNA in the intestinal flora and applying multivariate statistics revealed significant changes in the flora related to feeding with apple or apple pectin. This was also reflected in changed gut flora enzymatic activities, whereas caecum short chain fatty acid concentrations were unaffected by feeding with all apple products, except high doses of apple pectins.

In the human study the whole apple had the strongest hypocholesterolemic effect, followed by apple pomace and cloudy apple juice. The clear apple juice, which is free of cell wall components showed adverse effect on serum cholesterol concentration and the effect differed markedly compared to the other apple products. There was no effect on HDL-cholesterol, triacylglycerol, bile acid excretion, weight, waist-to-hip circumference or blood pressure.

**Conclusions:** We conclude that the cholesterol-lowering effect of apples is most likely due to the content of soluble fibre in combination with other cell wall components.

**Key Words:** apple, blood lipids, soluble fibre.

### Olive oil intake and mortality within the Spanish population (epic-spain)

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**Introduction:** Olive oil consumption is related to a decreased risk of several diseases, including mortality from cardiovascular disease (CVD) and incidence of certain cancers. Although the Mediterranean dietary pattern, rich in olive oil, has been shown to increase longevity, data on the individual effects of olive oil on overall mortality is scarce.

**Objectives:** We evaluated the association between olive oil and overall and cause-specific mortality in the Spanish population of the European Prospective Investigation into Cancer and Nutrition (EPIC-Spain).

**Method/Design:** 40,622 participants (62% female), aged 29-69 years, were recruited from 5 Spanish regions in 1992-1996. Habitual dietary intake was assessed using interview administered dietary history questionnaires. Olive oil was analyzed as a categorical variable (non-consumers and quartiles among consumers) and a continuous variable (10g/day), using the energy density model. The association between olive oil and overall and cause-specific mortality (CVD, cancer and other causes) was analyzed using Cox proportional hazards regression models adjusted for potential confounders.

**Results:** 1915 deaths were reported during 13.4 years of follow-up; 416 CVD deaths, 956 cancer deaths and 417 deaths from other causes. Compared to non-consumers, the highest quartile of olive oil consumption was associated with a significant 22% (95% CI 9%, 33%) reduction in risk of overall mortality and a 40% (95% CI 16%, 57%) reduction in CVD mortality. For each 10g/2000kcal/day increase in olive oil there was a 5% (95% CI 2%, 9%) decreased risk of overall mortality and an 11% (95% CI 4%, 18%) decreased risk of CVD mortality. Olive oil was not associated with overall cancer mortality though.

**Conclusions:** In this large Mediterranean cohort, olive oil was associated with a decreased risk in overall mortality, and an important reduction in CVD mortality. This provides further evidence on the beneficial effects of one of the key components of the Mediterranean diet.

**Key Words:** Olive Oil, Mortality, Spain, Epic Cohorte

### Comparison of six healthy and sustainable diet scenarios on health gain, climate impact and land use

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**Introduction:** Our diet accounts for approximately a third of the climate impact and land use of consumption. Studies suggest different options for reduction of impacts, but as Nutrition Centre we are especially interested in scenarios that are both healthy and sustainable.

**Objectives:** To explore opportunities and dilemmas to achieve a more healthy and sustainable diet in The Netherlands.

**Method/Design:** We formulated six potential scenarios for adult women: current Dutch diet (1), diet according dietary guidelines (2), half vegetarian (3), vegetarian (4), vegan (5) and Mediterranean diet (6). Using a LCA method (ReCiPe) we calculated the impact on greenhouse gasses (GHG), land use and land use change.

**Results:** The Mediterranean diet is expected to have the biggest health gain, although other diets (2,3,4) fell also within the dietary guidelines. A change towards diet 2 gives a reduction of GHG of at least 11% and land use of 35%. The biggest gain for GHG is in diet 5 and for land use in diet 6. Analysing the results we see that the most decisive food groups for GHG as well land use impact are: meat (including fish and eggs), dairy, drinks (alcoholic, juices, soft drinks, coffee) and 'extras' (snacks, sweets, pastry, confectionary). The biggest dilemma is the advise to consume fish two times a week. Reduction of meat consumption is the most effective scenario, but is dependent of the chosen meat replacers. There is a lot of opportunity in: reduction of overconsumption, restriction in consumption of snacks, less food waste, less (packed) drinks and smart food preparation technologies.

**Conclusions:** A diet according the dietary guidelines is also more sustainable. A further reduction in consumption of meat, dairy, drinks and extras within the guidelines gives the possibility of almost halving the climate impact and land use of diets.

**Key Words:** Sustainable Diet, Dietary Guidelines, Vegetarian, Mediterranean, Greenhouse Gases

### 27/1. Nutrition in the Management of Non-Communicable Diseases Nordic nutrition recommendations and mediterranean diet in relation to prostate cancer risk in Sweden

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**Introduction:** The Nordic Nutrition Recommendations (NNR) provide guidelines for nutrient intakes and physical activity in the Nordic countries, with the ultimate aim to prevent major chronic diseases such as cancer. The NNR could also be used as a measure of an "ideal" Nordic dietary pattern. The Mediterranean diet is suggestively protective against several malignancies. Thus, it is of relevance to evaluate the effect of both the NNR and a Mediterranean dietary pattern on prostate cancer risk in a Nordic population.

**Objectives:** We investigated whether adherence to the NNR or the Mediterranean diet reduces the risk of prostate cancer in Swedish men.

**Method/Design:** Questionnaire data on diet and physical activity were used from 1,375 incident prostate cancer cases and 940 population controls in the Cancer of the Prostate in Sweden (CAPS) study, a population-based case-control study. We created an NNR score and a Mediterranean diet score (MDS) and used unconditional logistic regression to estimate odds ratios (OR) with 95% confidence intervals (CI) for high and medium versus low adherence to the dietary scores. We also modeled the effect of each individual component of the scores separately.

**Results:** We found no association between the NNR and prostate cancer. An increased risk was observed for medium adherence to the MDS, adjusted OR 1.28 (95% CI 1.05-1.57), but no significant association was seen for high adherence to the score. Among the individual score components, recommended levels of certain types of fat seemed to increase the risk for different sub-types of prostate cancer.

**Conclusions:** We found no protective effect of adherence to the NNR or the Mediterranean diet on risk of prostate cancer. Hence, a potential lack of adherence to these dietary patterns in the general population cannot explain the high incidence of prostate cancer in Sweden.

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#### 27/46. Nutrition in the Management of Non-Communicable Diseases **Modulation of plasmatic SCD14 by symbiotics in obese subjects**

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**Introduction:** Animals fed high fat diets display alterations of their intestinal microbiota, gut barrier function, levels of circulating lipopolysaccharide (LPS) and biomarkers of oxidative stress and inflammation, and glucose/insulin metabolism. These animals have a higher risk of type-2 diabetes and non-alcoholic hepatosteathosis; these deleterious effects are prevented by antibiotics or prebiotics. Comparable findings in humans are scarce.

**Objectives:** to determine whether the administration of symbiotics may improve biomarkers of inflammation, LPS exposure, oxidative stress and glucose/insulin metabolism in obese subjects.

**Method/Design:** 41 obese subjects were randomized into two groups to receive a symbiotic (8g oligofructose + 1g Bifidobacterium lactis Bb12 (1010 CFU/g)) or a placebo (9g maltodextrin) twice a day for six weeks. The body composition (BodPod), blood lipids, antioxidant capacity of plasma (FRAP) and biomarkers of inflammation (usCRP, IL-6) and LPS exposure (LPS-Binding Protein and sCD14) were determined at baseline and after treatment. Areas under curves of glycemia and insulinemia were also calculated at the same time points.

**Results:** 39 subjects (34.8 ± 9.2y; BMI: 36.7 ± 5.3 kg.m<sup>-2</sup>) completed the study. A positive correlation was observed at baseline between usCRP, IL-6, LBP, sCD14 and the percentage of body fat; correlations also existed between these results of usCRP, IL-6 and LBP while sCD14 correlated with IL-6 only. Compared with placebo, the administration of symbiotic did not affect the body composition, lipid profile, antioxidant status, the areas under curves of glycemia and insulinemia and the circulating concentrations of usCRP, IL-6 and LBP. However the plasmatic concentrations of sCD14 were significantly lower with the symbiotic after treatment compared with the placebo group (5.98 µg/ml [5.01-6.96] vs. 7.26 [6.34-8.09] µg/ml (Means [CI95%], respectively; p=0.043).

**Conclusions:** These results suggest that the intake of symbiotics may decrease the exposition of the organism to LPS in obese subjects. (Supported by Fondecyt 1080519)

**Key Words:** obesity; metabolic syndrome; low-grade inflammation; sCD14; lipopolysaccharide; symbiotic; Bifidobacterium; oligofructose

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#### 27/78. Nutrition in the Management of Non-Communicable Diseases **Anthropometric nutritional assessment of patients with head and neck cancer: relationship with the staging and tumor site**

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**Introduction:** Many studies show that malnutrition interferes in the prognosis of cancer patients. Several indicators can be used to do the nutritional diagnosis, preferably through methods that are fast, non-invasive, low cost and accessible to professionals.

**Objectives:** A transversal and retrospective study in a state hospital in São Paulo (SP) was conducted with the objective to determine the relationship between the staging and tumor site with the nutritional status of patients with squamous cell carcinoma of the upper digestive airways.

**Method/Design:** The anthropometric indicators used in this study were: Body Mass index (BMI) and/or percentage of weight loss (%WL), triceps skinfold thickness (TST), arm circumference (AC) and arm muscle circumference (AMC). The statistical analyses, Student t-test for difference of means and one-way ANOVA to compare quantitative variables in different locations of the tumors, were performed using SPSS software (13.0).

**Results:** The study consisted of 92 patients (82 males and 10 females), mean age 59±11 years old. Elderly patients (>60 years old) presented more adipose tissue, evidenced by the TST measurement. The frequency of malnutrition was high and varied from 53.3 (BMI/%WL) to 78% (TST), while eutrophy was diagnosed varying from 15.4 to 34.2%. There were significant differences regarding anthropometric indicators according to the initial stage (IS) and advanced stage (AS): BMI (IS 24.1±4.5 versus AS 20.7± 4.8, p=0.004), AC (IS 28.5±3.9 versus AS 25.1±4.0, p=0.001) and AMC (IS 25.4±3.6 versus AS 22.6±3.3, p=0.002), except TST (p=0.158), which indicated that patients are malnourished in all clinical stages.

**Conclusions:** There was no difference between anthropometric values and tumor location. Therefore, it can be concluded that malnutrition is highly frequent among patients with head and neck cancer, having a direct relationship with the clinical staging.

**Key Words:** head and neck cancer; anthropometric evaluation; nutritional status.

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## 27/82. Nutrition in the Management of Non-Communicable Diseases

### Mineral intake in oral diets offered to hospitalized cancer patients in Minas Gerais, Brazil

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**Introduction:** The evaluation of the nutritional status as well as the adequacy of nutrient supply and consumption are important aids for the nutritional care of cancer patients.

**Objectives:** To determine the adequacy of calcium, copper, iron, manganese, magnesium, phosphorus, potassium, sodium, zinc and

selenium intake, regarding the Dietary Reference, in regular, soft and bland oral diets consumed by cancer patients.

**Method/Design:** Mineral levels were determined in duplicate samples of daily meals served on 2 winter non-consecutive week days, by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP OES). The mineral intake was estimated on the total daily meal offered to the patient by subtracting its individual leftovers. Statistical procedures include Shapiro-Wilk tests for normal distribution of variables, Student's t-test when the variable fulfilled parametric and the Kruskal-Wallis followed by Mann Whitney U test in non-parametric conditions. Level of significance was set at p<0.05.

**Results:** 41 patients (54% male) participated in the survey, 59% adults (average=47±8y) and 42% seniors (average=71±7y). Among the adults, the most frequent diagnosis (25%) was head and neck cancer and among the aged was urologic cancer (41%). The regular, soft and bland diets were prescribed to 76, 17 and 7% of the patients, respectively. Calcium, magnesium, potassium, copper and zinc consumption was inadequate for 98, 59, 100, 63 and 61% of patients, respectively. Iron, phosphorus and selenium intake was adequate for 76, 63 and 48% of patients, while manganese and sodium consumption was superior to the Tolerable Upper Intake Level among 54 and 66% of the patients, respectively. The calculated probability indicated that 50% of cancer patients had risk of inadequate consumption of calcium, manganese and zinc, 54% of patients for copper, 46% for iron and 48% for potassium.

**Conclusions:** The mineral intake were found inadequate regarding their recommendation, contributing to an aggravation of the disease.

**Key Words:** Mineral, food intake, nutritional recommendation

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## 27/83. Nutrition in the Management of Non-Communicable Diseases

### Acceptance and consumption of minerals offered in oral diets to hospitalized cancer patients

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**Introduction:** The adequate consumption of nutrients is an important aid for nutritional care of cancer patients.

**Objectives:** To determine the acceptance and verify the calcium, copper, iron, manganese, magnesium, phosphorus, potassium, sodium, zinc and selenium intakes in regular, soft and bland oral diets offered to cancer patients.

**Method/Design:** Mineral levels were determined in duplicate samples of daily meals served on 2 winter non-consecutive week

days, by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP OES). The mineral intake was estimated on the total daily meal offered to the patient by subtracting its individual leftovers. Statistical procedures include Shapiro-Wilk tests for normal distribution of variables, Student's t-test when the variable fulfilled parametric conditions and the Kruskal–Wallis followed by Mann Whitney U test in non-parametric conditions. Level of significance was set at  $p < 0.05$ .

**Results:** 41 patients (54% male) participated in the survey, 59% adults (average=47±8y) and 42% seniors (average=71±7y). The regular, soft and bland diets were prescribed to 76, 17 and 7% of the patients, respectively. The most accepted diet was soft(81%), followed by regular (73%) and bland (71%). Among the mealtimes, snack (88%) and supper (87%) had the best acceptance, while lunch (67%) and dinner (87%) were the least accepted. The intake of magnesium was the highest among patients on the regular diet (272±210mg/d) and the lowest on the bland diet (123±4mg/d). Regarding zinc intake, the highest intake was in the bland diet (10±0,8mg/d) and the lowest in the regular diet (5±2mg/d). For calcium intake, it was higher among patients on bland diet(810±162) and lower for regular diet (360±118mg/d).

**Conclusions:** Although the regular diet represents 73% of acceptance, its consumption resulted in the lowest intake levels of calcium, copper, phosphorus, potassium, zinc and selenium.

**Key Words:** Mineral, food intake, hospital diets.

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#### 27/85. Nutrition in the Management of Non-Communicable Diseases **Arabinoxylan oligosaccharides with bifidogenic effect counteract obesity and inflammatory disorders induced by high fat feeding**

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**Introduction:** A novel concept . “MicrObesity\” (Microbes and Obesity)- was recently born, to decipher the role of dysbiosis – defined as changes in the composition of the gut microbiota- in the occurrence of metabolic disorders related to energy storage. Dysbiosis can be reversed by colonic nutrient such as prebiotics. Non-digestible carbohydrates present in cereals may be interesting prebiotic substrates susceptible to produce health effects related to their influence on gut microbiota composition.

**Objectives:** We tested the hypothesis that arabinoxylan oligosaccharides (AXOS) prepared from wheat improve the metabolic disorders associated with obesity

**Method/Design:** Mice were fed a control diet, a high fat (HF) diet, or a HF diet supplemented with AXOS (7.5% w/w) during 8 weeks.

**Results:** AXOS supplementation induced caecal and colon enlargement associated with an important bifidogenic effect. It increased

the level of circulating satiety peptides produced by the colon (PYY and Glucagon-like peptide-1), and coherently counteracted HF-induced body weight gain and fat mass development. In addition, AXOS decreased HF-induced metabolic endotoxemia (LPS) and pro-inflammatory cytokines in the plasma whereas it increased the level of the anti-inflammatory interleukin IL10. The lower inflammatory tone was associated with the improvement of gut barrier function (estimated by the measurement of the expression of tight junction proteins), which was altered by the HF diet. Interestingly, bifidobacteria levels inversely correlated with the metabolic endotoxemia whereas it correlated positively with a tight junction protein ZO-1 expression measured in the colon. TaqMan low density array screening confirmed that 5 colonic genes of 7 involved in tight junction were upregulated by AXOS.

**Conclusions:** Our results suggest that AXOS produced from wheat bran constitute a promising prebiotic nutrient for managing obesity and inflammatory disorders linked to gut barrier alterations.

**Key Words:** Arabinoxylan Oligosaccharides, Prebiotic, Endotoxemia, High Fat Diet, Microbiota

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#### 27/104. Nutrition in the Management of Non-Communicable Diseases **Selenium level in hospital oral diets served in a Brazilian hospital**

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**Introduction:** Selenium (Se) is an essential nutrient, however, there is no information about composition of Se in hospital diets. Few tables of food composition values include values of Se, making it difficult to determine the amount consumed.

**Objectives:** Determine the Se content of three hospital diets with different consistency (regular, bland and soft) and diet for patients with renal insufficiency, checking suitability of Se content in current nutritional recommendations for healthy individuals (RDA=55mcg).

**Method/Design:** Se level was determined in duplicate samples of daily meals served on 4 not-in-a-row days (2d autumn, 2d winter), using a inductively coupled plasma optical emission spectroscopy (ICP OES). Statistical procedures include Shapiro-Wilk tests for normal distribution of variables and Student's t-test when the variable fulfilled parametric conditions and the Kruskal–Wallis follow by Mann Whitney U test in non-parametric conditions. Level of significance was set at  $p < 0.05$ .

**Results:** The average of Se in the diets was 52±38, 41±27,



48±40, 34±28mcg, for bland, soft and renal diets, some difference was observed in the content of the bland and renal diets between the collection of autumn (p= 0.017) and winter (0.049), with higher values in autumn. In the same week there was a difference only in soft diet (p= 0.020). The level of Se in the diets analyzed did not exceed the maximum safe intake. Regarding the recommendation, the regular diet offered of autumn and winter days was adequate for the RDA. As for bland and renal diet, only the one offered in one of the autumn days attended the RDA, while the soft diet was adequate in one of the autumn and winter days.

**Conclusions:** The results showed that over half of the experimental days, the offered Se in amount was below the recommendation, favoring a low intake by patients.

**Key Words:** nutritional recommendation, nutrition, hospital diet

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#### 27/105. Nutrition in the Management of Non-Communicable Diseases

### **Vitamin K intake is associated with bone quantitative ultrasound measurements, not with bone biochemical markers**

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**Introduction:** Vitamin K may have a protective role against bone loss and osteoporotic fractures associated to aging, although data in humans are inconsistent and the mechanisms involved are still unknown.

**Objectives:** The main objective of the study was to assess the associations between vitamin K intake, bone density, bone structure quality and biochemical bone metabolism markers in elderly subjects.

We also analysed the relationship between changes in vitamin K intake and the evolution of bone quality markers after two-years of follow-up.

**Method/Design:** Cross-sectional analysis was carried out on 365 elderly subjects, 200 of whom were also included in a 2-year longitudinal follow-up study. Usual dietary intakes were assessed using a semiquantitative 137-item food frequency questionnaire (FFQ). Vitamin K intake was estimated using the USDA database. Bone biochemical markers were measured in a subset of 125 subjects. Quantitative ultrasound assessment (QUS) was performed at the calcaneus to estimate bone mineral density (BMD), speed of sound (SOS), broadband ultrasound attenuation (BUA) and the quantitative ultrasound index (QUI).

**Results:** Dietary intake of vitamin K was significantly associated with higher BMD and better QUS.

No significant associations were found between vitamin K intake and bone biochemical markers.

Those subjects who increased their vitamin K intake showed a

lower loss of BMD, a lower decrease in SOS and a nonsignificant increase in BUA.

**Conclusions:** High dietary vitamin K intake was associated with superior bone properties. Moreover, an increase in dietary vitamin K was significantly related to lower losses of bone mineral density and smaller increases in the porosity and elasticity attributed to aging, which helps to explain the previously described protective effect of vitamin K intake against osteoporotic fractures.

**Key Words:** Vitamin K, bone metabolism, quantitative ultrasound measurements, Predimed

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#### 27/106. Nutrition in the Management of Non-Communicable Diseases

### **Dietary glycemic index/load, peripheral adipokines and inflammatory markers in elderly subjects**

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**Introduction:** Epidemiological and clinical studies suggest that low-glycemic index diets could protect against weight gain. However, the relationship between these diets and adipokines or inflammatory markers is unclear.

**Objectives:** In the present study we examine how the dietary glycemic index and dietary glycemic load are associated with several adipokines and related metabolic risk markers of obesity and diabetes in a cross-sectional and longitudinal manner.

**Method/Design:** We included 511 elderly community-dwelling men and women at high cardiovascular risk recruited for the PREDIMED trial. Dietary data were collected at baseline and after one year of follow up. The glycemic index (GI) and glycemic load (GL) were calculated. Leptin, adiponectin and other metabolic risk markers were

measured in blood samples collected at baseline and after one year. Multiple logistic regression models were used to examine the cross-sectional and longitudinal associations of GI, GL and biochemical markers.

**Results:** At baseline, subjects in the highest quartiles of GI showed significantly higher levels of TNF and IL-6 [geometric mean (CI95%) 11.82 (10.06-14.09), 9.48 (8.23-10.94)] than those in the lowest quartiles [geometric mean (CI95%) 15.56 (13.14-18.41), 11.63 (10.08-13.40)] (P=0.046, P=0.050 respectively). Dietary GI index was negatively related to plasma leptin and adiponectin levels. After one year of follow-up, those subjects who had a higher increase in dietary GI or GL also showed a greater reduction in leptin [CI95%: 0.39 (-0.87 to 0.26), P=0.019; 0.35 (-0.71 to 0.005), P=0.030] and adiponectin [CI95%: 15.14 (-27.32 to 0.29), P=0.027; 12.06 (-25.23 to 1.11), P=0.054] plasma levels. Overall, there was no association between GI or GL and the other metabolic markers measured.

**Conclusions:** Our results suggest that the consumption of high-GI or high-GL diets may promote weight gain and worsen the cardiometabolic profile by modulating adipostatic molecules such as leptin and adiponectin.

**Key Words:** Glycemic index; Glycemic load; Inflammation; Adipokines; Predimed Study

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### 27/107. Nutrition in the Management of Non-Communicable Diseases **Total and undercarboxylated Osteocalcin predict changes in insulin sensitivity and beta cell function**

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**Introduction:** Osteocalcin (OC) has been related to insulin secretion in experimental models. Very few prospective studies have evaluated the association between circulating osteocalcin concentration and insulin secretion and sensitivity in humans.

**Objectives:** To examine cross-sectional and longitudinal associations between circulating forms of osteocalcin and insulin secretion and sensitivity in elderly men at high cardiovascular risk.

**Method/Design:** We examined cross-sectional and longitudinal associations between serum measurements of total OC, undercarboxylated osteocalcin (ucOC) and ucOC/OC% and fasting glucose, fasting insulin, HOMA IR and HOMA beta cell (HOMA-BCF) in 79 elderly men. We also examined the associations between 2-year changes in each osteocalcin forms and changes in fasting glucose, insulin, HOMA IR and HOMA-BCF.

**Results:** In an adjusted multivariable linear regression analysis, increases in serum OC were significantly associated with an increase in HOMA BCF ( $\beta$  coefficient = 2.58, IC95% 0.30-4.85, p=0.027) and changes in ucOC were linked to a decrease in HOMAIR ( $\beta$  coefficient = 0.32, IC95% 0.59-0.04, p=0.028). Moreover, in subjects not taking oral antidiabetic drugs, baseline OC levels were positively associated with higher levels of fasting insulin and HOMA-BCF even after adjustment for BMI, physical activity, intervention group and baseline levels of each dependent variable.

**Conclusions:** Changes in serum osteocalcin and ucOC are associated to an improvement in insulin secretion and sensitivity, suggesting a possible role of bone in the development of type 2 diabetes.

**Key Words:** osteocalcin, insulin sensitivity, HOMA-BCF

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### 27/108. Nutrition in the Management of Non-Communicable Diseases **Mineral levels in oral diets served to kidney patients in a Brazilian hospital**

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**Introduction:** Chronic Renal Failure (CRF) describes a gradual loss of renal function, which can cause metabolic dysfunction and difficulty in filtering out protein metabolites, electrolytes and water. Nutritional counseling for kidney patients aims at improving the nutritional status, by providing diets that minimize the symptoms of the disease and that reduce or prevent its progression.

**Objectives:** Determining sodium, potassium, calcium, phosphorus and iron levels in hospital diets offered to CRF patients, and verifying their adequacy to the nutritional recommendations for CRF patients in conservative and dialytic treatment.

**Method/Design:** Mineral levels were determined in duplicate samples of daily meals served on 4 not-in-a-row days (2d autumn, 2d winter), using an inductively coupled plasma optical emission spectroscopy (ICP OES). Statistical procedures include Shapiro-Wilk tests for normal distribution of variables and Student's t-test when the variable fulfilled parametric conditions and the Kruskal-Wallis followed by Mann Whitney U test in non-parametric conditions. Level of significance was set at p<0.05.

**Results:** For all meal sampling days, the sodium level (average=4.4g/d) was superior than the recommendation (1-3g/d) in 50%, while potassium was adequate (1-3g/d). The calcium level did not meet the recommendation (1-1.5g/d), provided that the diet supplied no more than 35% of the minimum recommendation. The iron level was insufficient for patients of both sex in conservative treatment, which recommendation is 10mg/d for male and 10-15mg/d

for female, meeting only 50 and 33% of daily recommendations, respectively. Phosphorus level in the diet was sufficient to meet the recommendations (0.8-1g/d) in only one of the meal sampling days

**Conclusions:** Overall, the diet offered to CRF patients shows inadequate mineral levels to the treatment, which might contribute to the aggravation of this pathology.

**Key Words:** nutritional recommendation, sodium, chronic renal failure

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## 27/110. Nutrition in the Management of Non-Communicable Diseases

### **Bone quantitative ultrasound measurements in relation to the metabolic syndrome and type-2 diabetes mellitus**

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**Introduction:** Both metabolic syndrome and osteoporosis are major public health problems that have considerable impact on the quality of life and on health care resources. The relationship between the metabolic syndrome and both osteoporosis or the incidence of osteoporotic fractures is the object of considerable controversy. Some authors report a positive association between metabolic syndrome and bone mineral density, some report a negative association and other no association.

**Objectives:** The aim of this study is to determine whether metabolic syndrome, its individual components, or the presence of type 2 diabetes mellitus are associated with a better bone status estimated by quantitative ultrasound at the calcaneus.

**Method/Design:** Cross-sectional study.

251 elderly subjects at high cardiovascular risk from the PRE-DIMED study were included. MetS was defined according to the ATPIII diagnosis criteria. Calcaneus quantitative ultrasound (QUS) assessment was performed using the Sahara system.

**Results:** Subjects with MetS showed significantly lower 24-hour urinary deoxypyridinoline/creatinine (u-DPD/creatinine) levels and higher broadband ultrasound attenuation, and a tendency to higher bone mineral density (BMD) and quantitative ultrasound index (QUI) than their counterparts. Individuals with type 2 diabetes mellitus (T2DM) showed a significantly higher bone broadband ultrasound attenuation (BUA) and QUI than their non-diabetic counterparts, despite they shown a higher prevalence of osteoporotic fractures. Multiple linear regression analyses showed that quantitative ultrasound

parameters were positively associated with the metabolic syndrome and T2DM. Of the bone biochemical markers, only u-DPD/creatinine was related to MetS, abdominal obesity, hypertriglyceridemia component of the MetS, and the number of features that define the MetS.

**Conclusions:** This is the first study showing a positive association between MetS or T2DM with better bone status and lower bone resorption markers measured by quantitative ultrasound. Our results suggest that metabolic abnormalities have a positive effect on healthy bone in elderly subjects at high risk of cardiovascular disease.

**Key Words:** Bone health, metabolic syndrome, type 2 diabetes mellitus.

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## 27/116. Nutrition in the Management of Non-Communicable Diseases

### **Correlation between different methods of nutritional assessment in hospitalized patients**

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**Introduction:** There are some limitations in indicators of nutritional status but these parameters are often used with good efficacy in the diagnosis of nutritional deficit.

**Objectives:** To analyze the correlation between different indicators of nutritional status.

**Method/Design:** Cross-sectional study with patients at a public hospital in southern Brazil between december 2008 and March/2009. We included patients aged 18 years and excluded pregnant women, nursing mothers, amputees, edematous, with pacemakers or metal prosthesis. We collected anthropometric measures (weight, height and arm circumference) and impedance analysis (BIO). The outcome was underweight (UW) arising out of three indicators: a) body mass index (BMI) according to age (WHO, 1995; LEBRÃO, DUARTE, 2003), b) the adequacy of arm circumference (% AC) according with gender and age (Frisancho, 1990; BARBOSA et al. 2005); c) percentage of body fat (% BF) according with gender (LOHMAN, ROCHE, MARTORELI (1988), d) angle phase (Aph) according with gender and age (BARBOSA et al., 2005). Statistical analysis was performed in Stata version 8.0, and the criterion of significance was 5%. For correlation analysis of the diagnostic criteria of underweight was used the correlation coefficient (r).

**Results:** The sample (n = 93) was composed by 52.7% and 51.6% adults. The prevalence of UW was 47.3% for %AC, 29% for Aph, 20.4% for %BF and 18.3% for BMI. Correlation analysis indicated that BMI and %AC were those presenting the strongest correlation (r = 0.81) with statistical significance (r<sup>2</sup> = 0.00001) and BMI showed moderate correlation values for %BF (r = 0.59, r<sup>2</sup> = 0.00001), Aph (r = 0.41, r<sup>2</sup> = 0.00001).

**Conclusions:** The analysis showed that the methods (AC and BMI%) had a strong correlation because they are objective parameters causing less chance of error in the diagnosis of nutritional status when compared with the application of BIO in malnourished patients.

**Key Words:** Malnourished; Patients; Correlation analysis

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**27/117. Nutrition in the Management of Non-Communicable Diseases**  
**Profile of patients treated in a public hospital in southern Brazil**

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**Introduction:** Inadequate nutritional status in hospitalized patients can lead to significant organic changes and impairment of clinical treatment. Shares of maintaining the nutritional status in these patients should involve efficient and early nutritional assessment.

**Objectives:** This study aimed to characterize the nutritional profile of inpatients at a public hospital in southern Brazil.

**Method/Design:** Data collection was done between March and November 2010 from medical records and interviews with inpatients the Public Health System. Inclusion criteria were: oral feeding, 18 years and above. We were excluded amputees. The instrument used was a questionnaire of subjective global assessment (Desky, 1984). The variables were: gender, age, body mass index (BMI) and arm circumference (AC), adjusted for age and sex (OMS, 1995; LEBRAO; DUARTE, 2005; FRISANCHO, 1990) weight loss, change, acceptance and type of diet, gastrointestinal symptoms, functional capacity, body composition and physiological stress. Data were analyzed using Excel software for Windows.

**Results:** The sample consisted of 105 inpatients, most were women (54.3%) and elderly (51.4%). Malnutrition was identified in 39% (AC), 18% (BMI) and 31.4% (AGS). In AGS, the most important aspects are: change in diet (67.7%), low acceptance (46.6%), severe weight loss (44.7%) and loss of appetite (23.3%). The nausea was more frequent gastrointestinal symptoms (32.3%) followed by vomit (26.6%). Much reported that functional capacity was below normal (38%) and the level of stress was between moderate and high (77%). The change in body composition was more prevalent fat loss (46.6%), followed by muscle loss (37.1%) and edema presence (23.8%).

**Conclusions:** The data show that the occurrence of intrahospital malnutrition is lower than that found in the literature, but the factors associated with nutritional risk had a high occurrence. Shares of identifying malnutrition are important to what measures might be taken to reverse the nutritional deficit and provide appropriate treatment.

**Key Words:** Prevalence; Patients; Enteral; Risk

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**27/119. Nutrition in the Management of Non-Communicable Diseases**  
**Risk factors in patients undergoing enteral nutrition therapy**

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**Introduction:** Enteral Nutritional Therapy (ENT) is a procedure to achieve the energy and protein requirements for patients with nutri-

tional risk and we should be introduced as early as possible before the identification of worsening nutritional status.

**Objectives:** The aim was to characterize a sample of patients with ENT and determine the presence of risk factors that may cause the deterioration of nutritional status.

**Method/Design:** Data collection was conducted between March and November 2010 arising from charts of patients admitted to the medical clinic and emergency room of a hospital's public health system in a hospital in southern Brazil. Inclusion criteria were: over 18 years and ENT alone and were excluded amputees. The variables were: gender, age, nutritional status based on body mass index adjusted for age (OMS, 1995; LEBRAO; DUARTE, 2003), diabetes and hypertension, medications and other nutritional risk factors pre-determined.

**Results:** The sample consisted of 49 patients (18-82.5 years) and most men (63.2%) and the same percentage in the elderly. There was a high prevalence of underweight (35%). The hypertension was also high (42.8%) as well with diabetes (22.4%). The drug classes were the most prevalent anti-emetic (48.9%), followed by anti-hypertensive (44.8%). The use of three or more drugs amounts to 48.9% of the sample. The main risk factors that cause the worsening nutritional status was bedridden, elderly, hypertension or diabetes, use of three or more medications, and presence of dysphagia, and most of the sample (61.2%) had three or more risk factors.

**Conclusions:** We can conclude that the sample has many factors that may contribute to the deterioration of nutritional risk. To succeed in ENT, these patients should be identified and monitored by the Multidisciplinary Nutritional Therapy Team in order to prevent the worsening of clinical symptoms and improve quality of life.

**Key Words:** Patients; Prevalence; Risk factors

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**27/120. Nutrition in the Management of Non-Communicable Diseases**  
**Analysis of nutritional status in patients in treatment for breast cancer**

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**Introduction:** Brazilian statistics show that breast cancer is the leading cause of death among women. Nutritional therapy is an adjuvant antineoplastic treatment, with objective to ensure adequate intake of nutrients, reduction of adverse effects and maintaining the nutritional status, but the weight change is reported. There are few studies showing the changes in nutritional status of patients undergoing treatment for breast cancer.

**Objectives:** This study have the objective to analyze information by patients undergoing treatment for breast cancer.

**Method/Design:** This study (observation and prospective) was conducted in an oncology clinic of the southern Brazil (center-west of Paraná State) with 74 patients. These data were collected through medical records, which were recorded anthropometric values from the data available from the beginning and end of treatment. Inclusion

criteria: woman, perform the treatment by public health system, starting between 2004 and 2009 and exclusion criteria: death or lack of data. The indicators analyzed were: Body Mass Index (BMI) adjusted for age (OMS, 1995; LEBRÃO; DUARTE, 2003) and weight change. Data were analyzed with Excel for Windows.

**Results:** The age ranged between 28 and 70 years and only 6.8% were under 40 years. The anthropometric data showed significant difference ( $p < 0.05$ ) between the values of weight initial 63,7kg (IC95% 60,8-66,7) e final 66,8kg (IC95% 63,9-69,7) and BMI initial 24,8kg/m<sup>2</sup> (IC95% 23,8-25,9) e final 27,2 kg/m<sup>2</sup> (IC95% 26,2-28,3). Excess weight prevalence were 45.9% and final were 71.6% and 83.8% had weight gain.

**Conclusions:** The data show that there was an increase in weight of patients. This information is very important because health professionals can to give instruction in relation the weight gain caused by treatment again breast cancer. It is necessary that nutritional intervention have been appropriated for patients with breast cancer had improved their nutritional status.

**Key Words:** Cancer; Weight; Nutritional status

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#### 27/156. Nutrition in the Management of Non-Communicable Diseases

##### **Oral Betaine supplementation is associated with decrease in steatosis in nash patients**

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**Introduction:** Non-alcoholic fatty liver disease represents a spectrum of liver injury characterized by macrovesicular steatosis in the absence of significant alcohol ingestion. The hepatic histology involves pure steatosis, steatohepatitis (NASH) and cirrhosis. NASH is frequently associated with metabolic syndrome, obesity, dyslipidemia and type 2 diabetes. Currently no effective therapy exists for treating NASH. Betaine has been shown to raise S-adenosylmethionine levels that may in turn play a role in decreasing hepatic steatosis.

**Objectives:** The aim was to determine the effects of betaine supplementation in serum liver enzymes, in blood antioxidant parameters and in the amount of fat in the liver in patients with NASH.

**Method/Design:** The study population comprised 23 patients with NASH diagnosed by liver biopsy [11 female (52.9±7.9 years) and 11 male (42.6±9.9 years)]. The control group included 40 healthy volunteers [23 female (43.1±5.6 years) and 17 male (37.4±11.5 years)], all with normal liver ultrasound. NASH patients received an oral solution of betaine anhydrous (10 g/day) for 6 months. Serum levels of AST, ALT, Gamma GT, alkaline phosphatase, superoxide dismutase (SOD) and glutathione peroxidase (GSH-Px) were determined before and after supplementation. The amount of fat deposits in the liver was measured by magnetic resonance imaging (MRI) before and after

of the supplementation. The statistic analysis was performed using nonparametric Mann-Whitney test and paired t-Test.

**Results:** Significant decrease ( $p < 0.05$ ) in AST (47.86±23.84 U/L versus 34.64±12.44 U/L), ALT (65.45±35.64 U/L versus 50.05±29.97 U/L). The amount of fat in the liver by MRI decreased significantly (17.85±8.48% versus 12.03±9.14%) comparing the results before and after supplementation.

**Conclusions:** Betaine probably acts as a donor of methyl groups and can be considered a potential option in the treatment of NASH.

**Key Words:** NASH, betaine, steatosis, Magnetic Resonance Imaging.

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#### 27/165. Nutrition in the Management of Non-Communicable Diseases

##### **Quality of lipids in oral diets served to hospitalized cancer patients in Minas Gerais, Brazil**

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**Introduction:** Lipids are essential nutrients to human nutrition, considering that health might be affected by the lipids quality in diets.

**Objectives:** To determine the content and quality of lipids in regular, soft and bland oral diets offered to oncology patients.

**Method/Design:** Total lipids levels were determined in duplicate samples of daily meals served on 4 non-consecutive week days (2d autumn, 2d winter), by acid hydrolysis with boiling chloridric acid, followed by lipid extraction with petrol-ether. The classification and quantification of linoleic acid,  $\alpha$ -linoleic acid, saturated and trans fatty acids (FA) were estimated by gas chromatography, thus the result was compared to the current dietary recommendations for healthy adults. Statistical procedures included Shapiro-Wilk tests for normal distribution of variables, Student's t-test when the variable fulfilled parametric conditions and the Kruskal-Wallis followed by Mann Whitney U test in non-parametric conditions. Level of significance was set at  $p < 0.05$ .

**Results:** The average content of total lipids and saturated FA among regular (48 and 15g/d), soft (47 and 18g/d) and pureed (36 and 18g/d) diets was similar. The regular diet had the highest content of  $\alpha$ -linoleic acid (1.4g/d), while the soft diet presented more trans FA (1.3g/d). The average content of linoleic acid was similar in regular (14g/d) and soft (11g/d) diets, surpassing the bland diet content (5g/d). During winter, the soft diet presented higher total lipid, saturated FA, trans FA, linoleic and  $\alpha$ -linoleic acids, while the bland diet had more linoleic and  $\alpha$ -linoleic acids and trans FA, and the regular diet surpassed its trans FA content. The linoleic acid content was lower than its

recommendation in all diets.

**Conclusions:** Oral hospital diet ingredients might be selected considering the lipid quality to meet the recommendation levels, which may contribute to an improvement in patient health.

**Key Words:** nutritional recommendation, trans fatty acid, essential fatty acids.

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**27/168.** Nutrition in the Management of Non-Communicable Diseases  
**Effects of Vitamin E supplementation on redox status in chronic renal failure patients on hemodialysis**

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**Introduction:** Oxidative stress is prevalent in dialysis patients and has been implicated in the pathogenesis of cardiovascular disease. Vitamin E is a fat-soluble antioxidant that plays a central role in reducing lipid peroxidation and inhibiting the generation of reactive oxygen species.

**Objectives:** To evaluate the effect of vitamin E supplementation on redox status in chronic renal failure (CRF) patients treated by hemodialysis (HD).

**Method/Design:** 40 patients on HD (M/F=18/22; 45±10 years) received nutritional councils adapted to CRF (energy intake of 0.14 MJ.kg<sup>-1</sup>.BW.d<sup>-1</sup>, protein intake 1 g.kg<sup>-1</sup>.BW.d<sup>-1</sup>, lipid intake 35% of total energy intake with 25% PUFA, 50% of monounsaturated fatty acid and 25% saturated fatty acids. Patients were randomized into two groups; 20 patients received a supplementation with vit E (100 mg.d<sup>-1</sup>) during 30 days and 20 patients were used as controls. Blood samples were drawn at the beginning (T0) and 30 days (T1) after initiating treatment. In red blood cells, lipid peroxidation was assessed by hydroperoxides and thiobarbituric acid reactive substances (TBARS) analysis. Protein oxidation was evaluated by carbonyls analysis. Antioxidant defense was evaluated by the analysis of superoxide dismutase (SOD), glutathion reductase and catalase activities.

**Results:** At T1, in treated patients compared to controls, similar values of triacylglycerols and total cholesterol were noted. In red blood cells, concentrations of hydroperoxide were increased (p<0.01) and TBARS were decreased (p<0.01). Carbonyls concentrations were decreased (p<0.001). Low values of nitric oxide (NO) were observed in red blood cells (p<0.05). Activity of superoxide dismutase (SOD) was similar in the two groups. However, a significant increase in catalase activity was observed (p<0.001). Moreover, increased glutathion reductase activity was noted (p<0.01).

**Conclusions:** In hemodialysed patients, vit E supplementation improves oxidative stress generated by uremia through a decrease of protein and lipid oxidation and increase of antioxidant enzymes activities.

**Key Words:** Lipid peroxidation, Protein oxidation, Antioxidant defense, Chronic renal failure, Hemodialysis

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**27/172.** Nutrition in the Management of Non-Communicable Diseases  
**Soybean glycinin as a functional compound increases hdl-cholesterol in hypercholesterolemic rats: comparison with the rosuvastatin**

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**Introduction:** Considerable evidence in animal models and in humans indicates the involvement of soy protein in decreasing serum cholesterol and LDL-cholesterol particles. Moreover, many advances in pharmaceutical drugs that have proven to reduce cholesterol levels, as commonly called statins.

**Objectives:** The purpose of this study was to isolate the major protein of soybean glycinin and investigate the effect of oral administration compared to the statin drug in plasma and liver cholesterol in animals subjected to a hypercholesterolemic diet.

**Method/Design:** Male Wistar rats were maintained under controlled circumstances. They were divided into 5 groups (n=9): 1) STD (Standard casein diet AIN-93M); 2) HC (hypercholesterolemic group): diet STD plus 1% of cholesterol and 0.5% of cholic acid; 3) HC+11S: glycinin (300mg/Kg body weight/day); 4) HC+ROS: rosuvastatin (10mg/Kg body weight/day); 5) HC+11S+ROS (glycinin and rosuvastatin at the same doses as in previous groups). The protein and the drug were administered by gavage. The rats fed diets and water ad libitum and at the end of 28 days the animals were sacrificed by decapitation and the blood and liver were removed for biochemical analyses.

**Results:** The group HC+11S showed higher levels of plasmatic HDL-cholesterol. The hepatic cholesterol levels showed a significant reduction in HC+ROS group. However, the group HC+11S+ROS showed elevated hepatic cholesterol suggesting a negative interaction between the drug and the protein fraction. The groups HC+11S, HC+ROS and HC+11S+ROS showed a reduction in hepatic triglycerides in comparison to control group HC.

**Conclusions:** The results of the increase in plasma HDL-cholesterol presented by the group HC+11S suggest that the major protein fraction of soy can have a significant role in the metabolism of cholesterol when used alone, thereby acting as a functional compound.

**Key Words:** Soybean, Glycinin, Experimental Model, Rosuvastatin, Hypercholesterolemia.

**27/173. Nutrition in the Management of Non-Communicable Diseases**  
**Compare of resting metabolic rate among healthy men and men with Non-Alcoholic Fatty Liver Disease (NAFLD)**

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**Introduction:** Non-Alcoholic Fatty Liver Disease (NAFLD) is a major cause of liver-related morbidity with possible progression to cirrhosis, liver failure and hepatocellular carcinoma. Because of the high prevalence of NAFLD (2.8-46% in the general population), much work is ongoing to elucidate the mechanism for initiation of NAFLD.

**Objectives:** The purpose of this study was to compare the nutritional status, energy expenditure and biochemical indices analysis between two groups of adult men with NAFLD and healthy men.

**Method/Design:** Sixty- three men (BMI<30) participated in this case-control study- thirty- two healthy men and thirty-one who have NAFLD. Two groups were matched in age, physical activity and BMI. Parameters measured were biochemical indices (lipid profile, ALT, AST, GGT and AIP), anthropometric measurements (weight using beam seca scale, height by seca stadiometer, waist and hip circumferences using tape meter), body composition (using Tanita body composition analyzer, model BC-418 MA), resting metabolic rate (RMR) (by Fitmate, Cosmed co). The data were analyzed using independent t-test and linear regression (SPSS 16).

**Results:** Significance was determined at  $p \leq 0.05$ . The mean age was  $35/48 \pm 7/02$  and  $34/53 \pm 5/2$  years and the mean BMI was  $26/8 \pm 2/28$  and  $25/89 \pm 2/45$  for the NAFLD and healthy groups, respectively. Serum ALT, AST ( $P < 0.001$ ) and GGT ( $P: 0.008$ ) were significantly higher in the NAFLD group. There were no significant difference between both groups in RMR, anthropometric data, body composition but in NAFLD group, but RMR per kilogram of body weight (RMR/KgBwt) was statistically lower than healthy men ( $P: 0.002$ )

**Conclusions:** These finding may be useful in the nutrition management of NAFLD. An important question is if a lower RMR/KgBwt may be one of the factors underlying accumulation of fat in liver in NAFLD.

**Key Words:** Non-Alcoholic Fatty Liver Disease (NAFLD), Resting Metabolic Rate (RMR), body composition

**27/190. Nutrition in the Management of Non-Communicable Diseases**  
**Effect of a low-calorie diet with or without bread on dietetic parameters in overweight/obesity women**

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**Introduction:** Some control weight diets treatments recommend the exclusion of foods without scientific basis. Bread is one of the most restricted foods in the hypocaloric diets.

**Objectives:** To compare two nutrition intervention strategies (with or without bread) in overweight/obese women.

**Method/Design:** A clinical, prospective and randomized study was designed. 122 women (>18 years,  $BMI \geq 25 < 40 \text{ kg/m}^2$ ) were assigned to 2 groups: intervention group (BREAD) and control group (NO BREAD). Both groups received a balanced, low-calorie diet (1500 kcal, 55% carbohydrates, 21% proteins and 24% fat) based on the consumption of food groups recommended by the Spanish Society of Community Nutrition adapted for weight loss. The NO BREAD group was given other sources of cereals such as pasta, rice, potatoes, etc. Both groups were monitored for 16 weeks. A food frequency questionnaire and a "3-day food and drink record" validated in the Spanish population were used.

**Results:** 104 women completed the study ( $48.4 \pm 9$  years,  $29.8 \pm 3.5 \text{ kg/m}^2$ ). Anthropometric, biochemical or inflammatory markers improve after the intervention. However, there were no significant differences between groups. BREAD group significantly increased cereals consumption ( $3.2 \pm 1.3$  to  $3.7 \pm 0.5$  servings/day,  $p < 0.05$ ), achieving a reduction in the discrepancy with the recommendation (4 servings/day). In contrast NO BREAD group increased the discrepancy. BREAD group significantly increased the percentage of kcal provided by carbohydrates and reduced fat ( $41.2 \pm 6.4$  vs.  $45.9 \pm 5.0\%$  and  $39.0 \pm 6.6$  vs.  $32.7 \pm 5.1\%$   $p < 0.001$ ), in contrast, NO BREAD group no change significantly the caloric profile. Saturated fatty acids significantly decreased in both, with significant differences between groups (BREAD:  $10.5 \pm 3.0$  to  $7.7 \pm 1.9\%$ ; NO BREAD:  $9.9 \pm 2.7$  to  $8.3 \pm 1.6\%$ ,  $p < 0.05$ ). NO BREAD group had high number of diet transgressions ( $21.2 \pm 16.8$  vs  $18.2 \pm 12.0/\text{week}$ ;  $p < 0.05$ ).

**Conclusions:** The inclusion of bread in a low-calorie diet did not affect the improvement of nutritional parameters and favoured a better evolution of dietetic parameters and greater compliance of the diet.

**Key Words:** dietetic parameters, obesity, bread, hypocaloric diet

### **New Body Mass Index adjusted for fat mass (BMIfat) by the use of electrical impedance**

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**Introduction:** Body mass index (BMI) is one of the measurements most frequently used for the diagnosis of obesity; however, it does not differentiate between fat and lean mass.

**Objectives:** To propose a new Body Mass Index Adjusted for Fat mass (BMIfat) obtained by bioelectrical impedance in subjects of both genders and redefine the BMI cut off point for obesity in the studied population.

**Method/Design:** A cross-sectional observational analytical study with 200 individuals of both genders aged 18 to 60 years followed up at the University Hospital of FMRP-USP were divided into two groups: Group 1 (n = 100), used for the construction of the BMIfat and Group 2 (n = 100), used for the application of the BMIfat. All subjects were submitted to anthropometric and body composition evaluation.

**Results:** Groups 1 and 2 had similar characteristics. After factorial analysis of the data obtained for Group 1, a new score was obtained: (3 Weight + 4 Total Fat Mass) / Height. Considering cut-off points for body fat of 25% and 35% for men and women, respectively, it was observed that this BMIfat has a more accurate capacity to detect obese individuals (0.953) compared to the traditional BMI (0.888). When applied to Group 2, the BMIAF continued to have superior results versus traditional BMI. New ranges of cut-off points for BMI for the classification of obesity were also defined for the Brazilian population, i.e., 21.84 to 26.11 kg/m<sup>2</sup> for men and 22.03 to 25.3 kg/m<sup>2</sup> for women.

**Conclusions:** These data suggest the use of a new adjusted BMI in place of the traditional BMI. This is the first Brazilian study which, in place to proposing new cut-off points for the BMI. Subsequent studies aim to validate this index for the Brazilian population and propose comparisons between other index described in the literature.

**Key Words:** body mass index, electric impedance, body composition.

### **Oxidative stress in patients to roux-en-y gastric bypass after an two year follow-up**

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**Introduction:** Bariatric Surgery has been considered the method to induce a rapid and significant weight loss.

**Objectives:** Evaluated the effect of Roux-en-Y gastric bypass on blood markers of oxidative stress: catalase (CAT), reduced glutathione (GSH),  $\beta$ -carotene, vitamins C and E, ferric reducing antioxidant power (FRAP) and thiobarbituric acid reactive substances (TBARS).

**Method/Design:** A prospective-controlled clinical study, with two groups: control group (CG, n=35), assessed at a single time point, and bariatric group (BG, n=35), assessed in the basal period, and in the 6th, 12th and 24th months post-surgery.

**Results:** At two years after surgery the body mass index had fallen from 47.05 $\pm$ 1.46kg/m<sup>2</sup> to 30.53 $\pm$ 1.14kg/m<sup>2</sup> (p<0.001), and 25.7% had regained weight between 12 and 24 months. At six months there were raised blood concentrations of vitamin C (p=0.007),  $\beta$ -carotene (p=0.833), vitamin E (p=0.939), CAT (p=0.001) and FRAP (p=0.728). The concentrations of GSH (p=0.005) and TBARS (p=0.148) were lower at six months in relation to the basal period. At 12 months post-surgery there was an increase in vitamin C (p<0.001), CAT (p=0.052), and FRAP (p=0.487), although  $\beta$ -carotene (p<0.001), vitamin E (p<0.001), GSH (p=0.002) and TBARS (p<0.001) had fallen in relation to basal. At the end of the study, after 24 months, the concentrations of vitamin C had decreased 31.9 $\pm$ 4.6% (p<0.001), with  $\beta$ -carotene (p<0.001), vitamin E (p<0.001), GSH (p=0.090), CAT (p=0.029) and FRAP (p=0.085) also lower in relation to basal. The TBARS were reduced at 24 months (p<0.001) in relation to basal, although they were higher than at 12 months (p<0.001).

**Conclusions:** The markers vitamin C, E,  $\beta$ -carotene, GSH, CAT and FRAP decreased after Roux-en-Y gastric bypass. While TBARS decreased during the first year, they were increased after 24 months. This suggests a return of oxidative stress, explained in part by the imbalance between pro-oxidants and anti-oxidant defences, and/or by the weight regained.

**Key Words:** Obesity, Roux-En-Y, Gastric Bypass, Oxidative Stress, Antioxidant



27/269. Nutrition in the Management of Non-Communicable Diseases

### Relationship between nutritional status and oral health in patients submitted to Roux-en-Y gastric bypass

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**Introduction:** Obesity may influence both nutritional and oral health status. Roux-en-Y bypass gastric (RYBG) can lead to nutritional deficiencies that affect the integrity of oral tissues.

**Objectives:** Evaluate the effect of post-surgery weight loss over alterations in the nutritional status and the oral cavity.

**Method/Design:** One transversal and one prospective follow-up study were conducted, both with patients submitted to Roux-en-Y gastric bypass. The transversal study evaluated 101 individuals (39.9±9.2 years). The 12-month prospective follow-up study evaluated pre-surgery stage (basal), as well as 1st, 3rd, 6th, and 12th months post-surgery in 16 individuals (43.6±10.5 years).

**Results:** In the transversal study, mean weight loss was 35.9±15.9 kg, Body Mass Index (BMI) was 33.7±6.3kg/m<sup>2</sup> and waist circumference (WC) was 95.5±15.4cm. DMFT index was 17.19±0.85, decreasing to 16.7±1.07 six months after surgery. Individuals whose BMI values were above 30kg/m<sup>2</sup> had higher DMFT index values (17.6±1.03) as well as decayed (2.33±0.47) and lost (8.63±1.1) components. WC values were significantly correlated with weight (p<0.001), weight loss (p=0.023), BMI (p<0.001) and DMFT index (p=0.39) after surgery. In the prospective follow-up study there was a 51.5% (p<0.05) reduction in weight and BMI after surgery. DMFT index evaluation showed a decrease of 57.7% (p=0.037) in the number of decayed teeth at 12 months when compared to the basal period, while at the same time the number of filled teeth increased 20% (p=0.005). Salivary flow decreased 25% (p=0.044) in the first month and increased 50% (p=0.006) in the third month post-surgery when compared to the basal period, attaining normal levels (1.2±0.3ml/min). Buffer capacity decreased 21.7% (p<0.001) in the 6th month.

**Conclusions:** BMI and WC are anthropometric indicators which can be considered as risk factors for oral diseases. RYBG reduced the risk of periodontal disease and normalized the salivary flow and buffering capacity.

**Key Words:** Nutritional Status, Oral Health, Obesity, Roux-En-Y, Gastric Bypass.

27/308. Nutrition in the Management of Non-Communicable Diseases

### The FTO rs9939609 polymorphism study in patients with overweight and obesity

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**Introduction:** Obesity development are determined by lifestyle and genetic mechanisms. Among the obesity-related genes, polymorphisms in the fat mass and obesity associated (FTO) gene are strongly associated with body fat estimates in different populations

**Objectives:** Examine the relationship between the FTO rs9939609 polymorphism gene and body mass index, fat mass, fasting blood parameters indicative of glucose and lipid metabolism.

**Method/Design:** We studied polymorphism in 94 persons from Moscow region with body mass index (BMI) > 25 kg/m<sup>2</sup>. Overweight was present in 19% of patients, I degree of obesity - in 25%, II degree of obesity - in 16%, III degree of obesity - in 40%. The FTO polymorphism was genotyped with tetra-primer amplification refractory mutation system-PCR. We also have estimate of clinical, biochemical, anthropometric parameters and body composition by bioimpedansometria

**Results:** The frequencies of the TT (wild), TA and AA (mutant) genotypes of FTO gene were 0.17, 0.40 and 0.43, respectively. Carriers of the allele A were 83% patients, carriers of two copies A alleles - 43%. Hypercholesterolemia and hypertriglyceridemia in patients with A allele was much more frequent (74% and 46%) compared with TT homozygotes (41% and 29%). AA homozygotes and AT heterozygotes compared to TT homozygotes had higher BMI (39,±1,40 kg/m<sup>2</sup> and 36,0±1,40 kg/m<sup>2</sup>, respectively, p>0,05), fat mass (49,8±3,04 kg and 41,3±3,68 kg, p<0,05), body fat percentage (46,2±1,59% and 38,5±1,49%, p<0,02) and serum triglycerides concentrations (1,90±0,18 mmol/l and 1,70±0,20 mmol/l, p<0,02)

**Conclusions:** The test of the rs9939609 polymorphism in the FTO can be used for the personalization of diet in patients with overweight and obesity

**Key Words:** obesity, polymorphism of FTO gene

27/314. Nutrition in the Management of Non-Communicable Diseases

### Impact of dietary intervention on cardiovascular risks in adolescents

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**Introduction:** Cardiovascular diseases cause more than a half of death cases in Croatia. Since cardiovascular risk factors are increasing in childhood and adolescence, their early recognizing and treating are

of utmost importance. Although genetic factors play a certain role in appearance of cardiovascular risks, they are mostly related to poor life-style and eating habits.

**Objectives:** The aim of this study was to assess eating habits of adolescent population, diagnosed with one or more cardiovascular risks (increased blood lipid, blood pressure and BMI values) before and two months after the individual nutrition education.

**Method/Design:** The research included a group of 17 adolescents, age 14.5 years (12 male and 5 female). Initial investigation included a food frequency questionnaire (FFQ), anthropometric (body height and weight), blood pressure and biochemical (total cholesterol, HDL, LDL, TAG) measurements. The adolescents participated in individual nutrition education, and two months after the intervention, all of the measurements and dietary assessment were repeated.

**Results:** The results of this study show that the nutrition education on the adolescents had a significantly positive outcome in the two-month period. Total calorie intake, proteins, total and saturated fats, cholesterol, total and simple carbohydrates and sodium decreased significantly ( $p \leq 0.05$ ), and the intake of fibres increased significantly, too. The mean BMI showed significant decrease from 30.3 to 29.5 ( $p \leq 0.05$ ) as well as total cholesterol, LDL and TAG. HDL values increased and systolic and diastolic blood pressure values decreased by 12.6 and 3.8 mm Hg, respectively.

**Conclusions:** The nutrition advices had positive outcome on eating habits and the intake of some nutrients, as well as on cardiovascular risk values in adolescents.

**Key Words:** Cardiovascular Risks, Adolescents, Eating Habits, Intervention

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### 27/318. Nutrition in the Management of Non-Communicable Diseases **Determination of mothers' Knowledge about nutrition during diarrhea**

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**Introduction:** Diarrhea is one of the most important reasons for diseases and death in children over 5 years of age living in the developed countries, and it negatively affects the nutrition and growth of children, and thus the vicious cycle of diarrhea-malnutrition results in increasing mortality.

**Objectives:** The main aim of the study is to determine the knowledge levels of mothers about nutrition during diarrhea.

**Method/Design:** Study sample is composed of 110 mothers who agreed to participate in the study and applied to the Department of Pediatrics in Health Center of Middle East Technical University. Study data was collected through questionnaire. Questionnaire form includes the questions to determine the demographic structure and knowledge levels of mothers on nutrition during diarrhea. There are

21 statements that can be answered either 'yes' or 'no' to determine the knowledge about nutrition during diarrhea.

**Results:** The mean age of participant mothers was  $37.29 \pm 4.71$  years, and 42.7% of the children were female, 57.3% were male and their age changed between 4 months and 14 years. 43.6% of mothers were university graduates. 70.9% of mothers stated to consult doctor when her child had diarrhea, while 74.5% stated to make no application on their own. The maximum total score is 21 points when all the statements on nutrition during diarrhea are correctly answered. The mean knowledge score of mothers was determined as  $17.38 \pm 1.93$ . The mean knowledge scores had no statistically significant relation with education level, the number of total children, and the number of children <5 years of age ( $p > 0.05$ ). 51.8% of mothers stated to receive information on nutrition during diarrhea. The most common sources of information were health personnel (85.9%) and internet (24.6%).

**Conclusions:** Mothers' knowledge is quite important for protecting children from diarrhea and treatment in early period of diarrhea.

**Key Words:** Diarrhea, Child, Mother, Nutrition, Knowledge

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### 27/347. Nutrition in the Management of Non-Communicable Diseases **Nutritional status of Bulgarian 1-st grade schoolchildren - WHO childhood obesity surveillance initiative in Bulgaria**

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**Introduction:** Obesity in childhood period is a health problem, accelerating throughout the world. Nutrition and Food Security Programme of WHO/EC is establishing an European childhood obesity surveillance system, Bulgaria is included in the WHO Childhood Obesity Surveillance Initiative. The first national survey on representative sample of 1st grade schoolchildren (7-8 years old) was carried out in 2008.

**Objectives:** To create surveillance system in Bulgaria for assessment of overweight and obesity among 1st grade schoolchildren (7-8 years old).

**Method/Design:** Bulgaria applied two-stage cluster random sampling design - 184 schools of a total of 2171 primary schools are sampled, and 3311 children are enrolled. The weight, height, waist and hip circumference of children were measured with standardized anthropometric equipments and methods according to the Protocol were applied. Overweight and obesity were assessed by BMI. WHO growth standards, 2006 were applied.

**Results:** The prevalence of overweight among boys is 15.7% and those in girls - 16.7%. Obesity rate is also high - 13.2% among boys and 12.2% for girls. Only 42.4% of schools have initiatives to promote a healthy lifestyle - physical activity and/or healthy eating.

**Conclusions:** The WHO Childhood Obesity Surveillance Initia-

tive creates standardized and European-wide harmonized surveillance systems for routinely measurements and assessment the trends in overweight and obesity in primary school children. This is crucial for correct understanding the progress of obesity epidemic in this risk population group and for inter-country comparisons within the WHO European Region that are important for development strategy for effective nutrition policy.

**Key Words:** overweight, obesity, schoolchildren

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**27/352.** Nutrition in the Management of Non-Communicable Diseases  
**Altered fatty acid composition in bladder urothelial carcinoma tissue**

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**Introduction:** Bladder cancer cells appear to have an altered lipid metabolism as evidenced by modulated lipogenic enzymes.

**Objectives:** To investigate differences in tissue fat composition between malignant and normal urinary bladder from the same bladder specimens.

**Method/Design:** Normal and malignant bladder tissues were collected from 31 (age 49-75) patients with high-grade Ta urothelial carcinoma during transurethral surgical resection (TUR). The fatty acid composition in the obtained tissue was determined by gas liquid chromatography.

**Results:** In the bladder cancer tissue, the levels of stearic acid (18:0; P=0.01) and oleic acid (18:1n-9; P=0.03) were higher, and the level of arachidonic acid (20:4n-6; P<0.001) was lower than that in the normal bladder. The ratio of 20:4n-6/18:2n-6 was significantly decreased (P<0.001) in the bladder cancer. Overall, bladder cancer tissue had a significant reduction in the total n-6 polyunsaturated fatty acid (-15.1%; P<0.001).

**Conclusions:** This study demonstrates that tissue fatty acid content of bladder cancer differs from that of normal bladder. The change in the fatty acid metabolism may be a general phenomenon occurring during bladder tumor development, suggesting dietary fat and related metabolic pathways and as targets for bladder cancer therapy.

**Key Words:** fatty acids; urothelium; urinary bladder neoplasms

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**27/365.** Nutrition in the Management of Non-Communicable Diseases  
**Goat milk consumption improves antioxidant defence during Fe-deficiency anaemia recovery**

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**Introduction:** Antioxidant enzymatic defence depends not only by the dietary mineral concentrations, but also by the type, amount and quality of fat in the diets.

**Objectives:** The current study was carried out to assess the effect of cow or goat milk-based diets, on the enzymatic antioxidant defence of control and anaemic rats, after the experimentally induced Fe-deficiency anaemia.

**Method/Design:** 90 rats were divided into two groups: the control group receiving a normal-Fe diet (45 mg/kg) and the anaemic group receiving a low-Fe diet (5 mg/kg). Lately, the animals were fed for 30 days with cow milk or goat milk-based diet, with normal-Fe content. Subsequently, they were totally bled out by cannulation of the abdominal aorta. Brain, liver and erythrocyte cytosolic fraction were prepared fresh, protein contents in the cytosolic fractions and the activity of the antioxidant enzymes CAT, GPx and SOD in brain, liver and erythrocyte cytosolic fractions were subsequently measured.

**Results:** The increased activity of SOD in all the animals fed with cow milk-based diet, reveals they feature a higher rate of formation of radicals O<sub>2</sub><sup>•-</sup> than those fed with goat milk-based diet (P < 0.001) in all the tissues studied, indicating an increase in the production of H<sub>2</sub>O<sub>2</sub>, proportional to the rate of neutralization of radicals O<sub>2</sub><sup>•-</sup>. Goat milk consumption increases Zn bioavailability, a mineral with antioxidant capacity. The slightly modified activity of CAT and GPx in the animals fed cow milk based-diet, indicates that these enzymes are insufficient to neutralize and to scavenge this high production of H<sub>2</sub>O<sub>2</sub>.

**Conclusions:** The habitual consumption of goat milk, natural food with excellent nutritional characteristics, has positive effects on the enzymatic antioxidant defence, therefore, it would be recommendable its inclusion in the habitual diet, in the general population as well as in those affected by nutritional Fe-deficiency anaemia.

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**27/369. Nutrition in the Management of Non-Communicable Diseases**  
**Goat milk consumption reduces lipid peroxidation rate during chronic Fe-repletion**

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**Introduction:** Goat milk fat is of higher nutritional quality than cow milk and moreover, it has been observed the beneficial effect of goat milk consumption on mineral metabolism; nonetheless, there are no studies available about the influence of this milk type on lipid peroxidation.

**Objectives:** The current study was carried out to assess the effect of cow or goat milk-based diets, either with a normal-Fe content or Fe-overloaded on the lipid peroxidation processes of control and anaemic rats, after the experimentally induced Fe-deficiency anaemia.

**Method/Design:** 90 rats were divided into two groups: the control group receiving a normal-Fe diet (45 mg/kg) and the anaemic group receiving a low-Fe diet (5 mg/kg). Lately, the animals were fed for 30 days or 50 days with cow milk or goat milk-based diet, with normal-Fe content or Fe-overload (450 mg/kg). On day 30 and 50, the animals were totally bled out to measure thiobarbituric acid-reactive substances (TBARS) in plasma.

**Results:** An increase in TBARS has been found with Fe-overloaded diets, versus the animals fed with normal-Fe content ( $P < 0.001$ ). The generation of superoxide ions is much higher in situation of Fe-overload. Nevertheless, this increase is more significant in the animals receiving cow milk diet ( $P < 0.001$  for cow milk and  $P < 0.05$  for goat milk). This is due to the beneficial nutritional characteristics of this type of milk which increases bioavailability of antioxidant minerals. Finally, TBARS increased at day 90 with regard to 70 ( $P < 0.001$ ), since all the processes of lipid peroxidation are intimately related to the age.

**Conclusions:** The habitual consumption of goat milk limits the processes of lipid peroxidation in comparison with cow milk consumption, even in situation of Fe-overload. Therefore, it would be recommendable its consumption, by the general population and affected by nutritional Fe-deficiency anaemia, especially in those consuming oral supplements of Fe.

**Key Words:** goat and cow milk, antioxidant enzymes, Fe-deficiency anaemia, Fe-overload, lipid peroxidation

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**27/373. Nutrition in the Management of Non-Communicable Diseases**  
**Training of cooks from a public hospital: workshop about use of herbs in recipes.**

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**Introduction:** The sodium-restricted diets are used in hospitals to control the blood pressure levels and the knowledge about strategies to improve the sensory characteristics of the food offered is important.

**Objectives:** To train cooks from a hospital on the use of herbs and spices in recipes with salt restriction.

**Method/Design:** Were selected recipes that had ingredients easily found in hospital kitchen. From the recipes were selected herbs and spices that would be used. Cooks of a public hospital of São Paulo (Brazil) were invited to participate of the workshop. Half the recipe was prepared without the addition of herbs and spices and half with the addition of these ingredients. All recipes were prepared without added salt, so that participants would notice the role of herbs and spices in color, flavor and smell. The chefs took part in a sensory test acceptance with hedonic scale of 5 points.

**Results:** 35 cooks participated of the workshops. The recipes developed were tomato sauce, stew, omelet, sauté potatoes and cooked chayote. Herbs and spices added were thyme and basil in the tomato sauce, parsley and fines herbs in the stew, fresh basil and thyme in the omelet, marjoram in the sauté potato and laurel and fresh mint in the chayote. The sensory test showed that for all recipes developed, the versions with herbs and spices had greater acceptance, both in flavor and smell.

**Conclusions:** Through workshops, it possible to enable cooks of hospitals and make them aware of the importance of using herbs and spices to improve the taste and smell of salt-restricted recipes.

**Key Words:** Workshop, recipe, cook, herb

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**27/380. Nutrition in the Management of Non-Communicable Diseases**  
**Collagen hydrolyzate improves compositional and histological characteristics of the bone of osteopenic rats**

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**Introduction:** Osteoporosis is characterized by the reduction of bone mass and commonly leads to increased susceptibility of fractures. In women, osteoporosis is associated to the cessation of estrogen secretion and menopause. Collagen accounts for approximately 95% of the bone proteins and is to a large extent responsible for its biomechanical properties. Collagen hydrolyzates (CH) consist of mixtures

of peptides obtained by a partial hydrolysis of gelatins, which have received considerable scientific attention as potential repositories of osteoarticular tissues.

**Objectives:** To evaluate the effect of supplementing the diets of ovariectomized rats with a commercial CH upon the compositional and histological characteristics of the bone.

**Method/Design:** 48 adult female rats were divided into 6 groups: 3 of them ovariectomized, 1 sham-operated and 2 intact, fed the AIN 93-M diet, supplemented with either CH or gelatin (Control), in two levels: (1) a dose equivalent to 5x the amount suggested for humans (10g/day) and (2) a dose 10x greater. After eight weeks of treatment, the bones of femurs and vertebrae were excised. For the bone, gross weight, protein and mineral content (Ca, Na, Zn, Fe, K, P, Mg, Mn, Pb and Cu) were determined. Histological analysis of bone tissue sections was also performed to compare the different treatments.

**Results:** Histological analysis of the femurs of castrated rats that received the CH showed greater bone density than those receiving the gelatin supplementation. The analysis of the mineral content showed that calcium, copper, potassium, manganese, phosphorus, zinc and magnesium were in greater amounts in the bones of animals that were supplemented with CH, although no statistical difference.

**Conclusions:** CH consumption as a diet supplement by the ovariectomized rat had an unequivocal contribution in the conservation or preservation of bone mass not seen when gelatin was used as a supplement.

**Key Words:** Collagen Hydrolyzate; Osteoporosis; Ovariectomy; Gelatin.

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**27/399.** Nutrition in the Management of Non-Communicable Diseases  
**Weight loss after 12 weeks with new Nordic diet vs. Average Danish diet provided ad libitum - A randomized controlled trial using the shop model.**

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**Introduction:** The Mediterranean Diet has health promoting effects. Yet, the adoption of a New Nordic Diet (NND) may be just as healthy, more ecologically sustainable, more tasteful and better adopted by the Nordic people.

**Objectives:** To evaluate whether the NND can induce weight loss and beneficial changes in body composition after 12 weeks of highly controlled dietary intervention.

**Method/Design:** A total of 266 obese/overweight adults with enlarged waist circumference underwent screening. Out of these 220 were considered eligible. Due to various factors (primarily caused by logistics, start of new medication and lack of time) a total of 181 subjects from 151 families started the randomized intervention. From a food shop the subjects were provided, with all foods free of charge, with either the New Nordic Diet (NND, N=113) or a control diet

according to Average Danish Diet (ADD, N=68) for 12 weeks, both provided ad libitum. The study is part of the OPUS project 'Optimal well-being, development and health for Danish children through a healthy New Nordic Diet'. Supported by a grant from the Nordea Foundation and registered as NCT01195610.

**Results:** Of the 181 adults (mean age 41.3y; BMI 30.2±4.9 kg/m<sup>2</sup>; body fat 40.8±7.2% (mean ±SD)) starting the randomized dietary intervention, 153 participants (84.5%) completed 12 weeks; NND=84.1% and ADD = 85.3% (NS). Those assigned to the NND diet consumed significantly larger amounts of Nordic and organic produce of e.g. vegetables, fruits, berries, cabbage, fish, whole grains, wild plants and game meat. The NND and ADD diets had a -3.1±2.8 kg and -1.6±2.1 kg weight change respectively (p<0.005). The changes in body fat percentage were -2.1±1.6 vs. -1.5±1.5%, respectively (p=0.020).

**Conclusions:** In this large Danish study, the NND diet produced a greater weight loss and improved body composition during 12 weeks of highly controlled diet.

**Key Words:** Nordic diet, weight loss

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**27/416.** Nutrition in the Management of Non-Communicable Diseases  
**Development of an animal model to study the effects of functional foods on atherosclerotic plaque regression**

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**Introduction:** Numerous animal studies that utilize functional foods to induce plaque regression may be confounded from the initiation of intervention before the cessation of plaque development. Therefore, any effects on the plaque size would represent a slowing of plaque progression rather than an induction of plaque regression.

**Objectives:** The purpose of our study was to develop an animal model that exhibited clear evidence of plaque growth stabilization with vascular function abnormalities before an intervention was initiated.

**Method/Design:** NZW rabbits were randomly assigned to a control group fed a regular diet for 3.5 weeks, or to two experimental groups, both being fed a 1% cholesterol-supplemented diet but for either 3.5 or 4 weeks. The control and a subset of experimental animals given 3.5 weeks of cholesterol feeding were examined immediately afterwards. The remaining animals fed the cholesterol-supplemented diet for 3.5 weeks were then returned to a regular diet and examined 2-6 weeks later. Animals fed for 4 weeks were returned to a regular diet and examined 8 weeks later.

**Results:** Aortic plaques were not evident immediately after the 3.5 weeks of cholesterol feeding. Plaques did not develop until two weeks after cholesterol withdrawal and continued to develop until they plateaued by the eighth week. Eight weeks after cholesterol withdrawal the maximum contraction caused by norepinephrine signifi-

cantly decreased. Similarly, the relaxation response to acetylcholine was impaired after the same duration of withdrawal from cholesterol. No significant changes in the relaxation response induced by sodium nitroprusside were observed.

**Conclusions:** Plaque formation can initiate even after the removal of dietary cholesterol supplementation. Thus, studies on atherosclerotic plaque regression should not apply any intervention immediately after cholesterol supplementation. Rather, intervention should be applied eight weeks after withdrawal from cholesterol supplementation since at this time plaque growth has stabilized.

**Key Words:** Atherosclerosis, Regression

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### 27/421. Nutrition in the Management of Non-Communicable Diseases **Iron status associated with cardiovascular risks in hemodialysis patients**

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**Introduction:** Iron, a transition metal, is able to participate in the generation of powerful oxidant species and lipid peroxidation and thus plays an important role in reactive oxygen metabolite-mediated tissue injury and in the progression of cardiovascular disease. High serum iron is associated with less cardiac protection and more proinflammatory states in Hemodialysis (HD) patients than normal subjects and increased serum ferritin may be an independent predictor of cardiovascular mortality. Imbalanced lipid profiles, especially high triglyceride (TG) levels and lower levels of high-density lipoprotein cholesterol (HDL-c), are a common situation in patients on HD.

**Objectives:** The aim of this study was to investigate associations between iron status markers, nutritional status, and lipid profile in HD patients.

**Method/Design:** The study included the investigation of biochemical data of 43 patients treated by hemodialysis as the markers of iron status (serum iron, ferritin and TIBC), nutritional status (BMI and albumin) and lipid profile. Cases with  $\geq 18$  years old and on dialysis for at least 6 months were selected. Patients were classified as malnutrition, eutrophic or overweight using BMI values.

**Results:** There were positive correlations between serum iron and: Cholesterol - COL ( $r=0,419$ ;  $p=0,009$ ), and TG ( $r=0,352$ ;  $p=0,03$ ). Serum ferritin was correlated to: COL ( $r=0,515$ ;  $p=0,002$ ) and LDL-c ( $r=0,350$ ;  $p=0,042$ ). According to BMI, there were no differences for serum iron and serum ferritin ( $p>0,05$ ) for the three groups, but TG were higher in overweight group (versus eutrophic) and HDL-C were higher in malnutrition group (versus eutrophic and overweight groups). Iron and ferritin were also not different in groups separated by albumin (cut point of 4.0 mg/dL).

**Conclusions:** Imbalanced iron status in patients on HD coexisted with abnormal lipid profiles, which suggests that imbalanced iron status in HD patients may play a deleterious role in cardiovascular pathophysiology, with no association with nutritional status in these cases.

**Key Words:** Iron status, lipid profile and hemodialysis

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### 27/423. Nutrition in the Management of Non-Communicable Diseases **Effect of almonds on vascular reactivity and inflammation in patients with coronary artery disease**

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**Introduction:** An inverse association has been observed between nut consumption and risk of coronary artery disease (CAD) in cohort studies. Clinical trials of nuts in patients with stable CAD have not previously been reported.

**Objectives:** To examine in a clinical trial the effect of almonds added to a heart healthy diet on vascular reactivity and biomarkers of inflammation and oxidative stress in patients with CAD.

**Method/Design:** A randomized, controlled, cross-over study of 46 free-living CAD patients (27 F/18 M, 45-77 y, BMI=20-41) stabilized with medications in the context of a National Cholesterol Education Program (NCEP) Step 1 diet absent nuts (control) or with the same total calories and including 84 g almonds daily (treatment) for 6 wk periods with a run-in period of 6 wk and washout period of 4 wk with all subjects consuming the control diet. The mean total cholesterol, LDL-cholesterol, HDL-cholesterol, and total triglyceride values were 153.4, 82.6, 43.9, and 132.7 mg/dL. Mean blood pressure and heart rate were 137/75 mmHg and 62 beats/min.

**Results:** Addition of almonds to the NCEP Step 1 diet increased plasma  $\alpha$ -tocopherol status (5.8%;  $P<0.05$ ) indicating good compliance by the patients to the intervention. Compared to the control period, almond intake tended ( $P=0.06-0.15$ ) to improve plasma biomarkers of inflammation and oxidative stress: decreasing soluble vascular cell adhesion molecule-1 (5.3%), interleukin-6 (13.8%) and auto-antibodies against oxidized LDL (6.3%), and increasing nitric oxide (14.2%). Incorporating almonds into the Step 1 diet did not significantly alter endothelial function assessed by measures of flow mediated dilation, peripheral arterial tonometry or pulse wave velocity.

**Conclusions:** Consuming 84 g almonds daily for 6 wk as part of a heart healthy diet tended to improve selected biomarkers of inflammation and oxidative stress in patients with CAD but did not affect clinical measures of vascular reactivity.

**Key Words:** Almonds, Vascular Reactivity, Heart Disease, Inflammation

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### 27/465. Nutrition in the Management of Non-Communicable Diseases **Association between selenium concentration and antioxidant status in rheumatoid arthritis**

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**Introduction:** Selenium is an essential trace element in animal and humans species. It is present in catalytic sites of the most important antioxidant enzyme glutathione peroxidase (GPX), protecting cells from oxidant damage. Selenium status and impaired antioxidant system have been implicated in rheumatoid arthritis (RA). However, data of GPX activity in RA is discrepancy.

**Objectives:** The present study aimed to evaluate GPX, superoxide dismutase (SOD) activity and their relationships with selenium status in RA patients.

**Method/Design:** Twenty eight patients aged 30-59 y with classical or definitive RA, according to the American College of Rheumatology criteria and attending clinical treatment in São Paulo Hospital were included in this study. Besides that, the inclusion criteria were an age between 20 and 59 y; the absence of other diseases and the absence of intake of medicines that could interfere with selenium biochemical profile. Blood samples were measured for selenium concentration and enzyme activity. Results are expressed by means of media and standard deviation.

**Results:** All patients presented erythrocyte selenium concentration in the range of  $51.9 \pm 20.1 \mu\text{gSe/l}$  and below the reference values in healthy adults ( $90 - 190 \mu\text{gSe/l}$ ). The antioxidant defense system analyzed and represented by enzyme activity of the GPX and SOD varied significantly among patients ( $12646.6 \pm 4528.9$  GPX U/l;  $175.05 \pm 67.70$  SOD U/mL) but remains above limit levels of Randox reference ( $4171 - 10881$  U/L;  $164-240$ U/mL, respectively). Besides, a positive and significant correlation was found between erythrocyte selenium concentration and GPX activity ( $r = 0.526$ ;  $p = 0.004$ ). Selenium is part of the GPX that catabolyses peroxides which are suggested to be actively involved in inflammation.

**Conclusions:** Selenium concentration is associated with antioxidant status and may be further factor in the pathogenesis of rheumatoid arthritis.

**Key Words:** Selenium, Arthritis Rheumatoid, Antioxidant Status, Glutathione Peroxidase

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**27/486.** Nutrition in the Management of Non-Communicable Diseases  
**Nutritional education in post bariatric surgery**

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**Introduction:** Changes in patterns nutrition and consumption associated with reduced physical activity contributed to the growth of obesity. Since it is considered a disease that threatens life, patients with this disease need more efficient approaches to weight reduction,

and, therefore, are candidates for bariatric surgery, which aims to promote significant weight loss and reverse many co-morbidities.

**Objectives:** The main aim of this study was to investigate strategies to adapt changes caused by surgery and carry a nutritional education program in order to recover the nutritional status.

**Method/Design:** This study, considered volunteers of both sexes who underwent bypass surgery, attending in a Medical Integrated Center using focus group technique to collect data. The nutritional status was evaluated by comparing body mass index (BMI) and percentage of weight loss.

**Results:** The results showed that the main complaints were inappropriate chewing followed by vomiting. It was also noticed that the preoperative BMI average before surgery was  $42.9 \text{ kg / m}^2 (\pm 3.15)$ , and after 4 months there was a decrease to  $33.9 \text{ kg / m}^2 (\pm 2.7)$ , showing significant weight loss. Had significant improvement in the clinical picture of chronic diseases, such as lower rates of glucose, blood pressure, cholesterol levels, triglycerides, thyroid and symptoms of asthma, gastroesophageal reflux, obstructive sleep apnea and heart failure heart. Finally, the workshop provided a culinary experience of living and thinking about the relationship between food, culture and health, and contributed to rescue the practice of cooking.

**Conclusions:** Behavior changes are essential, since this surgery brings many physiological, psychological and social changes. Group meetings were effective as they allow experience exchanges, possibility of integration and identification with members of the same context.

**Key Words:** Obesity, Bariatric Surgery, Nutritional Education.

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**27/493.** Nutrition in the Management of Non-Communicable Diseases  
**Deterioration in nutritional status is related to decrease of renal function in patients at first attendance to a hospital nephrology service**

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**Introduction:** The late referral is one of the factors associated with poor prognosis of Chronic Renal Disease (CRD) and is directly related to higher rates of renal dysfunction progression, more complications and risk of need for emergency dialysis. The nutritional status acts as an important prognostic factor as it influences the response to treatment, quality of life and survival rate of these patients.

**Objectives:** To evaluate the nutritional status of CKD patients referred for an outpatient Nephrology Service at a hospital of high complexity, and to assess differences according to glomerular filtration rate (GFR).

**Method/Design:** The assessment of body composition (by Bioimpedance), anthropometric tests (weight, height, and circumferences) and history of previous loss of weight (between screening and first attendance) were evaluated in patients with CKD attended in an outpatient Nephrology Service in Brazil. It was considered late referred

patients with GFR <20 ml/min/1.73m<sup>2</sup>.

**Results:** Using a cutoff point for late referral (LR), comparisons were made for the parameters analyzed. The LR group had greater prior weight loss ( $-7.0 \pm 4.5$  X  $-2.3 \pm 6.9\%$ ) and lower mean abdominal circumference - AC ( $86.8 \pm 10.0$  X  $101.9 \pm 11.7$  cm) and fat mass - FM ( $14.7 \pm 5.1$  X  $23.0 \pm 8.2\%$ ). The mean age and percentage of lean mass (LM) were not different between groups. Strong positive correlations were found between GFR and: the percentage of previous weight loss ( $r = 0.51$ ), BMI ( $r = 0.43$ ), AC ( $r = 0.55$ ), LM ( $r = 0.48$ ) and FM ( $r = 0.48$ ).

**Conclusions:** The decrease of glomerular filtration rate showed a direct association with prior weight loss and worse maintenance of lean and fat masses, and also less abdomen and arm circumferences. The LR group showed, on average, greater weight loss, especially reflected in loss of total body fat (central and arm fat).

**Key Words:** nutritional status, renal function

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## 27/498. Nutrition in the Management of Non-Communicable Diseases Nutritional evaluation of meals served in hospitals of Madrid (Spain)

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**Introduction:** The food services are commonly very heterogeneous and not well considered by the users. The main objective of a hospital is to improve the health of the patient, and no doubt, to have a good dietary organization in the hospitals will be a step towards this.

**Objectives:** The aim of this study was to analyze the nutritional values of the hospital meals and to compare the weights of the different ingredients of the receipt to the ones indicated in the Standard Operating Procedures (SOP).

**Method/Design:** The sample consisted of 55 menus (46 of them were collected at lunch and 9 at dinner) of 8 public hospitals in Madrid during 2009-2010. A duplicate portion meal was collected

for nutritional analysis and also to compare the weight with the SOP, taking into account the edible portion and the possible loss or gain of moisture during cooked.

**Results:** The average energy intake from lunches was  $831 \pm 210$  kcal and  $797 \pm 109$  kcal for dinner. In both cases, these values are above the energy recommended intakes for lunch (30-35%) and dinner (25-30%). The contribution (%) of macronutrients to energy consumption from lunch was  $33 \pm 10\%$  lipids,  $20 \pm 5\%$  proteins and  $47 \pm 8\%$  carbohydrates whereas for dinner was  $36 \pm 7\%$  from lipids,  $18 \pm 6\%$  proteins and  $46 \pm 8\%$  carbohydrates. The dietary fat quality from lunches was  $16 \pm 3\%$  SFA,  $8 \pm 6\%$  MUFA and  $8 \pm 4\%$  PUFA; from dinners was  $8 \pm 3\%$  SFA,  $8 \pm 4\%$  MUFA and  $16 \pm 3\%$  PUFA. In relation to the comparison of weights, it was observed mean differences up to 100g, mainly in the second course, between the food cooked and the technical sheets in SOP.

**Conclusions:** Although the nutritional results are near recommendations, it would be necessary to work with the kitchen staff to adapt the meals served to the technical sheets designed by experts.

**Key Words:** Hospital meals, portions size, energy intake, nutrients intake

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## 227/514. Nutrition in the Management of Non-Communicable Diseases

### Independent associations of phase angle with glucose and hemoglobin a1c in Korean type 2 diabetes

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**Introduction:** Phase angle from bioelectrical impedance analysis (BIA) can be calculated from reactance and resistance. Phase angle could be an important tool for evaluating clinical outcome or for monitoring disease progression, but its biological meaning and reference values are still unclear.

**Objectives:** The aim of this study was to investigate the association of phase angle with type 2 diabetes.

**Method/Design:** We evaluated the resistance, reactance and phase angle of 322 subjects aged 27-83 y (BMI  $24.9 \pm 3.1$  kg/m<sup>2</sup>). Fasting blood levels of glucose, insulin, hemoglobin A1c, total cholesterol (T-Chol), high density lipoprotein cholesterol (HDL-C), and triglycerides (TG) were measured. General linear models identified the independent effects of phase angle after covarying for age, gender, and weight. The usual significance level of 5% was used for all tests.

**Results:** Phase angle of type 2 diabetes Korean subjects was significantly greater in the men ( $n=133$ ,  $6.84 \pm 0.99$ ) than in the women ( $n=189$ ,  $6.02 \pm 1.09$ ;  $p < 0.05$ ). Statistically significant independent associations were observed between phase angle with age ( $p=0.002$ ) and sex ( $p=0.03$ ), with men and younger subjects having higher phase angle. Phase angle were independently negative associated with fas-



ting glucose and hemoglobin A1c after covarying for age, gender, and weight ( $p=0.001$ ).

**Conclusions:** The concern that the independent association of phase angle with fasting glucose and hemoglobin A1c could suggest that phase angle may be useful in monitoring diabetes status in Korean type 2 diabetes.

**Key Words:** phase angle, type 2 diabetes, glucose, hemoglobin A1c

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#### 27/521. Nutrition in the Management of Non-Communicable Diseases

### **Nutritional status of selenium in patients with type 1 diabetes: preliminary data**

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**Introduction:** Diabetes is a group of chronic diseases characterized by hyperglycemia and oxidative stress, which may lead to complications associated with this disease. Selenium is a mineral important antioxidant defense system as it participates in the detoxification of hydrogen peroxide via glutathione peroxidase (GPx). In this sense, selenium status in patients with type 1 diabetes can be the determining factor in this relationship with oxidative stress, although studies show that this relationship are still quite controversial, promoting great discussions about the possible effect of this mineral.

**Objectives:** Evaluate nutritional status selenium in patients with type 1 diabetes mellitus

**Method/Design:** This cross-sectional study was carried out on 16 adolescents with type 1 diabetes, mean age 17.5 years, who attended at the Department of Pediatric Endocrinology of the Federal University of Sao Paulo. Anthropometric assessment was performed by measurements of weight, height and waist circumference. The selenium concentration in plasma and urine was evaluated by the method of hydride generation atomic absorption spectroscopy. The activity of GPx was determined using a RANSEL kit - RANDOX®.

**Results:** The results presented are part of a preliminary study. Most participants had BMI and waist circumference within of the reference values for age group studied. The average concentration of selenium in plasma and urine was  $58.42 \pm 9.36$  mcg/L and  $0.006 \pm 0.003$  mcg/mL, respectively, being that the reference value for plasma is 60 to 120 mcg/L and  $0.026 \pm 0.012$  mcg/mL for urine. The activity of GPx in patients evaluated corresponds to  $40.99 \pm 11.76$  U/gHb, being within the reference values adopted.

**Conclusions:** Patients evaluated are deficient in selenium, according to the urinary and plasma parameters of this element. However, this deficiency was not able to alter the activity of GPx.

**Key Words:** Selenium, Glutathione Peroxidase, Type 1 Diabetes, Adolescents.

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#### 27/563. Nutrition in the Management of Non-Communicable Diseases

### **Antioxidant and lipid peroxidation changes during a high fiber cereal regimen for weight loss**

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**Introduction:** Calorie restriction decreases free radical production in mitochondria and protect cells from oxidative stress while obesity increases reactive species, causing damage through lipid peroxidation. The effect of a dietary reduction plan on the antioxidant system has not been well documented.

**Objectives:** To establish changes induced by a dietary weight loss plan (high fiber cereal) on antioxidant status and lipid peroxidation.

**Method/Design:** 12 overweight, 33 obese and 34 non obese healthy adults were evaluated. Overweight and obese underwent a two weeks dietary program based on substitution of two meals a day for high fiber cereal and skimmed milk in the experimental groups, and no intervention for the controls. Anthropometry and concentrations of malondialdehyde (TBARS),  $\alpha$ -tocopherol and glutathione reductase (GR) were assessed in intervened and control subjects.

**Results:** Initially, obese individual showed significant higher concentrations of TBARS, GR and  $\alpha$ -tocopherol than controls, while in the overweight group only TBARS were significantly higher. After the dietary program, a weight reduction of almost 5% was observed, but no significant changes on TBARS were detected. Initially, obese individual showed significant higher concentrations of TBARS, GR and  $\alpha$ -tocopherol than controls. Only TBARS were significantly higher in overweight group. At two weeks, a weight reduction of almost 5% was observed, but with no significant changes in TBARS. GR activity increased significantly at two weeks for the overweight group. No significant changes occurred in  $\alpha$ -tocopherol for any group. A weight loss lower than 2.5% was associated to higher GR ( $p=0.037$ ) in overweight group, and to higher  $\alpha$ -tocopherol ( $p=0.024$ ) in obese. Overweight and obesity were significantly associated with increase in lipid peroxidation.

**Conclusions:** The dietary plan with a rich fiber cereal, produced not only a relevant weight decrease but also strengthened the antioxidant system, probably due to the increased intake of polyphenols, vitamins, minerals and fiber contained in the cereal.

**Key Words:** Oxidative stress; lipid peroxidation; tocopherol; fiber, weight loss

**27/596. Nutrition in the Management of Non-Communicable Diseases**  
**Let's hear from the patients: patients' views of the hospital foodservice in Iran**

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**Introduction:** Undernutrition in hospitals form a worldwide problem which increases mortality and complication rates, lengthens recovery and decreases the quality of life. Food unacceptability contributes to low dietary intakes and consequently dissatisfaction and undernutrition among hospitalized patients. Ensuring patients' adequate food intake is an inseparable part of effective hospital treatment and hence it is important to evaluate whether the food served in hospital meets patients' expectations.

**Objectives:** To investigate inpatients' satisfaction with food and nutrition services and to identify barriers to foodservice satisfaction

**Method/Design:** Five semi-structured focus group discussions with 23 participants, 75 face-to-face in-depth interviews and 21 meal observations were performed in five teaching hospitals in Tehran. Researchers followed the principles of grounded theory throughout, noting themes and categories as they emerged, so that purposive sampling could be followed with theoretical sampling. All interviews were recorded after obtaining patients' consents, and were transcribed verbatim and analyzed at the end of each day using the principles of grounded theory.

**Results:** The findings showed that over half of patients were dissatisfied with the hospital foodservices (41/75). Barriers to satisfaction were of three types: food-related, hospital-related and personal. Poor food quality, inadequate portions and poor food hygiene were the major food-related barriers to satisfaction. Inadequate hospital budgets, poor service delivery and unsuitable meals and meal-times arrangements were the main hospital-related barriers; while unmet expectations, perceived personal needs and patients' characteristics comprised the personal barriers.

**Conclusions:** Understanding patients' experience makes it possible to improve feeding arrangements with a positive impact upon patients' nutrition. This study provides evidence that a combination of better catering systems, better resourcing and recruitment of more clinical dietitians in hospitals would lead to a better satisfaction with hospital food provision. It is suggested that health authorities consider improvements in food quality as a pivotal standard in overall care quality.

**Key Words:** Foodservice, Satisfaction, Hospital, Focus Group and In-Depth Interviews

**27/626. Nutrition in the Management of Non-Communicable Diseases**  
**Essential fatty acids and their longer-chain metabolites in phenylketonuria: a systematic review**

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**Introduction:** The treatment of children with phenylketonuria (PKU) is mainly based on restricted dietary intake of phenylalanine (Phe)-containing foods. However, dietary protein restriction may not only reduce Phe intake, but may be associated with low intake of long-chain polyunsaturated fatty acids (LCPUFAs) as well.

**Objectives:** This systematic review focuses on the consequences of dietary restriction in PKU on the bioavailability of LCPUFAs.

**Method/Design:** We searched Ovid MEDLINE, EMBASE (Ovid), SCOPUS, CINAHL, LILACS and Cochrane Library CENTRAL databases for case-control studies and randomised controlled trials (RCTs) from inception to December 2010. We used formal inclusion/exclusion criteria and applied standard operation procedures for data extraction, validity assessment and meta-analysis.

**Results:** We were able to identify during a literature search 8 case-control studies (divided into 12 arms) investigating LCPUFA status in patients with PKU, and 5 RCTs reporting effect of LCPUFA supplementation to the diet of patients with PKU. We did not find any difference in the omega-6 essential fatty acid, linoleic acid status, and in the omega-3 essential fatty acid,  $\alpha$ -linolenic acid status between patients and healthy controls. In contrast, values of the principal omega-6 LCPUFA, arachidonic acid (AA) were significantly lower in total plasma lipids (10 studies with 533 participants, pooled effect: -1.07 [-1.57, -0.56], %wt/wt, mean [95% CI]), whereas in the other four biomarkers (plasma phospholipids, total erythrocyte lipids, erythrocyte phospholipids and plasma cholesteryl esters) AA levels did not differ in patients and controls. Even more marked reduction was observed in the values of the principal omega-3 LCPUFA, docosahexaenoic acid (DHA) in patients with PKU: DHA status was significantly lower in patients compared to healthy controls in all the lipid classes investigated. At the end of the intervention, patients receiving LCPUFA supplementation showed significantly higher DHA values than patients receiving placebo in all the 5 RCTs. The greatest effect was seen in the total plasma DHA level (2.94±0.88 vs. 0.73±0.88 %wt/wt, mean±SD, treatment group n = 10 vs. placebo group n = 11). None of the studies reported any adverse reaction to LCPUFA supplementation.

**Conclusions:** 1. Patients suffering from PKU showed lower contribution of DHA to the fatty acid composition of various plasma and erythrocyte membrane lipids than healthy controls. 2. LCPUFA supplementation effectively improved DHA status without detectable adverse effects.

**Key Words:** arachidonic acid, docosahexanoic acid, linoleic acid, phenylketonuria

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**27/630.** Nutrition in the Management of Non-Communicable Diseases  
**Prospective study of binge drinking and weight gain: the SUN project**

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**Introduction:** Binge drinking is defined as drinking 5 or more alcoholic drinks on a single occasion for men and 4 or more drinks for women. Excessive alcohol consumption has been linked to many public health issues, including obesity.

**Objectives:** Our objective was to prospectively assess the relationship between alcohol drinking patterns and the incidence of overweight or obesity in a Mediterranean cohort, the SUN project.

**Method/Design:** A total of 10,600 adults without previous history of chronic diseases at baseline were followed-up for an average of 6.2 years. Data on diet and lifestyle were collected at baseline using a previously validated questionnaire. For binge drinking assessment, we used a score combining five different items related to the pattern of consumption (on average, how many days/ week do you drink alcohol, on the weekends and special occasions how many alcoholic drinks are the maximum that you ever had and what is the most frequent alcoholic drink that you consumed). Weight was recorded at baseline and updated every 2 years during follow-up. The outcomes were average weight gained every year and incidence of overweight/obesity.

Linear regression and non-conditional logistic regression models were used to adjust for potential confounders, including total alcohol intake.

**Results:** During follow-up, 1,182 new cases of overweight/obesity were identified among participants with normal weight at baseline. Following a binge drinking pattern of alcohol consumption was not associated with a higher weight gain after adjusting for relevant confounders in this cohort ( $\beta$ -coef.=-45 g/year; 95%CI: -118 to 29). It was also not associated with a higher risk of developing overweight/obesity compared with those who did not follow this drinking pattern (OR= 1.09; 95%CI: 0.88 to 1.35).

**Conclusions:** Binge drinking pattern was not associated with major weight gain or with the risk of developing overweight/obesity in this Mediterranean cohort, independently of the amount of alcohol consumed.

**Key Words:** Alcohol, binge drinking, obesity, overweight, SUN project

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**27/634.** Nutrition in the Management of Non-Communicable Diseases  
**Variation of fasting plasma glucose, insulin and insulin resistance in Thai adults according to the new BMI criteria for Asians**

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**Introduction:** The risk for Asian population might be underestimated since there now is evidence that the 25 BMI being the cut-off points differentiating acceptable nutritional status from over nutrition should be lowered for Asian population to be 23.

**Objectives:** This investigation explored in a group of health conscious, the nutritional status the relationship of anthropometric indicator and plasma lipid status on fasting plasma glucose, insulin concentration and homeostasis model of the assessment of insulin resistant (HOMA-IR).

**Method/Design:** For a group of 73 males and 247 females of the nutritional status defined by the new criteria for Asians, the relationship of anthropometric indicators and the plasma lipid status to fasting glucose, fasting plasma insulin and the HOMA-IR has been studied.

**Results:** For multivariate regression models were computed to assess variation of glucose, insulin and HOMA-IR due to the nutritional status and serum lipids. A significant increase in fasting plasma glucose for both sexes and for females for the HOMA-IR models could be observed for the group with a BMI range of 23 to less than 25. Insulin concentrations and HOMA-IR correlated for both sexes especially with BMI and hip circumference while the variation of fasting plasma glucose is less dependent on anthropometrics nutritional indicators in comparison to insulin and HOMA-IR.

**Conclusions:** The finding reported here suggest that Asian populations are very sensitive to develop insulin resistance within BMI range considered still normal for middle aged Caucasian population. In western countries probably need further exploration since individuals with BMI lower than 25 might be at risk for cardiovascular diseases and diabetes even in the USA.

**Key Words:** HOMA-IR, BMI and Thai.

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**27/660.** Nutrition in the Management of Non-Communicable Diseases  
**Se status in a healthy adult population of Granada, Spain**

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**Introduction:** Malnutrition is the most common cause of mortality and one of the principal health problems, mainly affecting to those patients admitted in ICU, where the inability of intake and their disease situation is habitual. Copper and iron are essential nutrients, because a minimum daily intake is necessary for the correct function of cellular activity. Deficiency of one or more of those metal ion causes anemia, general weakness, depression of immune function, having a key role against oxidative stress through antioxidant enzymes.

**Objectives:** Assessment of Cu status in a collective of patients admitted in ICU for a period of seven days, establishing their plasma levels and studying a possible relationship with other mineral, such as Fe.

**Method/Design:** The average intake of selenium in this adult population was  $75.37 \pm 37.13$   $\mu\text{g/day}$  (2.8-272.4  $\mu\text{g/day}$ ). In comparison to the reference intakes for Se (55  $\mu\text{g Se/day}$  for women and 70  $\mu\text{g Se/day}$  for men), we found that 33% of the population studied were at risk of selenium deficiency, 2% at very high risk (<1/3 IR) deficiency, 7.8% at high risk (<2/3 IR), and 90.2% at moderate risk (IR-2/3 IR).

**Results:** We observed a significant positive correlation between physical activity and selenium intake ( $p = 0.018$ ,  $r = 0.266$ ) and between physical activity and plasma levels of the mineral ( $p = 0.039$ ,  $r = 0.227$ ). These findings may be due to an increased consumption of selenium and higher energy intake in the most active individuals. After adjustment for energy consumption, we still obtained significant correlation between physical activity and selenium intake.

**Conclusions:** In the healthy adult population studied here, we found a clear relationship between Se nutritional status and physical activity, which may be necessary for improved antioxidant defences.

**Key Words:** Selenium, adults, physical activity, intake.

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### 27/661. Nutrition in the Management of Non-Communicable Diseases Nutritional study of Cu and Fe in critical care patients

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**Introduction:** Malnutrition is the most common cause of mortality and one of the principal health problems, mainly affecting to those patients admitted in ICU, where the inability of intake and their disease situation is habitual. Copper and iron are essential nutrients, because a minimum daily intake is necessary for the correct function

of cellular activity.

**Objectives:** Assessment of Cu status in a collective of patients admitted in ICU for a period of seven days, establishing their plasma levels and studying a possible relationship with other mineral, such as Fe.

**Method/Design:** Multicenter observational study with a sample of 65 subjects, with an average age of 63'7, from the province of Granada. Inclusion criteria: SIRS and APACHE  $\geq 15$ . Cu and Fe were analyzed by AAS in plasma samples, mineralized by wet way, at the beginning and the seventh day of their stay in ICU. Informed consent and ethical committee acceptance were included.

**Results:** 100% of patients with enteral nutrition (EN) or parenteral nutrition (PN) have deficient supply of Fe during an ICU stay of seven days. 83'3% of individuals had inadequate Fe supply with PN+EN. In patients who received EN and PN nutrition, the inadequacy of the diet is 38'5% and 100%, respectively. A deficiency of Fe and Cu in plasma was observed at the beginning in 87'5% and 30'8% of patients, respectively which decreased to 78'8% and 10'7%, respectively. A correlation was found between both mineral intake ( $p=0.01$ ), possibly due to the polimineral supply.

**Conclusions:** Monitoring of minerals such as copper and iron status is necessary, being essential for a structural stability of molecules at cellular level, and on this way, being able to palliate the hypercatabolic situation in which the patients are immersed, avoiding deficiency that may worsen their evolution

**Key Words:** Copper status, Iron status, Critical Ill Patient.

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### 27/684. Nutrition in the Management of Non-Communicable Diseases Influence of a citrus-based functional juice on biomarkers of inflammation in metabolic syndrome patients

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**Introduction:** Inflammation and oxidative stress plays a critical role in cardiovascular disease (CVD) and Metabolic Syndrome (MetS). Abdominal obesity, elevated triglycerides, high blood pressure, and high fasting glucose are associated with elevated levels of C-Reactive Protein (CRP). It has been hypothesized that Vitamin C and other antioxidant such phenolic compounds protects against the development of ischemic heart disease.

**Objectives:** The aim of the study is to estimate the influence of a citrus-based functional juice (CFJ) on biomarkers of inflammation in obese adults with MetS compared to otherwise-healthy obese adults as control group (CG).

**Method/Design:** Functional beverage (CFJ) tested is based on

a mixture of citrus juice (95%) with berries (*Aronia melanocarpa* concentrate, 5%). The study included 53 subjects: 20 healthy subjects and 33 patients who fulfilled the MetS criteria (Adult Treatment Panel III). 18 MetS patients consume 300 mL of CFJ daily, during 6 months and 15 patients consume 300 mL of placebo beverage. The control group consumed CFJ. Analysis of CRP was performed by immunoturbidimetric assay.

**Results:** We found significant differences in CRP values between both groups (CG and MetS) with baseline values of  $0.22 \pm 0.09$  mg/dL in CG, and  $0.53 \pm 0.08$  mg/dL in patients with MetS. Six months after ingestion of CFJ we found significant differences ( $p < 0.05$ ) in CRP values ( $0.17 \pm 0.01$  mg/mL) compared to baseline in the MetS group, but, we have not found clear differences in CG, and MetS groups with the placebo drink once the 6-months study was ended.

**Conclusions:** Intake of naturally-rich antioxidant juices seems to have a positive effect on the values of CRP. We found this positive effect in MetS patients after six months of ingestion of CFJ. Additional studies are needed to establish the mechanisms of protection of the bioactive compounds in the novel beverage against the range of condition of MetS.

**Key Words:** C-Reactive protein; Metabolic Syndrome; Inflammation; bioactive compounds

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#### 27/687. Nutrition in the Management of Non-Communicable Diseases Effect of protein diet in blood pressure

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**Introduction:** High blood pressure is one of the most important risk factors for cardiovascular disease, and the importance of diet in the development of hypertension is a fact increasingly observed.

**Objectives:** To evaluate the effect of a protein diet on blood pressure

**Method/Design:** The study included 50 individuals of both sexes (24% male and 76% female) aged 18-68 years old. All patients were overweight (BMI  $\geq 25$ ) or obese (BMI  $\geq 30$ ). Patients were not treated with antihypertensive drugs and were subjected to a protein diet for 4 months. The protein diet is structured in a full range of preparations based on proteins of high biological value, in accordance with current legislation (EC Directive 96/8, 1996) and low glycemic load vegetables.

**Results:** The initial mean systolic blood pressure (SBP) of the sample population was  $128.4 \pm 14.6$  mmHg (men:  $128.7 \pm 11.4$  mmHg; women:  $128.3 \pm 15.4$  mmHg). The initial average diastolic blood pressure (DBP) was  $78.8 \pm 9.8$  mmHg (men:  $80.7 \pm 11.5$  mmHg; women:  $78.4 \pm 9.4$  mmHg ( $p \geq 0.05$ )). After 4 months of protein diet the average SBP in the sample population was reduced  $13.1 \pm 9.8$  mmHg, being higher the average decrease in SBP in women than in men ( $10.0 \pm 1.6$  and  $9.1 \pm 2.7$  mmHg respectively ( $p \geq 0.05$ )). The mean DBP also decreased  $7.8 \pm 1.7$  mmHg, showing a greater decrease in men ( $8.0 \pm 2.4$

mmHg) than in women ( $7.0 \pm 1.1$  mmHg), although no significant differences were found ( $p \geq 0.05$ ). In contrast, the mean systolic and diastolic blood pressure did not change during 4 months in patients who underwent a hypocaloric diet (1200-1500 Kcal/day). The mean BMI decreased  $6.4 \pm 2.8$  kg/m<sup>2</sup> ( $7.5 \pm 2.9$  kg/m<sup>2</sup> in men and  $6.1 \pm 2.9$  kg/m<sup>2</sup> in women ( $p \geq 0.05$ )).

**Conclusions:** The protein diet and lifestyle habits associated with this type of diet are effective in lowering the systolic and diastolic blood pressure.

**Key Words:** High blood pressure; Protein diet; Cardiovascular disease

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#### 27/704. Nutrition in the Management of Non-Communicable Diseases Intestinal permeability, folic acid and phase angle in patients with hematological cancers after chemotherapy

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**Introduction:** Chemotherapy causes harmful side effects to the digestive tract and one of the tests used to verify the intestinal permeability is the excretion of non metabolizable sugars, like mannitol and lactulose.

**Objectives:** To evaluate the intestinal permeability and serum levels of folic acid in patients with hematologic malignancies (leukemias and lymphomas) before and after one cycle of chemotherapy.

**Method/Design:** In 22 patients, measures of intestinal permeability (urinary excretion of mannitol - M and lactulose - L) and mucositis (grade of gastrointestinal signs and symptoms) were evaluated in the previous period (T0) and after chemotherapy cycle (T1). The control group (CG) had 17 healthy subjects. Anthropometric variables (weight, height and circumferences), data of body composition and phase angle (by bioelectrical impedance analysis), and serum folic acid were also analyzed.

**Results:** At T0, 32.0% of patients were overweight and 23.0% were at nutritional risk. The ratio lactulose / mannitol (L / M) doubled after chemotherapy, due to increased excretion of lactulose, and at T1 it was directly associated with the presence of nausea ( $p = 0.04$ ). Folic acid at T0 was lower than in CG, but it did not change at T1. The baseline L / M ratio showed an inverse relationship with BMI ( $r = -0.51$ ,  $p = 0.01$ ) and phase angle ( $r = -0.50$ ,  $p = 0.01$ ), which fell by 15.3% after chemotherapy.

**Conclusions:** The increased intestinal permeability, indicated by higher excretion of lactulose during the use of chemotherapy, may indicate damage to the intestinal mucosa at intercellular junctions (paracellular way). Considering the damage to the intestinal mucosa, the involvement of folic acid in the stages of cell division, in addition to changes in phase angle and body composition in these patients, it is clear the worsening of the nutritional status during this critical period.

**Key Words:** Intestinal permeability, chemotherapy, nutritional status.

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**27/717. Nutrition in the Management of Non-Communicable Diseases**  
**Prevalence of metabolic syndrome in pos menopause women. Rio de Janeiro, Brazil.**  
**A pilot study**

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**Introduction:** Metabolic Syndrome is a complex disorder including several factors predisposing to development of cardiovascular diseases and diabetes. Despite the importance of metabolic syndrome for the health system, in Brazil, there are few studies of the metabolic syndrome in the general population, and even fewer studies that establish a correlation between metabolic syndrome and climacteric.

**Objectives:** To determine the prevalence of metabolic syndrome in pos menopause women, Rio de Janeiro / Brazil.

**Method/Design:** It was a pilot cross-sectional study evaluated on gynecology clinic of Fernandes Figueira Institute (health women reference treatment), Rio de Janeiro – Brazil. The metabolic syndrome diagnosis was based using National Cholesterol Education Program – Adult Treatment Panel III: waist circumference (>88cm); blood pressure ( $\geq 130/85$ mmHg); plasma glucose (>110mg/dL); triglyceride (>150mg/dL); HDL-cholesterol (<50mg/dL).

**Results:** In a total, were evaluated 53 pos menopause women with  $56.2 \pm 9.7$  years old; these women, 50.9% showed waist circumference higher than >88cm; 43.4% showed blood pressure higher than  $\geq 130/85$ mmHg; 18.9% showed plasma glucose higher than >110mg/dL; 35.8 showed triglyceride higher than >150mg/dL and HDL-cholesterol higher than <50mg/dL. The metabolic syndrome diagnosis was observed in 39.6%.

**Conclusions:** High prevalence of metabolic syndrome requires attention for the treatment of the whole syndrome, retarding or preventing future consequences, like diabetes and cardiovascular disease.

**Key Words:** metabolic syndrome, pos menopause, aging.

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**27/723. Nutrition in the Management of Non-Communicable Diseases**  
**Influence of malnutrition-inflammation binomial in response to darbepoetin alpha as an Eritropoiesis-Stimulating Agent (ESA) in hemodialysis patients**

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**Introduction:** Anemia in hemodialysis patients (HD) is a multifactorial disorder that can be partially modified by the administration of erythropoiesis stimulating agents (ESA) and iron pharmacological supplementation.

**Objectives:** The study aimed to examine the interrelationship between inflammation, malnutrition and anemia and to investigate whether the response to darbepoetin alpha is influenced by some of these factors in HD patients.

**Method/Design:** Prospective study in 38 HD patients, 65,8% men and mean age ( $66.6 \pm 17.1$  years). Primary etiology of chronic kidney disease was diabetes mellitus (15,8%). Mean time on HD:  $47.5 \pm 40.3$  months. Assessment of nutritional status by compilation of subjective methods [nutritional anamnesis, nutritional scoring systems- SGA, malnutrition-inflammation score (MIS)-, physical examination], and objective parameters (laboratory test, bioimpedance analysis). We investigated whether the response to darbepoetin alpha was influenced by malnutrition-inflammation binomial in HD patients in two groups: well nourished non inflamed patients (group 1) and malnutrition – inflamed patients (group 2).

**Results:** We found a 51,8% of malnourished-inflamed HD patients. By comparing group 1 vs. group 2, differences significant were found with: time on nutritional follow-up, % triceps skinfold thickness, number of units of darbepoetin alpha, darbepoetin resistance index (all,  $p < 0,001$ ), and systolic blood pressure, phase angle, Charlson comorbidity index (all  $p < 0,05$ ). Time on nutritional follow up < 4 months was a malnutrition-inflammation risk factor in anemic HD patients (OR:2,4;  $p < 0,01$ ). Multivariate analysis model showed significance association with serum albumin and prealbumin, MIS, number of units of darbepoetin alpha, darbepoetin resistance index ( $p < 0,01$ ).

**Conclusions:** Anemia in HD patients was influenced by nutritional and inflammatory state. Therapeutic actions aimed to reduce or correct adverse effects of anemia- iron deficiency, body weight loss, muscle proteolysis, uremic anorexia, malnutrition-inflammation- might improve response to ESA and reduce related health costs in patients on HD.

**Key Words:** malnutrition-inflammation, anemia, hemodialysis, renal nutrition

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**27/736. Nutrition in the Management of Non-Communicable Diseases**  
**The sources of salt in Polish diet**

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**Introduction:** According to WHO recommendations daily salt intake should not exceed 5 g/day. Consumer's preferences to salt are different, but in Polish population, like in other European countries, salt intake is high and significantly (even 2-3 times) exceeds WHO recommendations.

Polish diet traditionally contains high amounts of salt. Many salt is

added during culinary processes, both in households and in catering establishments. Most of salt is provided by cooked potatoes, grits, pasta, soups and meat dishes. Salt is also added to many other dishes like fish dishes or salads. Hence dinners have essential share in contribution of salt to Polish diet.

**Objectives:** In the frame of Polish National Programme for the Prevention of Overweight, Obesity and Non-Communicable Diseases through Diet and Improved Physical Activity 2007-2011 - POL-HEALTH analytical estimation of salt content in dinners served in a different catering establishments (hospitals, elementary schools and working places) was performed.

**Method/Design:** Salt content was estimated using Mohr's method according to Polish Norm

**Results:** Results indicates that salt content in investigated meals was high and varied from 28% to even 225%; from 75% to 195% and from 130% to 194% daily salt intake recommended by WHO in meals served in schools, hospitals and working places respectively. Because natural content of sodium in raw food is low this indicates use of large amounts of salt during culinary processes. It should be noticed that beside salt often different containing salt spices blends are added to dishes without reduction of salt addition, which significantly raised total salt content.

**Conclusions:** Results indicates a reasonable need to take action towards gradual reduction of the salt content in products and meals, and accustom of Polish consumers to less salty taste. It is beneficial to appear of products with reduced salt content on the Polish market.

**Key Words:** salt, Polish diet, WHO recommendation

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**27/737.** Nutrition in the Management of Non-Communicable Diseases  
**Evaluation of metabolic profile and body composition in obese individuals after a 5% weight loss intervention with diet and diet associated with exercise.**

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**Introduction:** The epidemic of obesity alerts health professionals to create strategies for its treatment. Diet and physical activity in order to reduce the body fat mass has major improvements in these individuals metabolism, and also maintain a balance of biomarkers secreted by adipose tissue.

**Objectives:** To investigate the influence of diet and physical activity in biochemical, cardiovascular, metabolic and body composition in obese individuals.

**Method/Design:** This research is quantitative, characterized as a clinical trial with parallel groups. Subjects were divided into two

distinct groups in order to reduce 5% of their initial body weight through diet (GD) and diet and exercise (GDE). Sample consisted of 16 healthy sedentary subjects, nonsmokers, obese grade 1 (30kg/m<sup>2</sup> < BMI < 35kg/m<sup>2</sup>) of both sexes (11 women and 5 men), aged between 20 and 40 years.

**Results:** All subjects lost 5% of their initial weight. Mean initial BMI was 33.78 ± 1.35 kg/m<sup>2</sup> and final 31.99 ± 1.38 kg/m<sup>2</sup>. The weight loss of individuals of GD was 4.5 ± 1.5 kg, and the GDE was 5.7 ± 2.15 kg. Out of this body mass, fat mass loss was higher in GDE. Biochemical indicators had a significant improvement in the exercise group. We observed a significant increase in mean levels of IFN- $\gamma$  and interleukin 10 in the GDE. Interleukin 6 increased significantly after the intervention in GD and also increased in the intervention with diet and exercise but p = 0.06.

**Conclusions:** This study showed that the loss of 5% of initial body weight through diet shows improvement in body composition of obese subjects. This improvement was more significant when there was an association with exercise. A decrease in markers of inflammation should be found in a higher loss of body mass, especially fat mass. The data found in this study stress the importance of maintaining a healthy lifestyle throughout life.

**Key Words:** Obesity, Diet, Exercise

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**27/745.** Nutrition in the Management of Non-Communicable Diseases  
**Vitamins E and d supplementation on antioxidant enzymes in atopic dermatitis**

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<sup>1</sup>Nutrition; <sup>2</sup>Biochemistry; <sup>3</sup>Immunology.

**Introduction:** Atopic dermatitis is a public health problem worldwide. Prevalence of atopic dermatitis has increased by two to three folds during the past three decades. Increment of reactive oxygen species (ROS) production may be one of the contributing factors of tissue damage in atopic dermatitis.

**Objectives:** The present study was designed to evaluate the effect of vitamins E and/or D on erythrocyte superoxide dismutase and catalase activities in patients with atopic dermatitis.

**Method/Design:** In a randomized, double blind, placebo controlled clinical trial 45 atopic dermatitis patients were divided into four groups in permuted randomized block design. Each group received one of the following supplements for 60 days: group A (n=11) vitamins E and D placebos; group B (n=12) 1600 IU vitamin D3 plus vitamin E placebo; group C (n=11) 600 IU synthetic all-rac- $\alpha$  tocopherol plus vitamin D placebo; group D (n=11) 1600 IU vitamin D3 plus 600 IU synthetic all-rac- $\alpha$  tocopherol. Erythrocyte superoxide dismutase (SOD) and catalase activities, serum 25 (OH) D, plasma  $\alpha$ -tocopherol were determined before and after the trial. The data were analyzed by analysis of variance (ANOVA) and paired t test.

**Results:** After 60 days vitamin D and E supplementation, erythrocyte SOD activities increased in groups B, C and D (p=0.002, p=0.016 and p=0.015 respectively). Erythrocyte catalase activities increased in

groups B and D ( $p=0.026$  and  $p=0.004$  respectively). The increment of erythrocyte catalase activity was not significant in group C. There was positive significant correlation between SOD activity and serum 25 (OH) D ( $r=0.378$ ,  $p=0.01$ ).

**Conclusions:** The present study shows that vitamin D is as potent as vitamin E in increasing the activities of erythrocyte SOD and catalase in atopic dermatitis patients.

**Key Words:** Atopic Dermatitis; Vitamin E; Vitamin D; Superoxide Dismutase; Catalase

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#### 27/746. Nutrition in the Management of Non-Communicable Diseases

### Effects of vitamins D, E on serum Th2 cytokines in atopic dermatitis patients

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<sup>1</sup>Nutrition; <sup>2</sup>Biochemistry; <sup>3</sup>Immunology.

**Introduction:** Nutritional factors are among the environmental factors in the etiology of atopic dermatitis. Due to its immunological influences, vitamin D has been considered not only as an allergy inducer but also as a curative agent for atopic dermatitis. The immunological effects of vitamin E would be helpful in the treatment of atopic dermatitis. Considering the cytokines and their roles in the pathogenesis of atopic dermatitis, these two vitamins could be effective in reducing risk of atopic dermatitis through influencing cytokines.

**Objectives:** This study was designed to determine the effects of vitamins E and D individually and in combination on cytokines in atopic dermatitis patients.

**Method/Design:** In a randomized, double blind, placebo-controlled clinical trial 45 atopic dermatitis patients 10 to 45 years old were divided into four groups. They received the following daily for 60 days: Group 1 (n=11) vitamins E and D placebos; Group 2 (n=12) 1600 IU vitamin D3 plus vitamin E placebo; Group 3 (n=11) 600 IU synthetic all-rac- $\alpha$  tocopherol plus vitamin D placebo; Group 4 (n=11) 1600 IU vitamin D3 plus 600 IU synthetic all-rac- $\alpha$  tocopherol. After 10 to 12 hours fasting, serum IL-4, IL-5, IL-13, 25 (OH) vitamin D,  $\alpha$ -tocopherol, were determined before and after the intervention.

**Results:** The intervention brought about statistically significant changes in the groups as follows: a) increases in serum 25 hydroxy vitamin D in Groups 2 and 4; b) increases in plasma alpha tocopherol in Groups 3 and 4; c) decreases in serum IL-4 in Groups 2, 3 and 4; d) decreases in serum IL-5 in Group 2; e) decreases in serum IL-13 in Groups 2, 3 and 4.

**Conclusions:** Vitamins E and D could decrease the cytokines of Th2 subset with regulatory effects. It is essential to investigate the allergy-inducing properties of vitamin D.

**Key Words:** Atopic Dermatitis; Vitamin E; Vitamin D; Cytokine

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#### 27/749. Nutrition in the Management of Non-Communicable Diseases

### The efficacy of Omega-3 fatty acid supplementation on levels of inflammatory biomarkers in type 2 diabetics

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**Introduction:** Diabetes mellitus is one of the most prevalent non-communicable chronic diseases around the world. Consumption of omega-3 fatty acids can alter inflammation response in diabetic patients.

**Objectives:** There is no strong evidence about the effect of omega-3 fatty acids on inflammation of Iranian diabetics. So, the aim of this study was to determine the effects of omega-3 fatty acid supplementation on levels of C-reactive protein [CRP]; Interleukin [IL]-2 and Tumor necrosis factor-alpha [TNF- $\alpha$ ] in type 2 diabetics.

**Method/Design:** A randomized, double-blind, placebo-controlled clinical trial was conducted on 84 subjects with at least 2 years of diabetes type 2 history. Participants were randomly assigned to either the treatment or the control group. Each subject received 3 capsules per day (omega-3: including 2714 mg (eicosapentaenoic acid [EPA]: 1548 mg; docosahexaenoic acid [DHA]: 828 mg; and 338 mg of other omega-3 fatty acids) or placebo: including 2100 mg of sunflower oil) for a period of 8 weeks. At the beginning of the study and after intervention, IL-2, TNF- $\alpha$ , and CRP concentrations were assessed.

**Results:** Due to intervention, IL-2 and TNF- $\alpha$  levels were changed significantly in the treatment group in comparison with the control group ( $p<0.01$ ). Supplementation did not cause any significant change in serum CRP levels. Furthermore, there was no significant difference in the mean and standard deviation [SD] of age, body mass index [BMI], energy, carbohydrate, fiber, protein, and fat intakes of participants between the treatment and control groups, at the beginning and end of intervention.

**Conclusions:** Omega-3 fatty acid supplementation (8 weeks, 3 g/day) decreases the levels of TNF- $\alpha$  and IL-2 in diabetics with no change in CRP levels. Application of omega-3 fatty acid enriched foods such as marine products is highly prescribed to alleviate inflammations caused by diabetes.

**Key Words:** Diabetes Mellitus Type 2; Omega-3 Fatty Acid; IL-2; TNF- $\alpha$ ; CRP



27/797. Nutrition in the Management of Non-Communicable Diseases  
**Adolescents' knowledge of diet-related chronic diseases and dietary practices in Ghana**

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**Introduction:** Diet-related chronic diseases in Ghana constitute public health and developmental challenges. Ghana Health Service in 2007 reported a national prevalence of diabetes of 11.6% and 27.8% for hypertension. Twenty five percent of women were reported to be overweight. Adolescents usually adopt lifestyles that negatively affect their nutritional and health status and increase their risk for development of diet-related chronic diseases.

**Objectives:** The study investigated adolescents' knowledge of diet-related chronic diseases and its influence on their dietary practices.

**Method/Design:** The study design was a cross-sectional survey. Three hundred and thirteen adolescents aged 14-18 years from public and private senior high schools were selected for the study. Structured interviews and diet assessment methods were used to collect information on respondents' knowledge of diet-related chronic diseases, dietary practices, energy and nutrient intakes. Weight and height measurements were used to assess their nutritional status. The data collected were analyzed using the SPSS program version 11. The Chi-square test and regression analysis were used to determine the relationships between respondents' knowledge of diet-related chronic diseases, dietary practices and nutritional status.

**Results:** The results revealed that knowledge of diabetes, hypertension and obesity were low among the respondents with most of them (89.2%) having fair to poor knowledge of the diseases. Eighty eight percent of the adolescents ate two to three times in a day. Meals mostly skipped were breakfast and lunch. Dietary diversity and quality of diets of the respondents were generally poor. There was no association between knowledge of diet-related chronic diseases and the dietary practices of the adolescents.

**Conclusions:** Respondents had poor knowledge of diet-related chronic diseases as such their dietary practices were also poor reflecting negatively on their nutrient intakes.

**Key Words:** Adolescents, diet-related chronic diseases and dietary practices.

27/800. Nutrition in the Management of Non-Communicable Diseases  
**A NPY variant is associated with obesity and traits of metabolic syndrome in Spanish children**

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**Introduction:** The neuropeptide Y (NPY) is widely expressed in the central nervous system and influences many physiological processes, including cortical excitability, stress response, food intake, circadian rhythms, and cardiovascular function. NPY plays a well-established role in the hypothalamic control of body energy balance. This peptide is a very potent orexigenic, and when chronically administered into the central nervous system, it leads to increased food intake, weight gain, and adiposity in rats. NPY-induced obesity is not only due to hyperphagia; centrally administered NPY also promotes white adipose tissue lipid storage, inhibits brown adipose tissue thermogenesis, and induces hyperinsulinemia and hypercorticosteronemia.

**Objectives:** To determine whether NPY variant rs16131 was associated with obesity in Spanish children.

**Method/Design:** One single nucleotide polymorphisms (SNPs) in NPY gene (rs16131) was genotyped in 534 children (292 obese and 242 normal-weight). The analysis was performed using the Illumina GoldenGate protocol on 96-well format Sentrix® arrays. Arterial blood pressure as well as height and weight were measured. A routine biochemical analyses were done after 12h overnight fasting and, leptin and monocyte chemotactic protein 1 (MCP-1) were measured by immunoassay, with a MILLIplex™ kit using the Luminex 200 system. SNPAssoc (R package) and PLINK software were used for statistical analysis.

**Results:** The variant rs16131 was associated with obesity, OR 2.06 (CI 95%: 1.33-3.19, p=0.016). Carrying the risk allele of the SNP was positively associated with higher body weight, body mass index (BMI), BMI z score, insulin, homeostatic model assessment for insulin resistance (HOMA-IR), triacylglycerols, leptin and MCP-1. Opposite, it was negatively associated with HDL-c. All the analyses were adjusted by sex and age using an additive model

**Conclusions:** Carrying the risk allele of the rs16131 is associated with obesity and metabolic syndrome features in Spanish children. However, more studies in independent populations are needed to validate our results

**Key Words:** Npy Variants, Child, Obesity.

**27/807.** Nutrition in the Management of Non-Communicable Diseases

### **Nutritional assessment of cancer patients undergoing chemotherapy in Tehran university of medical sciences**

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**Introduction:** Cancer associated malnutrition and depletion of nutritional reserves can lead to an increase risk of morbidity, reduced chemotherapy response and shorter survival in patients with cancer. Appropriate and early nutritional assessment and nutritional recommendations/interventions may lead to improved treatment outcome.

**Objectives:** Cancer associated malnutrition and depletion of nutritional reserves can lead to an increase risk of morbidity, reduced chemotherapy response and shorter survival in patients with cancer. Appropriate and early nutritional assessment and nutritional recommendations/interventions may lead to improved treatment outcome.

**Method/Design:** Following approval by university ethics committee, 71 patients (41 men and 30 women) with lymphoma and malignant tumors of gastro-esophageal, colorectal, genitourinary, lung, breast, MUO and sporadic in stages II, III and IV, age 51.9±15.4 years, referred for chemotherapy (CT) were assessed. 10 patients died prior and 11 died after the middle of CT. Nutritional status was evaluated by anthropometric indices (BMI, MAC, AMA and TSF), biochemical parameters

(Alb, T, protein and TLC), body composition data (BF, FFM, Dry FFM and TBW), nutritional intake (24h-recall and 3 days Food Record) and Ottery's PG-SGA questionnaire during treatment.

**Results:** A nonsignificant increasing trend was observed for the anthropometric, biochemical (except TLC) and body composition data of 50 patients who finished the treatment period. Likewise, a nonsignificant decrease in their energy and macronutrient intake was observed. Patients who died during treatment cycle had significantly lower mean of all indices (except TSF and FM) ( $P < 0.05$ ). In stage IV, the mean of the all measured parameters were significantly lower than other stages ( $P < 0.05$ ). The frequency of malnutrition varied from 0 to 100% according to stage and kind of cancer and the methods used. Patients with highest malnutrition rate were those with MUO, upper GI and lung malignancies.

**Conclusions:** The majority of patients in the study required nutritional intervention (80%). Highest rate of malnutrition was prevailed in patients who died during the treatment, stage IV of disease, MUO, upper GI and lung cancer. The frequency of malnutrition depends on stage and kind of malignancy and methods used to assess patients.

**Key Words:** Nutritional assessments, Cancer, Malnutrition and Chemotherapy.

**27/818.** Nutrition in the Management of Non-Communicable Diseases

### **A variant in the pon1 gene confers protection against childhood obesity and increases pon1 lactonase activity**

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**Introduction:** Human paraoxonase 1 (PON1) is an antioxidant enzyme bound to HDL, which inhibits the oxidation of LDL and HDL particles, and thereby plays a role in the prevention of atherosclerosis. PON1 activity has been found to be decreased in patients with obesity and cardiovascular complications. PON1 exhibits esterase, arylesterase and lactonase activities. Although lactonase activity provides the best quality information in a physiological context, only esterase and arylesterase activities have been related to the presence of obesity in children.

**Objectives:** We aimed to determine the association of PON1 single nucleotide polymorphisms (SNPs) with childhood obesity and PON1 serum lactonase activity by using dihydrocoumarin (DHC) as a substrate.

**Method/Design:** A total of 16 SNPs were genotyped in 358 children (177 obese, 181 normal-weight). SNPs were searched in the HapMap and NCBI databases (minor allele frequency  $> 0.05$  and  $r^2 > 0.8$  for tagSNPs). The analysis was performed on the GoldenGate assay (Illumina). All SNPs were in Hardy-Weinberg equilibrium ( $P > 0.05$ ) in both groups. PON1 lactonase activity was determined in 150 (82 obese, 68 normal-weight) serum samples using 1mM DHC; 50mM Tris-HCl buffer and monitoring the reaction at 270 nm. Statistical analyses were carried out using PLINK and SPSS 15.0 softwares.

**Results:** A case-control association analysis revealed that the SNP rs854566 (G/A) was negatively associated with obesity [odds ratio = 0.62; 95% confidential interval (CI) = 0.42-0.91;  $P = 0.016$ ] under an additive model and adjusted by age and gender. Children carrying the risk allele A showed higher PON1 lactonase activity [ $\beta = 0.757$ ; 95% CI = 0.247-1.266;  $P = 0.004$ ]. With different serum PON1 lactonase activity among genotypes (AA =  $9.3 \pm 1.3$ ; AG =  $8.5 \pm 0.2$ ; GG =  $7.7 \pm 0.2$  in U/ml), suggesting a role of PON1 antioxidant properties in the protection from obesity.

**Conclusions:** According to these results, the presence of PON1 rs854566 confers protection against obesity and increases PON1 lactonase activity in Spanish children.

**Key Words:** Paraoxonase 1, Single Nucleotide Polymorphism, Obesity, Child

27/832. Nutrition in the Management of Non-Communicable Diseases

### **A variant in 11 $\beta$ -Hydroxysteroid dehydrogenase type 1 gene is associated with obesity in children**

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**Introduction:** 11 $\beta$ -Hydroxysteroid dehydrogenase type 1 (11 $\beta$ -HSD1) catalyses the regeneration of active cortisol from inert cortisone and plays a critical role in tissue-specific corticosteroid reactions, and is therefore a key molecule associated with the development of obesity. Despite evidence for a role in obesity, to date, no polymorphisms have been significantly associated with the disease per se.

**Objectives:** The aim of the present study was to evaluate whether variations in the HSD11B1 gene, never studied before, were associated with obesity and related traits as well as biomarkers of inflammation, liver damage and cardiovascular disease in a cohort of Spanish children.

**Method/Design:** We performed a prospective case-control study. A total of 534 children were examined and classified according to Cole et al, as obese (n=292) or normal weight (n=242). Anthropometric and biochemical measurements related with obesity, inflammation, liver damage and cardiovascular disease were determined. Genomic DNA was extracted and 10 SNPs of the HSD11B1 gene were genotyped using the Illumina GoldenGate protocols on 96-well format Sentrix<sup>®</sup> array. PLINK software were used for statistical analysis.

**Results:** The association analysis revealed a novel SNP rs3753519 strongly associated with obesity which was the only one statistically significant after Bonferroni correction (OR = 1.97 for allelic effect, 95% confidence interval= 1.23–3.16; P = 0.004 and Bonferroni corrected P = 0.045). In addition, this SNP was significantly and positively associated with increased body mass index (BMI), BMI z-score, weight, waist circumference, plasma gamma-glutamyl transpeptidase, plasma active plasminogen activator inhibitor 1 and negatively with plasma adiponectin and cortisol after adjustment by sex and age. None of the inflammation biomarkers showed association with the risk allele.

**Conclusions:** These data linking genotype with both disease prevalence and related phenotypes strongly support a role for the polymorphism rs3753519 in the HSD11B1 gene in the pathogenesis of paediatric onset obesity.

**Key Words:** 11Beta-Hydroxysteroid Dehydrogenase Type 1, Genetic Polymorphisms, Obesity, Child.

27/878. Nutrition in the Management of Non-Communicable Diseases

### **Lipid profile and its relationship with body weight in hiv infection**

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**Introduction:** Although highly active antiretroviral therapy (HAART) reduces mortality in individuals living with Human Immunodeficiency Virus (HIV) infection, it has known effects on lipid metabolism and body composition and may lead to increases in the patient's body weight.

**Objectives:** To describe the behavior of body weight and lipid profile in adults with HIV who receive HAART, at the CAPASITS (HIV and Sexually Transmitted Diseases Ambulatory Care and Prevention Clinics) in Chihuahua City, Mexico.

**Method/Design:** We analyzed 89 cases (70 men, 19 women), through a retrospective and cross for serum cholesterol, triglycerides, HDL and LDL. Age (mean  $\pm$  SD) was 40.8  $\pm$  9.9 years.

**Results:** The average initial body weight was 66.4  $\pm$  14.5 kg and the final weight was 69.3  $\pm$  14.0kg. 57 patients (65.2%) had total blood cholesterol levels below 200 mg/dL, 24 patients (27.6%) had levels between 200 and 239 mg/dL and 6 patients (6.9%) were above 240 mg/dL. The blood triglyceride concentration was normal, less than 150 mg / dL, in 23 patients (26.4%) and 22 patients (25.3%) had bordering levels, between 150-199 mg/dL.

**Conclusions:** We found an increase on the average body weight, and as for cholesterol levels, they have been successfully controlled through nutrition intervention, but the reduction of serum triglycerides, whose prevalence is 52.8% in these patients, presents a greater difficulty.

**Key Words:** Haart, Hiv, Blood Lipids, Body Weight

27/879. Nutrition in the Management of Non-Communicable Diseases

### **Whole grain and weight management: an intervention study to clarify underlying mechanisms**

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**Introduction:** Epidemiological studies associate whole grain (WG) consumption to reduced CVD risk, body weight and abdominal circumference. Data obtained by intervention studies were not conclusive. Evidence from animal and few human studies indicated that prebiotic dietary fibre ameliorates metabolic syndrome and controls body weight through reduction of inflammation.

**Objectives:** This study aims i) to evaluate the effect of WG on body weight, circumferences and composition, ii) to clarify the un-

derlying mechanisms

**Method/Design:** A commercial WG product, having prebiotic properties and a high amount of polyphenols bound to dietary fibre, was selected. Eighty healthy overweight subjects will be enrolled. Forty volunteers will be asked to slightly change their habitual diet replacing equicaloric portions of specific foods with 68 g WG/die for 8 weeks; the other half will not change their diets. At baseline, and after 4 and 8 weeks, measure of body weight, waist and hip circumferences, bioimpedance analysis and blood, urine and feces collection will be performed. Markers linked to antioxidant status (serum ferulic acid,  $\beta$ -carotene and FRAP), to inflammatory status (several cytokines by multiplexed immunometric assay), to lipid and glucose metabolism as well as to the overall nutritional status and appetite, will be measured.

**Results:** Preliminary data indicated that in subjects consuming WG, starting from 4 wk of treatment: i) both body weight and waist circumference were significantly reduced by 5% and 4% from baseline, respectively; ii) ferulic acid concentration was significantly doubled both in serum and urine, and triplicated in feces; iii) both fullness and satiety were doubled, while hunger did not vary from baseline.

**Conclusions:** The study is still ongoing but data obtained up to now indicated a good bioavailability of ferulic acid by WG consumption and encouraging perspectives as regards body weight management. The completion of protocol and analyses will permit to clarify the underlying mechanisms.

**Key Words:** whole grain, weight management, ferulic acid, prebiotic, inflammation

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#### 27/913. Nutrition in the Management of Non-Communicable Diseases

### The evaluation of the risk of metabolic syndrome among obese children in Krakow

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**Introduction:** Literature data indicate that the prevalence of metabolic syndrome (MS) appears to increase pararely with higher degree of obesity.

**Objectives:** The estimation of the risk of MS among obese children in Krakow.

**Method/Design:** Among 770 children (mean age 8.2 +1.5 years) during comprised prophylactic examinations in the Department of Hygiene and Dietetics. Jagiellonian University. the group of 49 obese children (6.4% ) was separated. The check-up with blood pressure measurement. anthropometric measurements . body mass components and biochemical examinations (total. LDL and HDL cholesterol. fasting triglycerides. fasting glucose) and TSH was done. Nutritional habits were estimated with the use of the Questionnaire of Food Products Frequency Intake.

**Results:** The waist circumference of obese children was 75.6 cm; hip circumference - 86.9 cm; WHR - 0.87; W.H-0.56; fatty mass% -25.3%. The values of other examinations were as follows: gluco-

se-4.45 mmol.l. HDL cholesterol -1.24 mmol.l. triglycerides-1.14 mm.l.; systolic blood pressure-106.8 mmHg. TSH level - lower than upper limit - 4.94 uIU.ml. In 3 obese children four components of MS were present simultaneously : waist circumference bigger than 90th percentile for the age and gender. fasting triglycerides level greater than 95th percentile. HDL cholesterol level less than 1.04 mmol.l and blood pressure bigger than 90th percentile for age and height. In all obese children too low consumption of milk and dairy products. dark bread. fish. vegetable oils . fruits and vegetables and mineral water was noted . Too frequent consumption of light bread . sugar. sweets and sweet drinks was declared. Fast foods were not eaten or eaten rarely than once a week.

**Conclusions:** 1. In Krakow population of 5-9 years old children the prevalence of obesity was 6.4% and among obese children the prevalence of MS was 6.1%.

2. Nutritional habits of obese children were deviated from the Polish food-based dietary guidelines.

**Key Words:** Obesity, Children, Antropometric Measurements, Triglycerides, Hdl Cholesterol, Nutritional Habits

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#### 27/978. Nutrition in the Management of Non-Communicable Diseases

### Anti-genotoxic effects of leguminous protease inhibitor concentrates in Incap prostate cancer cells

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**Introduction:** Epidemiological studies support a role for diets rich in legumes and pulses in prostate cancer prevention. A protease inhibitor from soybean (Bowman-Birk Inhibitor; BBI) has been shown to exert anti-cancer properties in several in vitro and in vivo carcinogenesis model systems, including those of prostate cancer. The anti-cancer effects of protease inhibitors from other legumes have been poorly investigated. BBI and other protease inhibitor concentrates (PICs) have previously been shown to decrease oxidative damage by inhibiting free radical production. These mechanisms may account for BBI's potent anti-inflammatory effects and consequently BBI's anti-cancer properties. The ability of PICs to modulate oxidatively-induced DNA damage is not fully elucidated and is investigated in the current study.

**Objectives:** To determine if PICs from leguminous sources commonly consumed in the Western diet exert anti-genotoxic effects on LNCaP human prostate cancer cells in vitro.

**Method/Design:** Cells were treated with PICs from soybean and chickpea (0.05, 0.1, 0.3, 1 and 3 mg/ml) for 24 hours and the Comet assay was used to assess the reduction of DNA strand breaks induced by a H<sub>2</sub>O<sub>2</sub> challenge (75  $\mu$ M, 5 min, 4°C). Purified BBI was used as

a reference. The genotoxicity of PICs was assessed using the Comet assay following exposure to PBS. The toxicity of PICs was assessed using the MTT assay.

**Results:** Both soybean and chickpea PICs (1, 3mg/ml) significantly reduced H<sub>2</sub>O<sub>2</sub>-induced DNA damage in LNCaP cells by up to 25.6% ( $p < 0.05$ ). Similar effects were apparent with BBI (0.1, 0.3 mg/ml). No PIC tested was genotoxic to LNCaP cells.

**Conclusions:** Soybean and chickpea PICs exerted anti-genotoxic effects on LNCaP cells supporting previous findings that BBI and protease inhibitors have a protective effect on oxidative damage. Soybean and chickpea PICs may therefore play a role in prostate cancer prevention, however, further research is needed to fully understand the molecular mechanisms involved

**Key Words:** antigenotoxicity, Bowman-Birk Inhibitor, prostate cancer, Protease Inhibitor Concentrates.

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### 27/1010. Nutrition in the Management of Non-Communicable Diseases **Relation between body mass index and chronic diseases in adult population in Serbia**

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**Introduction:** There is consistent evidence that obesity is a correlate of mortality. Less information is available about the relation between body weight and the prevalence of diseases.

**Objectives:** Our study investigated relationship between body mass index (BMI) with 14 groups of chronic diseases in adult population of Serbia, using the data from 2006 National Health Survey

**Method/Design:** The study represents secondary analysis of the National Health Survey 2006., and involved 8274 women and 4832 men older than 20 years. Body mass index (BMI), used as a measure of nutritional status, was computed according to the Quetelet formula (weight [kg]/height<sup>2</sup> [m<sup>2</sup>]). Standardized morbidity prevalence ratios (SMR) were computed using the lowest BMI category as reference. Odds ratios (ORs) for the prevalence of the selected chronic diseases and their 95% confidence intervals were calculated by multivariate logistic analysis adjusted for age and BMI.

**Results:** Hypertension was the most prevalent disease in all BMI categories; SMR was higher in men with BMI  $\geq 35$  kg/m<sup>2</sup> (203) and lower in women with BMI  $\geq 35$  kg/m<sup>2</sup> (181). Rheumatism/arthritis was the second most prevalent disease in both sexes, with the highest prevalence in BMI category  $\geq 35$  kg/m<sup>2</sup>; the pattern did not remain the same after standardization (SMR was 130 in men and 145 in women). The prevalence of hyperlipidemia was associated with BMI category  $\geq 35$  kg/m<sup>2</sup> in both men and women (SMR was 200 in men and 146 in women). Logistic regression models showed that overweight and obesity were associated with higher prevalence of hypertension, hy-

perlipidemia and rheumatism/ arthritis in women, while obesity with higher prevalence hypertension in men.

**Conclusions:** The results indicate necessity for promotion of healthy lifestyles among adult population in Serbia (including proper nutrition), and follow-up of nutritional status as determinant of certain chronic diseases.

**Key Words:** Obesity, Prevalence, Chronic Diseases, Serbia

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### 27/1026. Nutrition in the Management of Non-Communicable Diseases **High prevalence of nutrition-related chronic diseases in child-bearing age urban Moroccan women**

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**Introduction:** A marked increase in the prevalence of chronic non-communicable diseases is underway in emerging countries, including Morocco, especially in urban areas together with a growing epidemic of overweight/obesity, a recognized underlying risk factor.

**Objectives:** : To describe the patterns of biological risk factors among women from an urban environment and to assess relationships with current socio-demographic factors, anthropometry and medical history.

**Method/Design:** Cross-sectional survey (2010) in Rabat the capital city. Two-stage random cluster sample: 895 women (20-49 y). Tension  $>140/90$  mm Hg or hypertension diagnosis/treatment defined hypertension. Together with diabetes diagnosis/treatment, fasting plasma glucose  $\geq 7.0$  mmol/L defined diabetes, and  $\geq 6.1$  mmol/L hyperglycaemia. Metabolic syndrome defined according to IDF definition. Adjusted relationships (OR) estimated by logistic regression.

**Results:** Prevalence of hypertension was 25.2% [21.9-28.6], hyperglycaemia 14.0% [11.0-17.0], diabetes 6.7% [4.8-8.6] and metabolic syndrome 35.1% [31.0-39.1]. Only 39.5% of hypertension and 47.4% of diabetes had been previously diagnosed; among them 21.8% received treatment when hypertension and 65.9% when diabetes. Familial history was declared in 57.0% hypertension and 71.1% diabetes cases. Metabolic syndrome affected 66.0% of hypertension and 84.1% of diabetes cases. After adjustment OR of hyperglycaemia as well as diabetes increased with familial history whereas OR of hypertension did not. OR of hypertension increased only with age. No other factor was related to diabetes whereas OR of hyperglycaemia increased also with age and waist circumference. No relationship was observed with educational or economic level or parity.

**Conclusions:** In urban Morocco, a quarter of women were suffering from hypertension and 1 out of 7 from hyperglycaemia. For hypertension as well as diabetes, only less than 1 out of 2 cases was previously diagnosed. Among known cases, only 1 out of 5 received hypertension treatment whereas two thirds diabetes treatment. Specific control program should detect nondiagnosed hypertension and

hyperglycaemia at an early age to reduce diabetes and cardiovascular risk.

**Key Words:** Urban Morocco, women, chronic diseases, tension, glycaemia

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**27/1042.** Nutrition in the Management of Non-Communicable Diseases  
**Eating habits as a risk factor in eating disorders**

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**Introduction:** Eating disorders are a difficult, time-consuming and costly condition to treat. Being young, female, and dieting are risk factors that have been linked to the development of eating disorders. It is important to identify eating habits that are risk factors in eating disorders in order to prevent the development of these disorders.

**Objectives:** The aim of our work was to identify eating habits that are risk factors for eating disorders in adolescents in the second grade of Secondary Schools in Madrid.

**Method/Design:** We administered a questionnaire that assessed their current eating habits and risk factors for eating disorders to a 502 undergraduate students.

**Results:** We found that not eating breakfast, dieting without supervision and poor self-esteem are risk factors for the development of eating disorders.

**Conclusions:** Promoting healthy eating habits is an important way to prevent the development of eating disorders

**Key Words:** Eating disorders, healthy eating, risk factors

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**27/1061.** Nutrition in the Management of Non-Communicable Diseases  
**Expression of transcription factors PPAR- $\alpha$ , PPAR- $\gamma$  and SREBP-1C in obese patients with non alcoholic fatty liver disease (NAFLD).**

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**Introduction:** Non-alcoholic fatty liver disease (NAFLD) in obesity refers to a broad spectrum of liver damage. The pathogenesis is associated with metabolic disorders with insulin resistance as a common factor which leads to accumulation of fatty acids (FA) and TAGs within hepatocytes, alterations in the hepatic bioavailability of long

chain polyunsaturated fatty acids (LCPUFA) and plasma adipokines, conditions that could be associated with changes in the expression of transcription factors in the liver.

**Objective:** the aim of this study was to determine the role of transcription factors PPAR- $\alpha$ , SREBP-1c and PPAR- $\gamma$  in the pathology of NAFLD in obese patients.

**Methods:** we studied the hepatic expression of transcription factors in 24 obese patients subjected to subtotal gastrectomy with gastro-jejunal anastomosis and Roux and 18 eutrophic patients undergoing laparoscopic cholecystectomy. In addition, we determined the FA profile in liver phospholipids (GC) and serum levels of total adiponectin (RIA) and its high molecular weight isoform (ELISA). Data were analysed in GraphPad Prism 4.0 and results are shown as mean  $\pm$  S.E.M.

**Results:** Obese patients with NAFLD showed (i) decreased expression of PPAR- $\alpha$  ( $340 \pm 34$  vs  $500 \pm 51$ ,  $p < 0.05$ ), (ii) increased expression of PPAR- $\gamma$  and SREBP-1c,  $53$  and  $29\%$  [ $(10 \pm 1.6$  vs  $4.6 \pm 0.38$  and  $140 \pm 11$  vs  $92 \pm 10$ ,  $p < 0.05$ )], respectively, and (iii) increase of  $52\%$  in the SREBP-1c/PPAR- $\alpha$  ratio ( $p < 0.03$ ), compared to control subjects. In addition, obese patients had lower levels of LCPUFA n-3, mainly DHA, decreased plasma levels of total and high molecular weight adiponectin compared to control subjects, respectively [ $(13.5 \pm 0.83$  vs  $8.5 \pm 0.50)$ ,  $(8.5 \pm 0.47$  vs  $2.9 \pm 0.34)$   $p < 0.05$ ].

**Conclusions:** Obesity significantly increases the lipogenic potential over that of FA oxidation in the liver of patients with NAFLD, which is associated with metabolic abnormalities that involve diet imbalance and changes in insulin sensitivity.

**Keywords:** Fatty Liver, Obesity, Insulin Resistance, Transcription Factors.

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**27/2.** Nutrition in the Prevention of Non-Communicable Diseases  
**Effect of weight loss induced by 6-month lifestyle intervention on adipokines in obese adolescents**

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**Introduction:** Adolescent's obesity is associated with an increased risk of adult obesity and subsequent cardiovascular diseases.

**Objectives:** To assess the effect of weight loss after 6-month lifestyle intervention in obese adolescents on the adiponectin, resistin and tumor necrosis factor receptors (TNFRs).

**Method/Design:** Fifty-seven obese adolescents aged 10 to 16 years were assigned to a 6-month intervention and thirty-four adolescents with normal weight were enrolled as a comparison group.

The levels of serum adiponectin, resistin and TNFRs were measured by ELISA method. Insulin resistance was calculated by homeostasis model (HOMA-IR).

**Results:** Compared with subjects with normal weight, obese adolescents at baseline demonstrated significantly higher levels of triglycerides, glucose, insulin and HOMA-IR. Serum adiponectin levels of obese adolescents were significantly lower than that of controls ( $5.57 \pm 3.12$  vs  $7.14 \pm 3.94$   $\mu\text{g/ml}$ ,  $p < 0.05$ ) while serum resistin levels were significantly higher ( $30.33 \pm 10.04$  vs  $23.47 \pm 9.08$   $\text{ng/ml}$ ,  $p < 0.01$ ). No significant difference was observed in the levels of TNFRs between two groups. After 6-month intervention, those obese adolescents with decreased standard deviation score-body mass index (SDS-BMI) displayed significant decreases in insulin ( $24.9 \pm 10.4$  vs  $17.9 \pm 10.5$   $\mu\text{U/ml}$ ,  $p < 0.01$ ), HOMA-IR ( $6.14 \pm 3.80$  vs  $3.99 \pm 2.99$ ,  $p < 0.01$ ) and total cholesterol ( $194.9 \pm 86.3$  vs  $163.6 \pm 43.0$   $\text{mg/dl}$ ,  $p < 0.05$ ). The levels of adiponectin increased significantly ( $5.39 \pm 2.91$  vs  $7.58 \pm 4.34$   $\mu\text{g/ml}$ ,  $p < 0.01$ ) while the levels of resistin decreased significantly ( $31.71 \pm 9.49$  vs  $27.24 \pm 6.88$   $\text{ng/ml}$ ,  $p < 0.01$ ) in those subjects with decreased SDS-BMI. However, no changes in these parameters were observed in the obese adolescents with stable or increased SDS-BMI.

**Conclusions:** The present study demonstrated decreased adiponectin and increased resistin in obese adolescent, which is in part reversible by a 6-month lifestyle intervention.

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#### 27/11. Nutrition in the Prevention of Non-Communicable Diseases

### Correlations between percentage body fat and Body Mass Index, waist circumference and waist-to-hip-ratio in Austrian adults

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**Introduction:** The majority of epidemiologic studies used Body Mass Index (BMI) to determine the prevalence of obesity. Hence, obesity is defined as "a medical condition in which excess body fat has accumulated to the extent that it may have an adverse effect on health" and BMI does not differentiate between weight associated with muscle and weight associated with fat, additionally, other methods such as the measurement of waist circumference (WC), waist-to-hip-ratio (WHR) or percentage body fat should be applied to identify individuals at increased risk. Since percentage body fat is not simply to measure, the question arises, which other method is an appropriate indicator of body fatness.

**Objectives:** To identify the correlation between percentage body fat and BMI, WC and WHR in Austrian adults.

**Method/Design:** 149 female and 106 male adults aged between 18 and 64 years participated in the study. Body height, body weight, WC and WHR were measured. Percentage body fat was measured using bioelectrical impedance.

**Results:** BMI, WC and WHR were significantly correlated with body fat ( $p < 0.01$ ). In both sexes, percentage body fat was higher

correlated with BMI and WC than with WHR. In men, the highest correlation was found between percentage body fat and WC ( $r = 0.741$ ), whereas in women, the highest correlation was found between percentage body fat and BMI ( $r = 0.809$ ).

**Conclusions:** In epidemiologic studies it is not always possible to measure percentage body fat, therefore BMI and WC seem to be accurate indicators of body fatness and can be measured relatively simply and accurately.

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#### 27/30. Nutrition in the Prevention of Non-Communicable Diseases

### Red wine polyphenols decrease homa index in high cardiovascular risk subjects

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**Introduction:** Epidemiological data suggests that moderate red wine (RW) consumption may be associated with enhanced insulin sensitivity and reduced incidence of type 2 diabetes and cardiovascular disease. Furthermore, it has also been associated with lower triglyceride and insulin concentrations, although an explanation for these epidemiologic observations is not yet known. Therefore, it remains unclear if the responsible of these effects is alcohol or polyphenols from RW.

**Objectives:** To evaluate and compare the effects of RW, dealcoholized red wine (DRW) and gin (G) on the lipid and glucose metabolism.

**Method/Design:** Randomized, crossover, controlled clinical trial administering 30g alcohol/d of RW, G and the equivalent amount of DRW in subjects at high risk of CHD in whom diet and exercise were monitored. Adiponectin, Apolipoprotein A-I (ApoA-I), Apolipoprotein A-II (ApoA-II), Apolipoprotein B (ApoB), Apolipoprotein C-I (ApoC-I), Apolipoprotein C-III (ApoC-III), C-Reactive Protein (CRP), Glucose, Insulin, Leptin and Apolipoprotein(a) (Lp(a)) were quantified by a customized Human Multi Analyte Profiling.

**Results:** Although glucose concentration did not change after the three interventions, insulin decreased after the RW and DRW interventions ( $P = 0.003$ ). Therefore, HOMA index decreased after the RW and DRW interventions ( $P = 0.005$ ).

Total cholesterol and LDL cholesterol decreased after DRW ( $P = 0.017$  and  $0.015$ ), whereas HDL cholesterol increased after RW and G ( $P = 0.001$ ). Therefore, LDL/HDL ratio increased after DRW, but only reached statistical significance compared to G ( $P = 0.038$ ). ApoA-I decreased after DRW ( $P = 0.044$ ), and ApoA-II decreased after DRW and G ( $P = 0.002$ ). ApoB decreased after DRW ( $P = 0.002$ ). ApoC-III increased after RW compared to DRW and G ( $P = 0.018$ ). No significant changes between the three interventions and baseline were observed for adiponectin, leptin, triglycerides and ApoC-I.

**Conclusions:** RW polyphenols have a direct effect on insulin resistance and lipid metabolism, contributing to the protective effects of RW on cardiovascular symptoms.

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**27/31. Nutrition in the Prevention of Non-Communicable Diseases**  
**Pasta consumption elicits similar post-prandial glucose, but lower gip and insulin response compared to bread**

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**Introduction:** Consumption of slowly digestible starch is implicated with a decreased risk for the development of obesity, insulin resistance and type 2 diabetes. Underlying mechanisms of this beneficial effect are not yet elucidated.

**Objectives:** Investigating the difference in metabolic response after the consumption of products with slowly and rapidly digestible starch in human subjects.

**Method/Design:** Ten healthy male volunteers (age 21.4 ± 0.5 y, BMI 22.5 ± 0.6 kg/m<sup>2</sup> [mean ± SEM]) participated in a cross-over study, receiving two different meals on separate days. The test meals were fiber-enriched wheat bread and pasta. The products were enriched in <sup>13</sup>C and the dual isotope technique was applied in order to calculate glucose kinetics: the rate of appearance of exogenous glucose (RaE), endogenous glucose production (EGP), and the glucose clearance rate (GCR), reflecting glucose uptake by tissues. Blood samples were drawn for analysis of total glucose concentration, insulin and incretin concentrations.

**Results:** The incremental area under the curve (iAUC, 0-2 h) for total glucose concentrations was not significantly different between both meals, however the iAUC of insulin was significantly lower after pasta (p<0.01). Glucose appearance from pasta was slower compared to bread, resulting in a lower iAUC of RaE compared to bread (p<0.0001) and correlated with low postprandial concentrations of the incretin hormone glucose-dependent insulinotropic polypeptide (GIP). In accordance with the lower insulin concentrations the GCR was lower after pasta, but paradoxically, EGP was more suppressed.

**Conclusions:** Slower intestinal uptake of glucose from a starchy food product results in lower postprandial GIP and insulin concen-

trations, but not necessarily in lower glucose concentrations. In view of the proposed effects of GIP on fat storage and resting energy expenditure these results might explain the role of slowly digestible carbohydrates in the prevention of obesity.

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**27/34. Nutrition in the Prevention of Non-Communicable Diseases**  
**Prevalence, characteristics and mortality risk of Metabolically Healthy Obese (MHO) Dutch individuals**

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**Introduction:** Overweight and obesity constitute an important public health concern because of their association with major health problems such as type 2 diabetes mellitus, cardiovascular disease, arthritis and several types of cancer. Whether or not obese individuals without further metabolic risk factors have an increased risk of cardiovascular disease as compared to normal weight individuals is unclear. From the perspective of obesity prevention policy it is important to gain more understanding into these so-called “metabolically healthy obese” (MHO).

**Objectives:** To gain more insight into the prevalence, characteristics and associated mortality risk of MHO individuals in the Netherlands.

**Method/Design:** The study was conducted within the Monitoring Project on Chronic Disease Risk Factors (MORGEN-project), a population-based cohort study among 23,100 individuals aged 20-59 years in the Netherlands. MHO was defined as abdominal obese (waist circumference ≥102 cm/≥ 88 cm (men/women)) but normal glucose, blood pressure and plasma lipids. Prevalence of MHO was assessed at baseline (1993-1997). General, lifestyle (including dietary) and health characteristics were compared between MHO, “metabolically unhealthy obese” (MUO) and normal weight individuals. All cause-mortality risks adjusted for age and sex were estimated using Cox Proportional Hazards analysis.

**Results:** MHO represented 13.4% (men) and 23.4% (women) of the obese population. As compared to MUO, those with MHO were less severely obese, reported a healthier lifestyle and were more positive about their own health. Until January 1st 2008, 838 participants died. As compared to normal weight individuals, MUO showed a 65% higher mortality risk (Hazard ratio (HR) 1.65; 95% confidence interval (CI) 1.43-1.92), while for MHO the risk was non-significantly increased (HR 1.20; 95%CI: 0.86-1.66).

**Conclusions:** In this study, MHO individuals are characterized by a healthier lifestyle and health perception and lower mortality risk than MUO. Follow-up including cause-specific analyses will have to show whether these differences persist over time.



### **Dietary glycemic load and glycemic index and risk of coronary heart disease and stroke**

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**Introduction:** The associations of glycemic load (GL) and glycemic index (GI) with risk of cardiovascular diseases (CVD) are not well established, particularly in men, and may be modified by gender.

**Objectives:** To assess whether high dietary GL and GI are associated with an increased risk of CVD in men and women.

**Method/Design:** A large prospective cohort study (EPIC-MORGEN) conducted within the general Dutch population among 8,855 men and 10,753 women, aged 21-64 years at baseline (1993-1997) and free of diabetes and CVD. Dietary intake was assessed with a validated food-frequency questionnaire and GI and GL were calculated using Foster-Powell's international table of GI. Information on morbidity and mortality was obtained through linkage with national registries. Cox proportional hazards analysis was performed to estimate hazard ratios (HRs) for incident coronary heart disease (CHD) and stroke, while adjusting for age, CVD risk factors, and dietary factors.

**Results:** During a mean follow-up of 11.9 years, 581 CHD and 120 stroke cases occurred among men, and 300 CHD and 109 stroke cases among women. In men, GL was associated with an increased CHD risk (multivariate-adjusted HR per 1-SD increment: 1.17 [95% confidence interval (CI): 1.02-1.35]), while no significant association was found in women (1.09 [95% CI: 0.89-1.33]). Neither in men nor women was GI associated with CHD risk. GI was, however, associated with increased risk of stroke in men (1.27 [95% CI: 1.02-1.58]) but not women (0.96 [95% CI: 0.75-1.22]). Similarly, total carbohydrate intake and starch intake were associated with a higher risk of CHD in men (1.23 [95% CI: 1.04-1.46]); and 1.24 [95% CI: 1.07-1.45]), but not women.

**Conclusions:** The present study in a large population based sample shows that, in men but not women, high GL and GI, and high carbohydrate and starch intake, were associated with increased risk of CVD.

### **Effects of alcohol on glycaemic and insulinaemic responses**

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**Introduction:** The challenge of measuring the glycaemic index (GI) value for beer with a standardized method is well known. This is due to the low carbohydrate content of beer. As a result, a high volume of beer needs to be drunk in a short time during the GI testing. Therefore, imputed GI values based on closely-related foods for beer have often been used in epidemiological studies. Moderate alcohol intake has been associated with a lower risk of type 2 diabetes, but in postprandial studies alcohol has impaired glucose tolerance.

**Objectives:** To assess how alcohol modifies glycaemic and insulinaemic responses and to measure the glycaemic (GI) and insulinaemic (II) indices for medium strength and non-alcoholic beers.

**Method/Design:** Ten healthy volunteers (40.9±11.5 yrs, BMI 23.0±3.3 kg/m<sup>2</sup>) were served each test beverage (medium strength beer (alcohol 4.5%vol), non-alcoholic beer, and glucose solution with alcohol) once and the reference glucose solution twice, containing 25 g of available carbohydrates, after an overnight fast at one-week intervals in a random order. The portion of medium strength beer and glucose solution with alcohol contained 21 g of ethanol. Capillary blood samples were drawn at 15-30 min intervals for 2 h after each study meal. The incremental areas under the curves (IAUCs), GIs and IIs were calculated.

**Results:** The alcohol-containing glucose solution produced 15% larger glycaemic and insulinaemic responses than pure glucose solution. Medium strength beer and non-alcoholic beer yielded GI values 119 and 80, respectively, and II values 131 and 88, respectively.

**Conclusions:** Alcohol in beverages increases postprandial glycaemic and insulinaemic responses.

### **Dietary changes and decline of serum cholesterol in Lithuanian rural population from 1987 to 2007**

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Health Sciences. Academy of Medicine. Faculty of Public Health. Kaunas. Lithuania.

**Introduction:** During the transition to market economy a lot of changes in nutrition habits of Lithuanians have occurred. Those changes influenced diet-related risk factors for chronic diseases.

**Objectives:** To assess to what extent the observed dietary changes can explain the decline in total cholesterol (TC) in Lithuanian rural regions from 1987 to 2007.

**Method/Design:** Within the framework of the Countrywide Integrated Noncommunicable Diseases Intervention Programme dietary intake and serum lipids were assessed in randomly selected samples of population aged 25–64 in five rural regions of Lithuania (n 2061 in 1987 and n 1739 in 2007). 24 hour recall was used for evaluation of diet. Levels of serum lipids were determined using enzymatic methods. The Keys equation was used to predict the changes of TC over 20 years.

**Results:** The percentage of energy (E%) from saturated fatty acids (SFA) decreased from 18.0 to 15.1 among men and from 17.6 to 14.8 among women. The intake of polyunsaturated fatty acids (PUFA) has increased by 1.8 E% among men and 2.4 E% among women. The trends in the fatty acids composition were determined by increase of the use of vegetable oil for cooking and by replacement of butter with margarine. Mean value of serum TC declined from 6.2 mmol/l to 5.6 mmol/l among men and from 6.1 mmol/l to 5.5 mmol/l among women. Total dietary effect accounted for 43.3% decline of serum cholesterol among men and 50.8% among women. Changes in intake of SFA explained 33.3% of serum cholesterol decline in men and 32.8% in women; changes in intake of PUFA – 10.0% among men and 13.1% among women. Dietary cholesterol accounted only for 4.9% of the change in women.

**Conclusions:** Positive trends in dietary habits, such as change in the quality of fat, were associated with reduction in serum cholesterol in Lithuania.

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#### 27/42. Nutrition in the Prevention of Non-Communicable Diseases **Transparency and uncertainty in scientific advisory bodies: five European case studies**

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**Introduction:** There have been calls within Europe to harmonise the process of setting micronutrient recommendations and share best practice between countries and regions. However the various scientific advisory bodies (SAB) responsible for setting recommendations appear to differ by their statutory model of operation as well as the degree of transparency available throughout the decision making

process, particularly concerning the handling of risk and uncertainty.

**Objectives:** The present study explored how risk and uncertainty was handled in SABs across Europe. Particular attention was paid to understanding the types of deliberations surrounding the terms of reference, selection of expertise, sources of evidence, evaluation of evidence and communication of findings to policy decision makers, wider stakeholders and the general public.

**Method/Design:** A retrospective in-depth case study design was used to explore how risk and uncertainty were handled in the SABs concerning the vitamin D and folate nutrient recommendations in five countries/regions: England, the Netherlands, Poland, Spain and the Nordic countries. A case study consisted of semi-structured interviews with at least two members of SAB as well as in-depth desk research surrounding the recommendations. Interview data was analysed in the native language using template analysis and a skeleton coding structure created and modified by partners during preliminary analyses. Thematic analysis was then carried out by each country and an English-translated summary of identified themes and illustrative quotes was produced and combined with the desk research to form each case study.

**Results:** This paper will explore any disparity in decision making around risk and uncertainty across countries/regions and micronutrients.

**Conclusions:** Implications for the interaction between science and policy in terms of evidence based policy decision making will be discussed.

**Key Words:** Eurreca; scientific advisory bodies; case studies; uncertainty; transparency

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#### 27/57. Nutrition in the Prevention of Non-Communicable Diseases **Fighting diabetes in African-American communities**

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**Introduction:** Diabetes is epidemic in the United States, and a disproportionate burden in African American populations. The Diabetes Prevention Program demonstrates that lifestyle modification can prevent diabetes among high-risk individuals.

**Objectives:** 1) To identify persons at risk for diabetes among African American population through selected churches. 2) to encourage the adoption of healthy lifestyle. 3) to develop a culturally sensitive health education program, and 4) to determine if frequency of attendance and the point-of-testing nutrition counseling affected the outcomes.

**Method/Design:** A finger-stick whole blood sample was collected and entered into a Cholestech LDX analyzer for rapid assay of glucose, triglycerides, and total cholesterol, HDL-cholesterol, LDL-cholesterol and VLDL-cholesterol, anthropometric measures assessed

included Body Mass Index (BMI), and blood pressure, while a 24 hour food recall assessed individual nutrient intake. Critical to this project was the use of the train-the-trainer model, and the use of point of testing counseling.

**Results:** A total of 315 individuals were screened for fasting blood sugar, hypertension, cholesterol, dietary and physical activity habits. Approximately 50 of those screened participated in nutrition and exercise programs. A total of 5 Community Health Mentors were trained to lead exercise groups. Participants in the exercise program, showed significant decrease in their BMI ( $P=0.028$ ), and more importantly, they lost inches around their waistline. Similarly, blood pressure values shifted from hypertension to pre-hypertension between baseline and follow-up screening for participants in the exercise group, 21.28% and 17.83% respectively. Body mass index decreased significantly after baseline to endpoint among subjects who attended more than two sessions of point-of-testing nutrition counseling.

**Conclusions:** Based on these findings it is reasonable to conclude that point-of-testing nutrition counseling and increased physical activity improved subjects' anthropometric and biochemical measures especially for participants that participated in the exercise program.

**Key Words:** Diabetes Point-of-testing-counseling mentoring

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#### 27/69. Nutrition in the Prevention of Non-Communicable Diseases **Phytosterols protects against CLA effects on liver insulin signaling**

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**Introduction:** Conjugated linoleic acid (CLA), a mixture of linoleic acid isomers, shows antagonistic biological effects, decreasing weight gain and fat mass accumulation, however, contributing to insulin resistance (IR). The phytosterols, sterols derived from plants, are related to fat body homeostasis.

**Objectives:** Investigate the effect of the interaction between CLA and phytosterols on weight loss, glucose and insulin sensitivity in high-fat-fed mice.

**Method/Design:** Forty male Swiss mice were treated for 8 weeks with five different diets: standard diet AIN 93-G (P group), high-fat diet with 35% (w/w) of lipid (HF group), high-fat diet supplemented with 2% of CLA (C group), high-fat diet with 2% of phytosterols (F group) and high-fat diet with 2% of CLA plus 2% of phytosterols (S group). Total weight gain, glucose tolerance test (GTT), insulin tolerance test (ITT), serum leptin and hepatic P-Akt activity were analyzed.

**Results:** The C and S groups showed reduction in weight gain and serum leptin ( $P<0.05$ ), while F group showed similar results compared to HF group. All high-fat groups showed glucose intolerance, and ITT revealed insulin resistant on C and S groups. The liver of HF and C groups showed an important reduction of Akt phosphorylation,

but this activity was partially recovered on F and S groups. The CLA reduced body fat mass and increased lean mass composition, but it was not sufficient to revert the IR. Phytosterols supplementation, however, did not alter the body composition of animals, but prevented/reversed the IR. The S group provides positive results related to body composition and showed an improvement in hepatic insulin signaling, protecting against CLA effects, reflected improvement of Akt protein activity.

**Conclusions:** The body composition benefits of conjugated linoleic acid were not reflected on liver. CLA exhibit a worse effect on liver insulin signaling, but the phytosterols protected against this condition.

**Key Words:** conjugated linoleic acid, phytosterols, obesity, insulin resistance.

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#### 27/76. Nutrition in the Prevention of Non-Communicable Diseases **Does good knowledge of fruit and vegetables predict intake in urban Moroccan women?**

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**Introduction:** Morocco is undergoing a nutrition transition with increasing prevalence of obesity and non communicable diseases (NCD). In that context, consumption of fruit and vegetables (F&V) is of public health interest as they are recognised as having a preventive role on such diseases.

**Objectives:** To estimate F&V consumption; to evaluate knowledge about the health benefits of F&V; and to investigate whether there is a relationship between F&V knowledge and consumption.

**Method/Design:** A cross-sectional survey conducted in 2009-2010 in Rabat-Salé (urban area), including 894 randomly selected women (20-49y). Dietary intake was assessed using a single 24 hour recall (portion size quantified). Knowledge was evaluated with a questionnaire (developed and validated for this study) which consisted of 24 items to assess three domains of knowledge: F&V food based guidelines, F&V link with NCD and the nutrient value of F&V.

**Results:** The mean F&V daily intake was 326g [308-345] (158g/day [145-172] for fruit and 168g/day [158-178] for vegetables). More than half of the women (51.4%) were classified as low consumers (intake <280g of F&V/day) and 31.1% met the recommended 400g/day. On a 100 point scale the overall mean F&V knowledge score was 40.5 points [39.5-41.6]. Women scored best for their knowledge about F&V food based guidelines (mean score of 42.6) and scored least for their knowledge about the link between F&V and NCD (mean score of 32.4). Women with higher overall knowledge scores ate significantly more fruit and vegetables than women with lower scores ( $p<0.001$ ), even after adjustment for educational level.

**Conclusions:** Findings suggests poor overall knowledge of fruit

and vegetables. Two out of 3 women did not meet the WHO daily guidelines for F&V intake. As a significant association between knowledge and intake was found, education programmes targeting overall knowledge about F&V may have a significant impact on F&V consumption.

**Key Words:** Morocco. Fruit. Vegetables. Knowledge. Consumption

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**27/81.** Nutrition in the Prevention of Non-Communicable Diseases  
**Antioxidant properties of dietary fiber from Passiflora Edulis**

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**Introduction:** Brazil is the biggest producer of passion fruit, especially *Passiflora edulis*. More than half its production is used by juice factories. Peels are major by-products obtained during the processing of various fruits; they are, in general, very rich in dietary fiber and polyphenols.

**Objectives:** To determine the fiber content and antioxidant activity of passion fruit peel.

**Method/Design:** *P. edulis* fruits were obtained from the Torre de Pedra (São Paulo, Brazil) organic producer. The fruits were washed and the pulp separated from peel. Peels were dried at 50 °C for 24 hours, grinded (20 meshes) and stored in polyethylene bags. Dietary fiber and the total content of phenolics extracted by water and organic solvent (methanol and acetone) were analyzed. Moreover, the antioxidant activity by 2,2-diphenyl-1-picrylhydrazyl (DPPH) and ferric reducing antioxidant power (FRAP) assay were determined.

**Results:** The flour showed 69.60% of dietary fiber (50.69% insoluble dietary fiber and 18.91% soluble dietary fiber) and the phenolics contents of each extract were 8.34±0.34 and 7.58±0.49 GAE/100g, respectively. The aqueous and solvent flour extracts showed a high antioxidant activity after 30 minutes assay scavenging 49.5 and 50.5% respectively of DPPH radical. Similarly to the DPPH, the FRAP assay shows a comparable activity in both extracts: 57.95µM ferrous sulfate/g of flour in the aqueous extract and 58.20µM ferrous sulfate/g of flour in the aqueous organic solvent extract.

**Conclusions:** These results showed that the flour of *P. edulis* peel is a good source from dietary fiber and antioxidants compounds and its use can be very interesting for environment and health proposals.

**Key Words:** passion fruit, antioxidant activity, dietary polyphenols, dietary fiber.

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**27/89.** Nutrition in the Prevention of Non-Communicable Diseases  
**Iron and zinc bioavailability during abrasive decortication of non-gmo biofortified and traditional Pearl Millet**

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**Introduction:** Micronutrient deficiencies can be remedied through four complementary strategies: dietary diversification, mineral supplementation, food fortification or biofortification. Beyond the micronutrient content improvement in the staple food crops, the amount and bioavailability of micronutrients remaining in the foods following usual processing methods are essential.

**Objectives:** We investigated the potential of traditional and biofortified millet grains to give flours, after abrasive decortications at different extraction rate, with increased amounts and bioavailability of iron and zinc.

**Method/Design:** Estimation of iron and zinc bioavailability was carried out through the calculation of molar ratios phytate to mineral.

**Results:** Iron and zinc content in the biofortified varieties Tabi and GB8735 were 2 to 3 fold higher compared to the traditional variety Gampela, showing the efficiency of conventional breeding for increasing the micronutrient content in pearl millet. Iron content reached about 7.2 and 6.7 mg/100gDM in the biofortified varieties, what corresponds to the targeted values of biofortification programs. Zinc content was 5.6 and 4.1 mg/100gDM for respectively GB8735 and Tabi varieties. Due to the presence of phytate, polyphenols and some fibres partially removed during decortication, estimation of iron bioavailability showed no improvement with the biofortified varieties. On the contrary, due to phytate:zinc ratios ranging between 6 and 18 whatever extraction rate, it was hypothesized that zinc absorption can be improved through the use of these biofortified varieties for food processing.

**Conclusions:** Estimation of zinc bioavailability in decorticated grains varied from low with the traditional variety to medium with the biofortified ones, showing a potential improvement of zinc absorption. For iron, no improvement of bioavailability was obtained even for the biofortified varieties, due to the concomitant presence of chelating factors such as phytates. Molar ratios changes must then be studied during the next steps of food processing.

**Key Words:** phytate:iron ratio, phytate:zinc ratio, biofortification, bioavailability, cereal

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**27/114. Nutrition in the Prevention of Non-Communicable Diseases  
Interventions in the school environment  
in order to reduce obesity: a systematic  
review of the Bank of Thesis from the  
Higher Education Personnel Improvement  
Coordination (CAPES)**

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**Introduction:**

**Objectives:** A systematic review of literature on studies about interventions in schools environment in Brazil aiming the reduction of obesity and life changes habits in schools was done.

**Method/Design:** Thesis and dissertations published in the Higher Education Personnel Improvement Coordination (CAPES) from 1987 to 2010 were investigated. The studies were selected based on the reading and analysis of their titles and summaries, to perform a quality analysis based on the Downs & Black (1998) protocol.

**Results:** From the 107 thesis and dissertations selected, 48 duplicated studies and 53 that did not fit the criteria of selection were excluded. The analysis of the 6 remaining studies demonstrated that the intervention period varied from 4 months to 3 years. It was also observed in 4 out of the 6 studies the applied intervention was on nutritional education. The 2 others investigated the encouragement of physical activity and the increase of milk consumption. Positive results regarding the nutritional education in schools were found in 2 studies, whereas the others found no significant changes after intervention, suggesting the need of longer run interventions. It was not possible to combine studies in a meta-analysis due to methodological diversity of the same.

**Conclusions:** We concluded that there are few intervention studies conducted in Brazil within the Graduate Programs and CAPES and there is the need to expand interest in the subject, given the importance of the topic. Lasting longer interventions and the monitoring of outcomes are necessary to evaluate the effectiveness of these actions. It is also suggested the relocation of the CAPES Thesis Database searching system, combining key words in between and guiding institutions to provide the studies in order to facilitate access to information.

**Key Words:** obesity, schoolchildren, nutritional intervention, review

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**27/121. Nutrition in the Prevention of Non-Communicable Diseases  
Fruit and vegetable intake and thyroid  
cancer risk among women: a case-control  
study in South Korea**

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**Introduction:** Thyroid cancer is the most common cancer among Korean women. However, there was little data on dietary factors related to thyroid cancer risk, even on fruits and vegetables rich in antioxidant vitamins.

**Objectives:** We conducted a case-control study on thyroid cancer risk in relation to fruit and vegetables consumption.

**Method/Design:** The study included histologically confirmed 111 malignant thyroid cancer cases and 115 benign cases. Controls who did not have nodule by thyroid ultrasonography were matched to cases by age (+/-2). Food and nutrient intake were estimated by quantitative food frequency questionnaire with 121 items. Conditional logistic regression analysis was used to obtain the OR and corresponding 95% CI.

**Results:** The average intake of raw vegetables in malignant cases was lower than in controls. High raw vegetable intake was inversely associated with thyroid cancer risk (4th v. 1st quartile, odds ratio [OR] = 0.27, 95% confidence interval [CI] = 0.10-0.74, P for trend = 0.03 in malignant case; OR = 0.47, 95% CI = 0.21-1.05, P for trend = 0.05 in benign case). We also found an inverse association between persimmon intake and thyroid cancer risk (OR = 0.39 in the highest quartile, 95% CI = 0.17-0.88, P for trend = 0.03 in malignant case; OR = 0.35 in the highest quartile, 95% CI = 0.15-0.83, P for trend = 0.01 in benign case).

**Conclusions:** These results suggest that high consumption of raw vegetable and persimmon may decrease thyroid cancer risk.

**Key Words:** Thyroid cancer, vegetable intake, fruit intake.

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**27/123. Nutrition in the Prevention of Non-Communicable Diseases  
Gut hormone profiles among those suscep-  
tible or resistant to obesity**

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**Introduction:** An alternative approach in determining the cause, treatment and prevention of obesity is to study those who have remained lean (expenders) despite living in an obesogenic environment.

**Objectives:** To observe the gut hormone profiles and appetite responses in spenders versus conservers (those who struggle to maintain a healthy weight).

**Method/Design:** Fasted spenders (n=33) and conservers (n=28) consumed a standardized breakfast meal (2440kJ females; 2928kJ males). Fingerprick capillary blood samples to measure glucose, insulin, leptin, ghrelin (active), and total peptide YY (PYY), and visual analogue scales (VAS), to measure hunger, fullness, and desire to eat, were collected at baseline and 15, 30, 45, 60, 120 and 180 minutes following the start of ingestion. Fasting, Area Under the Curve (AUC), peak/nadir and time to peak/nadir were compared. The Three Factor Eating Questionnaire (3FEQ) was completed on another occasion.

**Results:** No significant differences were observed for ghrelin or PYY. The significantly higher leptin values observed in the conservers disappeared when percent body fat (%BF) was controlled for. The nadir for hunger was significantly lower for conservers compared with spenders (p=0.017) but there were no differences in baseline, AUC or time to nadir. There were no significant differences observed in ratings of fullness or desire to eat. Preoccupation with thoughts of foods was higher at fasting in females (p=0.015) and time to nadir occurred later in the conservers (p=0.040). Female conservers reported the highest scores for dietary restraint (p=0.042). Disinhibition scores were significantly higher in conservers versus spenders (p<0.001), while no significant differences were observed in scores for hunger.

**Conclusions:** Despite reporting similar postprandial and overall hunger levels and displaying similar gut hormone profiles, conservers appear to respond differently to hunger by exhibiting higher levels of dietary restraint and disinhibition compared with spenders.

**Key Words:** gut hormones, obesity, dietary restraint, disinhibition

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**27/128.** Nutrition in the Prevention of Non-Communicable Diseases

### **Associations of dietary phosphorus intake and carotid intima-media thickness - PHOMI Study**

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**Introduction:** Dietary phosphorus (P) intake in Western countries is 2-3 fold higher than recommendations. Phosphate is commonly used as food additive which also increases P intake. P may play a role in cardiovascular diseases, because high serum phosphate is associated with subclinical atherosclerosis in healthy individuals. Carotid intima-media thickness (IMT) can predict cardiovascular events.

**Objectives:** The objective was to investigate associations of dietary P intake and carotid IMT by a cross-sectional study on healthy individuals.

**Method/Design:** 624 subjects (199 men, 425 women) aged 37-46 years participated in the PHOMI study. Their carotid IMT was measured by ultrasound on the right and left common carotid arteries. Fasting blood samples were collected and confounding biomarkers were analysed. Dietary data was collected by a validated food frequency questionnaire and a 3-day food record. Participants were divided into quartiles according to their dietary P intake. To examine the association of P intake with IMT, the differences between the quartiles were compared with analysis of covariance. The following covariates were used: blood pressure, calcium intake, smoking, physical activity, alcohol consumption, body mass index, age and serum lipids.

**Results:** When men and women were analysed together and sex was also used as a covariate, a trend in associations between P intake and IMT (p=0.097) was found. When genders were analysed separately, P intake was associated with higher IMT in women (p=0.024) but not in men (p=0.40). In women the mean IMT was lower in the 1st quartile when compared with the 2nd (p=0.002), 3rd (p=0.044) and 4th (p=0.118).

**Conclusions:** In women lower P intake was associated with lower IMT. P intake exceeding 1300 mg/d was not associated in a dose-dependent manner with IMT. Men had more cardiovascular risk factors which may explain that no connection was found.

**Key Words:** phosphorus, cardiovascular, IMT

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### **27/129.** Nutrition in the Prevention of Non-Communicable Diseases **Consumption of plant-sterol enriched foods in Flanders, Belgium**

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**Introduction:** Since the cholesterol-lowering effect of plant sterols (PS) was discovered, food industries started to add plant sterols to food products.

**Objectives:** The present study aimed to describe the consumption of foods enriched with plant sterols (PS) and supplements containing PS, and evaluates PS intakes via the current consumption and for specific consumption scenarios.

**Method/Design:** A market inventory was performed to collate different PS-enriched food items and supplements available in

Belgium. An food frequency questionnaire (FFQ) was developed to investigate the consumption of PS-enriched foods and supplements.

**Results:** In total, 139 pre-school children (2.5–7 years old) and 569 adults (54.1% women) living in Flanders (the northern, Dutch-speaking part of Belgium) participated in the study. Of these, 21% (Flemish pre-school children) and 28.5% (Flemish adults) consume PS-enriched food products, leading to a mean PS intake in the consumer group of 0.70 (SD 0.61) g/d for pre-school children and 1.51 (SD 1.42) g/d for adults. Of the adult PS consumers, 23.2% did not suffer from elevated blood cholesterol levels; 50% of them had a PS intake less than or equal to 1 g/d and 16.4% had a PS intake above 3 g/d and 7.8% even had an intake above 4 g/d. Scenario studies assessed the intake when all Belgian adults would consume PS-enriched margarines without (scenario 1) or with (scenario 2) a daily consumption of a PS-enriched yoghurt drink. This resulted in an intake above 3 g/d in 17% (women) and 29% (men) for scenario 1 and 40% (women) and 53% (men) for scenario 2.

**Conclusions:** The results indicated that PS-enriched food products are also consumed by the non-target group. Efficient communication tools are needed to inform consumers better about the target group of PS-enriched products, the advised dose per day and alternative dietary strategies to lower the blood cholesterol level.

**Key Words:** plant sterols, enriched foods, dietary intake, pre-school children, Belgium

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#### 27/131. Nutrition in the Prevention of Non-Communicable Diseases

### Association between refined bread consumption and weight gain or overweight/obesity: the Sun Project

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**Introduction:** Epidemiological studies assessing whether the consumption of refined bread leads to higher weight gain or overweight /obesity have reported inconsistent results.

**Objectives:** To evaluate prospectively the relationship between bread consumption and weight change or the incidence of overweight/obesity in a Mediterranean cohort.

**Method/Design:** We followed-up 9,267 Spanish university graduates (54 percent women, mean age: 38 years) during 4.5 years (median). To assess dietary exposures, a validated semi-quantitative

136-item food-frequency questionnaire (FFQ) was administered.

**Results:** After adjusting for age, sex, physical activity, TV watching time, other sedentary activities, smoking status, baseline body mass index (BMI), fiber intake, total daily energy intake, and protein percentage, a higher consumption of refined bread was not associated with a higher average yearly weight gain during follow-up (linear trend,  $P = 0.494$ ).

Among 6,496 participants initially free of overweight-obesity we found 943 incident cases of overweight/obesity. A higher consumption of refined bread was associated with incident overweight-obesity (adjusted OR for  $\geq 2$  times/day vs.  $\leq 1$  time/week: 1.40; CI 95%: 1.08–1.82) (linear trend,  $P = 0.011$ ).

**Conclusions:** A higher consumption of refined bread was not associated with a higher mean weight gain per year. However, a higher frequency of white bread consumption was associated with an increased risk of developing overweight /obesity in a highly-educated Mediterranean cohort with a low baseline BMI.

**Key Words:** SUN Project, food-frequency questionnaire (FFQ), refined bread, overweight /obesity.

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#### 27/133. Nutrition in the Prevention of Non-Communicable Diseases

### Association between pregnancy weight gain and child weight at 1 and 2 years of age

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**Introduction:** Genetical and environmental factors will determine child weights at ages 1 and 2 years. It is not known however if pregnancy weight gain could affect these after-birth variables

**Objectives:** We investigated the possible association between pregnancy weight gain and child weights at ages 1 and 2 years in urban Damavand city, North-East Tehran, Iran

**Method/Design:** In a cross-sectional study using existing data collected by the urban health centers, prenatal records of 266 women who attended for prenatal care and delivered between March 2004 and March 2008 with singleton term pregnancy were analyzed. Data on pre-pregnancy weight, height, total pregnancy weight gain, mother's age, parity, neonatal birth weight, birth order, mother's educational and working status, breastfeeding practice and child weight at 1 and 2 years of age were extracted. Pregnant women were categorized as underweight, normal, overweight, obese based on their Pre-pregnancy BMIs using IOM-1990 recommendations. Pregnancy weight gain were classified as inadequate (<15 pound), normal (15–25 pound) and excess (>25 pound). Chi-square and ANOVA tests were employed to

analyze data using SPSS software

**Results:** Mean ( $\pm$ SD) of gestational weight gain was  $11.4 \pm 3.9$  Kg. On average, 34% of mothers had inadequate weight gain, while 44 and 22% gained adequate and excess weight, respectively. About 34, 56, 20 and 13% of mothers were classified as underweight, normal, overweight and obese. There was a significant difference between mean child weight at 1 and 2 years of ages in all 3 categories of pregnancy weight gain ( $p < 0.01$ ).

**Conclusions:** Child weight at 2 years of age is associated with mothers weight gain during pregnancy.

**Key Words:** Pregnancy, weight gain, child weight

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### 27/135. Nutrition in the Prevention of Non-Communicable Diseases **Magnesium and depression: a systematic review**

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**Introduction:** The incidence of depression is increasing worldwide. Though magnesium plays an important role in the pathophysiology of depression, much is still unknown about its possible role in depression prevention and treatment. Moreover, the few available epidemiological studies analyzing magnesium and depression have produced inconsistent results and present methodological limitations.

**Objectives:** We summarized background information on magnesium and depression and systematically reviewed the possible links between both in cross-sectional and intervention studies.

**Method/Design:** We searched PubMed for cross-sectional, prospective cohort studies and intervention trials about the relationship between magnesium and depression. We also obtained additional published studies by hand-searching the key publications and reviews for references. No prospective observational cohort studies were found. Twenty cross-sectional studies and three intervention trials were included for analysis.

**Results:** Results assessing the association between blood magnesium and depression are inconclusive. Magnesium seems to be effective in the treatment of depression but data are scarce and incongruous. Similarly, a higher intake of dietary magnesium seems to be associated with lower depression symptoms but reverse causality cannot be excluded.

**Conclusions:** Disturbance in magnesium metabolism is related to depression and oral magnesium supplementation may prevent depression and might be used as an adjunctive therapy. More interventional and prospective studies are needed in order to convincingly demonstrate a cause-effect relationship between magnesium and depression. Future research should specifically focus on the effect of oral magnesium supplementation and dietary intake in the treatment and on the development of depression, which remains poorly investigated at this time.

**Key Words:** Magnesium, Depression, Review

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### 27/153. Nutrition in the Prevention of Non-Communicable Diseases **Effect of a diet rich in $\alpha$ -linolenic acid on nitric oxide synthesis**

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**Introduction:** The beneficial effects of N-3 PUFA result mainly from their impact on lipid and carbohydrate homeostasis, but also probably from an effect on secondary amino acids metabolism. Arginine, the precursor of nitric oxide (NO), a key regulator of vascular homeostasis, is a specifically interesting target.

**Objectives:** We aimed at exploring the effect of n-3 PUFA on the regulation of the metabolism of arginine, in particular for its competitive channelling towards systemic NO or urea.

**Method/Design:** Mice received for 5 weeks hyperlipidic/hypercaloric diets rich in either linseed oil (LIN, rich in  $\alpha$ -linolenic Acid, 18:3 n-3), or palm oil (PALM, rich in saturated fatty acids). Measurements: plasma markers of lipid and carbohydrate metabolism; total NO production and competitive channelling of systemic arginine towards urea production (measured by an isotopic tracer method); plasma concentration and urinary excretion of urea and final products of NO degradation; hepatic expression of genes and proteins involved in the arginine-NO/urea metabolism

**Results:** Body weight, adiposity and glycemia were not influenced by the diet, whereas LIN mice (vs PALM) exhibited lower plasma triglycerides, total cholesterol, and non-HDL-cholesterol. NO production (+53%) and plasma nitrate and nitrite concentration (+25%) were higher after the LIN (vs PALM) diet. Urinary excretion of nitrate and mRNA level of hepatic NO synthases were similar in the two groups. The plasma concentration and urinary excretion of urea, gene expression of arginase 2, and the amount of both arginase isoforms were similar in both diet groups, whereas hepatic gene expression of arginase 1 was twice higher in LIN mice.

**Conclusions:** A diet rich in 18:3 n-3 favours NO production from arginine, suggesting a new, potentially beneficial, pleiotropic effect of n-3 PUFA, not mediated by changes in hepatic gene regulation of NO synthesis.

Financial support: GLN & VALOREX (France).

**Key Words:**  $\alpha$ -Linolenic Acid, Arginine, Nitric Oxide



27/157. Nutrition in the Prevention of Non-Communicable Diseases  
**Increased insulin stimulation of AKT phosphorylation by DHA in mouse skeletal muscle**

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**Introduction:** Omega-3-polyunsaturated fatty acids (n-3 PUFAs) have beneficial health effects on metabolic disorders such as dyslipidemia, atherosclerosis, inflammation and insulin resistance. In skeletal muscle, n-3 PUFAs may promote the action of insulin on energy metabolism but the effectors and the molecular pathways triggering their beneficial effects still remain partially identified.

**Objectives:** The present study aimed at determining whether nutritional supplementation with docosahexanoic acid (DHA) had beneficial effects on lipido-energetic metabolism and insulin response in mouse skeletal muscle.

**Method/Design:** Young LDLR <sup>-/-</sup> mice were daily supplemented with 3 different doses of DHA (0.1, 1 or 2% of daily energy requirement) for 20 weeks. Insulin induced AKT protein phosphorylation was determined in incubated gastrocnemius muscle preparation. Gene expression and fatty acid composition analyses were performed in frozen gastrocnemius and soleus muscle respectively.

**Results:** Increased doses of DHA intake led to a significant enrichment in soleus muscle DHA content whereas that of arachidonic acid was reduced ( $p < 0.01$ ).

The measurement of mRNA level of genes related to lipid metabolism revealed few changes. Although no variation in PPARs and lipolytic enzyme gene expression were detected, we observed that adipophilin and Srebf1 gene expression significantly decreased with treatment ( $p < 0.05$ ). Expression of these genes was correlated to TNF $\alpha$  mRNA expression ( $p < 0.01$ ). These adaptations were associated with a DHA dose-dependent improvement in the insulin-dependant phosphorylation of AKT ( $p < 0.05$ ).

**Conclusions:** This study showed that the LC-PUFA DHA may be nutritionally protective against the development of insulin resistance in skeletal muscle. The modulation of Srebf1 gene expression suggests that the transcription of genes involved in lipid storage may be repressed by DHA intake. On the contrary, the down regulation of adipophilin expression may affect lipid droplet structure, leading to a stimulation of lipid degradation. Common features of regulation and links with inflammatory status may exist and remains to be explored.

**Key Words:** insulin sensitivity, muscle, lipids

27/158. Nutrition in the Prevention of Non-Communicable Diseases  
**Gender differences in prevalence and environmental and socioeconomic cofactors of obesity among Tunisian adults**

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**Introduction:** In south Mediterranean countries the epidemiologic transition results in increasing prevalences of obesity.

**Objectives:** Assess gender differences in prevalence, geographic distribution and socio-economic co-factors of obesity among 35-70 y. Tunisians.

**Method/Design:** Cross-sectional survey (2005): 35-70y. Tunisians. National, 3 level random cluster sample (F: n=2964, M: n=2379). Obesity (OB): BMI= weight/height<sup>2</sup>  $\geq$  30kg/m<sup>2</sup> ; abdominal obesity (AO): waist circumference WC $\geq$ 88 cm (F) & 102 cm (M). Environment: urban vs. rural. 24 governorates. Odds-ratios (OR) (adjusted for subject and household socio-economic characteristics). Geographic variation: governorate Intra Class Correlation (ICC).

**Results:** National: prevalence of OB much higher for F (37.0%[34.5-39.6]) vs. M (13.3%[11.2-15.4]), all the more for AO (F: 60.4%[57.7-63.0] vs. M: 18.0%[15.5-20.5]). U vs. R contrasts: sharper for F for OB (F: 43.7% vs. 23.7%,  $P < 0.0001$ ; M: 15.0% vs. 9.7%  $P = 0.0073$ ) and AO (F: 66.1% vs. 49.0%  $P < 0.0001$ ; M: 20.7% vs. 12.1%,  $P < 0.0002$ ). Geographic contrasts: sharper for F vs. M for BMI (ICC=0.082 vs. 0.043) and even more for WC (ICC=0.134 vs. 0.087). OB and especially AO increase with age is sharper in U vs. R, but similarly for F and M. OB increases with education ( $P = 0.017$ ) for M while prevalence is highest for F in the intermediate level ( $P = 0.0085$ ). Obesity increases with economic level for M (middle vs. low OR=2.1[1.4-3.4], high vs. low OR=3.7[2.4-5.8]) and also but somewhat differently for F (OR=2.6[2.1-3.3] and OR=3.3[2.4-4.6]). Similar results for AO. Mediating effect of socio-economic factors: - on U vs. R contrasts much less for F vs. M, - on geographic contrasts: similar F vs. M for BMI, much less for F for WC.

**Conclusions:** Prevention-wise, all hypotheses must be considered to explain the major gender differences regarding prevalence, environmental and socio-economic co-factors of obesity as, among 35-70y. Tunisian women, it is already a very serious public health issue.

**Key Words:** North-Africa, gender, socio-economic, obesity, abdominal obesity

### **Inhibition of activation NF- $\kappa$ B Related to atherogenesis after one year of intervention with a Mediterranean diet**

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**Introduction:** Activation Nuclear Factor-  $\kappa$ B (NF- $\kappa$ B) plays a key role in the inflammation processes. as it regulates the expression of proinflammatory cytokine gene. adhesion molecules. chemokines. growth factors and enzymes such cyclooxygenase-2 (COX-2) and inducible NO synthase.

**Objectives:** Analyze the effect of the Mediterranean diet (Med-Diet) supplemented with virgin olive oil (VOO) or nuts (N) on the level of NF- $\kappa$ B activation from peripheral blood mononuclear cells in a subgroup of persons with high cardiovascular risk after 12 months of the intervention.

**Method/Design:** 69 participants were recruited from a Primary Care Centre and were randomized into 3 groups: Med-Diet+VOO (23). MED-Diet+N (23) and Low-fat diet (23). At baseline and after one year of intervention. phosphorylated p65 subunit (p65-P). total p65 (t-p65) and  $\beta$ -actin in peripheral mononuclear cells were studied by immunodetection.

**Results:** After a year of intervention. adherence to the Diet-Med increased in both groups Med-Diet ( $P < 0.001$ ). Activation of NF- $\kappa$ B decreased in both groups of Diet-Med. being significant in the group of Med-Diet supplemented with nuts. -16% (CI. -32.2 to -0.4.  $P = 0.048$ ). Low-fat diet group showed an opposite trend to the Diet-Med groups. Compared to low fat diet. when the two Med-Diet groups were analyzed together. the differences in the activation NF- $\kappa$ B were highly significant with a reduction of -18.1% (CI -32.5 to -3.6;  $P = 0.015$ ). There were no significant changes in the expression of t-p65 in any of the three groups.

**Conclusions:** The modulation of the inflammatory response induced by the Diet-Med is partially explained by reduced activation of transcriptional factors involved in the synthesis of proinflammatory molecules.

**Key Words:** Mediterranean diet. olive oil. nuts. atherosclerosis. NF- $\kappa$ B

### **Dietary acid load and risk of Hypertension: The Rotterdam Study**

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**Introduction:** Mild metabolic acidosis. which can be caused by diet. may result in elevated blood pressure.

**Objectives:** We prospectively examined the association between dietary acid load and incident hypertension in the general Dutch older cohort of the Rotterdam Study.

**Method/Design:** The analyses included 2241 participants ( $\geq 55$  y) with complete data on diet and blood pressure. who were free of hypertension at baseline (1990-1993). Dietary data was obtained from a 170-item semiquantitative food frequency questionnaire. We used two measures to characterize dietary acid load. i.e. 1) potential renal acid load (PRAL) using an algorithm including total dietary protein. P. K. Ca and Mg; and 2) estimated net endogenous acid production (NEAP) based on total dietary protein and K. Hazard ratios (HR) for 6-y incidence of hypertension were obtained in tertiles of PRAL and NEAP. with adjustment for age. sex. BMI. smoking. educational level. and intake of alcohol. fiber. and total energy.

**Results:** We identified 1113 incident cases of hypertension during 8707 person-years of follow-up. After adjustment for potential confounders. the risk of hypertension was not significantly associated with diet-dependent acid load. Multivariate HR (95% CI) in consecutive tertiles of PRAL were 1.00 (reference). 0.99 (0.86;1.15) and 1.00 (0.86;1.16. p-trend: 1.00). Corresponding HR were 1.00 (ref.). 0.92 (0.80;1.07) and 0.94 (0.81;1.10. p-trend:0.46) for NEAP.

**Conclusions:** The findings from this prospective cohort study provided no evidence for an association between dietary acid load and risk of hypertension in older adults.

**Key Words:** dietary acid load. protein. PRAL. NEAP. blood pressure. hypertension.

**27/201.** Nutrition in the Prevention of Non-Communicable Diseases  
**Serum B-Cryptoxanthin is associated with bone formation markers in post-menopausal women**

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**Introduction:** Osteoporosis is a highly prevalent condition in the elderly and constitutes a major health problem. Nutrition is an important modifiable factor in the development and maintenance of bone health and several dietary factors and antioxidants (i.e., vitamin A, E, carotenoids) have attracted much attention due to their potential relevance in preventing bone loss.

**Objectives:** To assess the status and associations between fat-soluble vitamin and antioxidant status and levels of bone remodelling markers in post-menopausal women

**Method/Design:** Sixty-one post-menopausal women were contacted to participate in a dietary intervention trial and a total of 36 women were finally included (age (45-65y), BMI <35, amenorrhea (> 12 months), no estrogens use, no anabolic or antiresorptive therapy). Blood samples were obtained after overnight fast, between 8.00-10.00a.m. in winter (January), and processed for the assessment of retinol,  $\alpha$ -tocopherol, 25-OH-D3, lutein/zeaxanthin,  $\beta$ -cryptoxanthin, lycopene,  $\alpha$ -carotene and  $\beta$ -carotene (by UHPLC), parathyroid hormone (iPTH) and bone metabolism markers (osteocalcin, beta-crosslaps (b-CTX), and N-terminal peptide of procollagen I (P1NP)) (Roche Diagnostics), sex hormones and lipid profile.

**Results:** Mean values of all the parameters evaluated, except total cholesterol, were within reference ranges even when mean concentrations of 25-OH-vitamin D could be considered as insufficient (mean, CI95%; 47.7 nmol/l (41.1, 54.2)). Bone remodelling markers in serum were unrelated to age, age of menopause, weight, BMI, sex hormones, lipids, retinol,  $\alpha$ -tocopherol or 25-OH-vitamin D. Only crude and cholesterol-adjusted values of  $\beta$ -cryptoxanthin showed a positive and significant correlation with bone formation markers ( $r=0.53$ ,  $p=0.001$  for osteocalcin;  $r=0.41$ ,  $p=0.013$  for P1NP) while lycopene displayed an inverse association with P1NP ( $r=-0.34$ ,  $p=0.043$ ) and b-CTX ( $r=-0.28$ ,  $p=0.099$ ). In regression analysis,  $\beta$ -cryptoxanthin explained 28% of the variation of osteocalcin ( $r^2=0.278$ ).

**Conclusions:**  $\beta$ -cryptoxanthin or  $\beta$ -cryptoxanthin containing foods may be beneficial for bone health.

Funding: Ministerio de Ciencia e Innovación, Spain (AGL2008-02591-C02-02).

**Key Words:**  $\beta$ -cryptoxanthin, bone markers, osteoporosis, carotenoids, human study

**27/209.** Nutrition in the Prevention of Non-Communicable Diseases  
**Dietary proteins poorly contribute to the endogenous production of Glucose after egg ingestion in humans**

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**Introduction:** A high protein meal is considered to activate gluconeogenesis with a potential link with the satiating power of proteins. However, the contribution of dietary proteins to gluconeogenesis has never been directly determined.

**Objectives:** We aimed to determine glucose production after a free-carbohydrate meal and to quantify the amount of dietary amino acids that are transferred to glucose.

**Method/Design:** We used a multiple tracer methods, including the intrinsic and uniform labeling of egg proteins with 15N and 13C. After fasting overnight, eight healthy volunteers were intravenously infused with [6,6-2H]-glucose. Two hours later, they ingested 4 uniformly labeled eggs, cooked as an omelette (23g protein). The metabolic fate of 15N and 13C was followed through metabolic pools, and the endogenous production of glucose was determined for 8 h.

**Results:** After 4 h, oxidation of dietary AA was only the half of deamination while they were similar after 8 h, reaching 18 % of ingested proteins (i.e. 4.1 g). The endogenous production of glucose did not increase after meal ingestion, and significantly decreased after 6 h. The contribution of dietary amino acid to glucose was maximal between 3 and 5 h (representing 5% of produced glucose). On the 53 g of glucose that were produced through 8 h, 1.8 g originated from dietary proteins (i.e. 3.4% of produced glucose and 33% of deaminated AA).

**Conclusions:** After fasting overnight and in the absence of carbohydrate in the meal, the ingestion of a mixed meal containing proteins and fat did not enhance glucose production. Although a significant part of dietary AA-derived carbon skeletons from deamination were converted to glucose, total dietary proteins poorly contributes to glucose production.

**Key Words:** egg proteins, gluconeogenesis, stable isotopes, postprandial state, humans

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**27/216.** Nutrition in the Prevention of Non-Communicable Diseases

**Effect of dietary protein and Cysteine on high-fat induced obesity and low-grade inflammation in mice**

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**Introduction:** High protein diets alleviate obesity and glycemic dysregulation but little is known regarding the effect of individual amino acids.

**Objectives:** This study addresses the consequences of increasing dietary protein or cysteine level on body composition, glycemic regulation and inflammation in mice fed a high-fat diet.

**Method/Design:** Mice were fed either a low-fat diet (Control) or high-fat diets with a normal protein level supplemented or not (HFNP) with cysteine (HFC) or with a high protein level (HFHP). Weight gain was recorded twice weekly and blood glucose, insulin, leptin, resistin and PAI-1 were measured after 9 weeks. After collagenase digestion of an epididymal fat pad (EFP), adipocyte size was measured and macrophages and lymphocytes were counted using flow cytometry. Expression of mRNA coding for MCP1, and CD68 was measured in EFP.

**Results:** Weight gain was significantly higher in mice fed the high-fat diets compared to control. Increasing protein level slightly reduced the high-fat induced weight gain while cysteine supplementation did not. EFP weight and mean adipocyte size were higher in HFNP and HFC mice compared to control, while HFHP mice exhibited an intermediate phenotype. High-fat feeding induced an increase in the proportion of lymphocytes and macrophages in EFP which was unchanged in HFHP and HFC mice. Likewise, a 3 fold increase in MCP1 and CD68 mRNA level was observed in EFP of high-fat fed mice compared to control. Whatever the diet, plasma leptin and resistin also increased as a consequence of high-fat feeding. In contrast, compared to control, blood glucose, insulin and PAI-1 were significantly higher in HFNP and HFC mice but not in HFHP mice.

**Conclusions:** Altogether, these results indicate that increasing the level of dietary protein but not cysteine mitigates high-fat induced obesity and insulin resistance, but not low-grade inflammation in the adipose tissue.

**Key Words:** obesity, protein, cysteine, inflammation

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**27/225.** Nutrition in the Prevention of Non-Communicable Diseases

**Effect of aqueous extract of passiflora alata leaves in Non-Obese Diabetic mice (NOD)**

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**Introduction:** Passiflora spp popularly known as passion fruit has approximately 450 species, but just Passiflora alata and Passiflora edulis have a higher commercial value in Brazil. In northeast of Brazil, passion fruit has been used as a sedative and in diabetes control by popular medicine. Recent studies report consumption of passion fruit peel with the reduction of hyperglycemia, suggesting the effect of soluble fibers in diabetes mellitus. However, there aren't information concerning the effect of leaves aqueous extracts in diabetes expression.

**Objectives:** The aim of this work is to evaluate the consumption of aqueous extract of Passiflora alata leaves in diabetes incidence in genetically predisposed mice to type 1 diabetes (Non-Obese Diabetic mice).

**Method/Design:** 34 female NOD mice aging 4 weeks of life were hosted in a SPF animal facility. The animals were divided into control group and aqueous extract group. The treated group received the sterile aqueous extract ad libitum for 24 weeks with the ingested volume daily monitored. The control group received sterile water. The aqueous extract was prepared with 1g of leaves/100 mL followed by autoclaving for 35 minutes. The quantity of leaves was determined by the Half Inhibitory Concentration (IC50) of free radicals in aqueous extract. Blood glucose levels were monitored weekly between the fourth and twenty eight week of life.

**Results:** 28% (4 /14) of animals treated with P. alata aqueous extract developed the disease in opposite to 60% (12/20) from control group.

**Conclusions:** The results suggest that the daily ingestion of aqueous extract of Passiflora alata can reduces the autoimmune diabetes in NOD mice.

**Key Words:** Passiflora Alata; Diabetes Mellitus; Nod Mice.

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**27/233.** Nutrition in the Prevention of Non-Communicable Diseases

**Changes in cellular inflammatory biomarkers related to Atherosclerosis after consumption of tomato sauces**

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**Introduction:** Epidemiological studies have suggested a negative relationship between tomato consumption and incidence of cancer and cardiovascular disease. The cardio-protective effects of tomato have been attributed to functional components, particularly lycopene, vitamin C and polyphenols, however their possible anti-inflammatory effect has not been studied.

**Objectives:** We examined the effect of acute consumption of tomato sauce with virgin olive oil (T-VOO), refined olive oil (T-ROO) and without olive oil (T-WOO) on inflammatory biomarkers related to atherosclerosis.

**Method/Design:** Open, prospective, randomised, cross-over feeding clinical trial including 10 healthy men (mean age 29.6±3.75 years; mean BMI 24.46±1.85 kg/m<sup>2</sup>). Participants were instructed to abstain from polyphenol-rich foods during 48 hours prior to the study. Blood samples were collected before and 6 hours after the three interventions: T-VOO, T-ROO and T-WOO. A fraction of peripheral blood mononuclear cells was separated by Fycoll-Hypaque gradient. Cells were marked with monoclonal antibodies (MAB) conjugated by double direct immunofluorescence technique. Adhesion molecules studied were: LFA-1, CD11b, CD40, MAC-1, Sialil-Lewis, VLA-4, CD-36 and CCR2. The MAB used to select lymphocytes and monocytes were antiCD2 and antiCD14. Determinations were performed using a FACSCalibur flow cytometer.

**Results:** After consumption of T-VOO, we observed a significant reduction in the expression of CD11b, CD49 and CD15 in monocytes and lymphocytes and CD40 and CD11a in monocytes. In lymphocytes, expression of CD40 and CD11b increased after consumption of T-WOO and CD15 after T-ROO. In monocytes, we observed a significant increase in CD36 and CCR2 after consumption of T-ROO and in CD49 after T-WOO.

**Conclusions:** Consumption of T-VOO showed a higher anti-inflammatory effect reducing the concentration of certain adhesion molecules associated with atherosclerosis than T-ROO or T-WOO, which had the opposite effect, possibly due to the better bioavailability of the functional compounds with the presence of T-VOO.

**Key Words:** Tomato sauce, atherosclerosis, inflammatory biomarkers, flow cytometry.

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### 27/236. Nutrition in the Prevention of Non-Communicable Diseases **Coffee consumption and incidence of the metabolic syndrome: the Sun Project**

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**Introduction:** The metabolic syndrome (MS) is a cardiovascular risk factor tightly associated with type 2 diabetes mellitus. Although coffee consumption has been inversely associated with diabetes, some cohort studies have found no association between coffee consumption and the risk of the MS.

**Objectives:** We aimed to address the long-term association between coffee consumption and incidence of the MS in the SUN Project, a Spanish cohort of university graduates.

**Method/Design:** The SUN Project is an ongoing, dynamic, prospective cohort. To warrant a minimum follow-up of 6 years, the 11,682 participants recruited up to March 2004 were considered for

the present analysis. Of these, 9924 were retained in the cohort for at least 6 years. After excluding participants with extreme caloric intake or with prevalent MS, the effective sample size was 8837.

Dietary information was collected with a 136-item food-frequency questionnaire. Coffee consumption was addressed as regular and decaffeinated coffee. Coffee consumption was categorized into never or seldom / <1 cup per day / 1-2 cups per day / ≥2 cups per day. Components of the MS were self-reported at baseline and in the 6- and 8- years follow-up questionnaires. The MS was defined according to the International Diabetes Federation criteria.

The association between total and regular or decaffeinated coffee and MS was assessed with non-conditional logistic regression models adjusted for potential confounders.

**Results:** We observed 634 incident cases of MS. There was no significant association between total and regular or decaffeinated coffee. Odds ratios and their 95% confidence intervals for the comparison between those consuming ≥2 cups per day versus those who never or seldom consumed coffee were 1.11 (0.82-1.50), 1.01 (0.80-1.29) and 1.18 (0.80-1.75) for total, regular and decaffeinated coffee, respectively.

**Conclusions:** In the SUN Project, coffee consumption was not associated to the long-term incidence of the metabolic syndrome.

**Key Words:** Coffee; metabolic syndrome; cohort, prospective

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### 27/238. Nutrition in the Prevention of Non-Communicable Diseases **Intake of dietary lignans and cardiovascular risk factors in Spain: the Aligned Study**

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**Introduction:** Lignans are fibre-related phenolic compounds widely distributed in the human diet. After consumption, dietary lignans undergo an extensive metabolism by the gut microflora leading to the formation of enterolactone that is absorbed from the colon and can be detected in human biological fluids. Epidemiological studies have related the presence of enterolactone in plasma or urine with reduced risk of cardiovascular disease and, in general, with a healthier lifestyle. In contrast to other regions there is no information on the lignan intake in countries of the Mediterranean area such as Spain, where the consumption of lignan-rich foods has been traditionally high.

**Objectives:** The goals of this study are to define the intake of dietary lignans in Spain, and the determinants of enterolactone levels, and their possible association with cardiovascular intermediate risk factors in Spain.

**Method/Design:** A specific food database was developed, and further used to calculate the intake using consumption data from household surveys, and epidemiological studies using food frequency questionnaires adapted to Spain. The study was completed with new data from an intervention study aiming to study the determinants of lignan intake and its relation with intermediate cardiovascular risk factors.

**Results:** The database, available at [www.alignia.org](http://www.alignia.org), includes approximately 600 foods and beverages commonly consumed in Spain. Lignan intake was estimated as ~1 mg/day although different intakes were found for children, adolescents, and adults, and across different Spanish regions.

**Conclusions:** The use of collected information on dietary habits and nutrient intake from different studies allowed a very accurate calculation of lignan intake in Spain and its relation with CVD risk factors both in healthy volunteers and individuals at risk.

**Key Words:** Dietary Lignan; Enterolactone; Intake; Cardiovascular Disease

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**27/240.** Nutrition in the Prevention of Non-Communicable Diseases  
**Do toddlers need iron-fortified toddler foods to ensure their dietary iron requirements are met?**

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**Introduction:** Adequate nutrition during toddlerhood is essential for optimal growth and development, yet biochemical data suggest that 12-24-month-old children are at risk of iron deficiency. Mathematical modelling combined with experimental interventions can provide strong evidence regarding the types of foods required to improve toddler iron status.

**Objectives:** To determine the types of foods required to ensure adequate dietary iron intakes for 12-24-month-old New Zealand children.

**Method/Design:** First, a 4-phase modelling approach based on linear and goal programming was used to identify foods required to improve toddler iron intakes. Subsequently, the efficacy of the identified foods for improving biochemical iron status in 225 healthy 12-20-month-old New Zealand children was tested in a 20-week randomised controlled trial.

**Results:** Mathematical modelling indicated that only replacement of non-fortified cow milk with an iron-fortified toddler milk ensured adequate iron intakes. If no iron-fortified foods were allowed in the models, a recommendation for  $\geq 2$  servings/day of red meat was necessary although unlikely to provide more than 56% of recommended iron intakes. The randomised controlled trial that tested these recommendations (iron-fortified toddler milk or red meat compared with control (non-fortified milk)) resulted in a serum ferritin 68% higher in the iron-fortified toddler milk group ( $P < 0.001$ ) than in the control group. Serum ferritin was 29% higher in the red meat group ( $P = 0.033$ ) compared to the control group, because the red meat group maintained its concentration (10% increase;  $P = 0.241$ ) while the control

group tended to decrease serum ferritin concentration (14% decrease;  $P = 0.063$ ).

**Conclusions:** Dietary iron recommendations are difficult to achieve using foods habitually consumed by New Zealand toddlers. An increased intake of red meat is satisfactory to maintain body iron stores. However, to achieve an increase in body iron stores during toddlerhood, as is currently recommended, it is necessary to consume iron-fortified milk in place of unmodified cow milk.

**Key Words:** iron, food-based recommendations, toddlers

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**27/245.** Nutrition in the Prevention of Non-Communicable Diseases  
**Modeling and simulation of food-borne epidemic spread**

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**Introduction:** Actually food security is very important problem in nutrition. Specially it is important even for government prevention policy against food-borne epidemic spread and terrorism activity.

**Objectives:** The paper presents a mathematical model of epidemic development of food-borne diseases. Contaminated substances of pathogens may be food or water. Model of epidemic spread is a developed model of food-borne disease epidemic process. The model is built on the basis of cellular automata model with a modification concerning territorial characteristics, random nature of many parameters and the impact of an activity of personal and financial investment on selected model elements.

This model takes into account both the size of the population in a given area as well as its distribution. The model also includes the characteristics of countermeasures and the costs of these activities. The result is a representation of the evolution of the epidemic in the area including the effect of countermeasure actions.

**Method/Design:** Many characteristics connected with the selected values of model parameters are difficult to obtain in analytical way. Therefore software event-driven simulator was developed in order to show evolution of the epidemic in a given area taking into account the countermeasures activities. In this case some mechanism of stepwise simulation were used with the possibility of countermeasures as disease activities during epidemic spread.

**Results:** Simulation experiments can give many interesting, from a practical point of view, characteristics describing development of the epidemic spread. The simulator can also be used in cases of deliberate food contamination.

**Conclusions:** Results of this work may be used by government for planning countermeasures connected with food-borne epidemic spread.

**Key Words:** food born epidemic spread, countermeasures, simulation model, computer simulator

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**27/247.** Nutrition in the Prevention of Non-Communicable Diseases  
**The role of Vitamin D in prevention of chronic diseases**

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**Introduction:** An estimated 1 billion people worldwide, across all ethnicities, age and genders groups, have a vitamin D deficiency. The United States Institute of Medicine (IOM) currently recommends vitamin D intakes of 15 µg per day for people aged 1-70 years, and 20 µg per day for those older than 70 years.

**Objectives:** The influence of vitamin D deficiency on skeletal health is well-known. Some research suggests that inadequate vitamin D intake increases significantly the risk of development of many "vitamin-D sensitive" conditions (non-skeletal health outcomes), such as: cancer; cardiovascular disease and hypertension; diabetes and metabolic syndrome (obesity); immune response and autoimmune disorders (multiple sclerosis); neuropsychological functioning (cognition, depression), and disorders of pregnancy (preeclampsia).

**Method/Design:** Vitamin D effects can be explained by its ability to bind DNA and influence gene regulation. 1,25-Dihydroxy-vitamin D binds to vitamin D receptors (nuclear transcription factors) and induces a cascade of molecular interactions that modulate the transcription of specific genes. In creating a map of vitamin D receptor binding, researchers recently identified 2276 binding sites for the vitamin D receptor along the length of the genome, many of which were concentrated near genes associated with risk for autoimmune disorders and cancer. The researchers also found that vitamin D had a significant effect on the activity of 229 genes, including those for multiple sclerosis, Crohn disease, and type 1 diabetes mellitus.

**Results:** Our study will show the level of 25(OH)D among patient with metabolic syndrome and the role of genetic polymorphism of VDR (vitamin D receptor) in the same group.

**Conclusions:** Therefore, to maximize health and reduce the risk of common diseases, it is reasonable to pay attention to the 25(OH)D concentration and VDR polymorphism.

**Key Words:** Vitamin D, Cancer, Diabetes, Cardiovascular Disease, Genes

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**27/257.** Nutrition in the Prevention of Non-Communicable Diseases  
**Body composition evaluated by different methods in Algerian students**

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**Introduction:** In Algeria, nutritional status in population is often assessed by body mass index (BMI).

**Objectives:** To Assess the body composition of young Algerians according to different methods.

**Method/Design:** Data were collected from volunteers of 217 girls and 123 boys students aged between 18 to 27 years were compared in terms of the body composition using different methods: BMI, skinfold thickness (Skinfolds) and bioelectrical impedance analysis (BIA: Tanita Impedance BC-418, 8 electrodes, 12 Ω). BMI was calculated from body weight and height.

Predicted percentage body fat by Skinfolds (Holtain Ltd, Crymch, UK) was estimated using the equations of Durnin and Womersley (1974).

**Results:** All measurements are significantly different ( $p < 0.001$ ) by sex except for age and BMI ( $p > 0.05$ ). Boys were significantly heavier ( $68.7 \pm 9.7$  kg) and taller ( $174.9 \pm 5.8$  cm).

Significant differences in the mean skinfold thickness at the biceps, triceps, suprailiac and subscapular was recorded between boys and girls.

Mean body fat mass percentages evaluated by Skinfolds and BIA were different between gender (all  $p < 0.001$ ).

Correlations between the BMI and estimated % body fat by Skinfolds and BIA were moderate ( $r = 0.69$ ;  $r = 0.77$ ;  $p > 0.05$ ) for boys but higher correlation for girls ( $r = 0.82$ ;  $r = 0.89$ ,  $p > 0.001$ ).

Simple correlation coefficients between the two methods for body fat mass percentages provided the following coefficients for Skinfolds vs BIA:  $r = 0.86$  for girls and  $r = 0.76$  for boys. Students girls, have a significant differences in the values among the two methods with the Skinfolds providing the lowest body fat mass and percentage, and BIA the highest ( $p < 0.001$ ).

**Conclusions:** These results reflect the body composition of Algerian students. However, more studies are needed to evaluate the applicability of these methods to other populations. It is important to consider the limitations of each method to assess body composition and determine reference values.

**Key Words:** Body composition; skinfold thickness; bioelectrical impedance analysis; Algeria

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**27/261. Nutrition in the Prevention of Non-Communicable Diseases**  
**The effect of glycaemic load on satiety in healthy adult males**

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**Introduction:** This study examines the feasibility of using glycaemic load as a predictor of appetite, satiety and hunger and its physiological and psychological impact. Blood glucose levels are an important determinant of food drive with low blood glucose signalling meal initiation and hunger. Low glycaemic load (GL) foods result in sustained glucose release and are thought to increase satiety. This may also improve cognitive function and enhance mood which may also determine eating behaviour.

**Objectives:** To examine if individuals consuming a low GL diet will have a sustained blood glucose response, increased feelings of satiety, improved cognitive function and lower levels of anxiety when compared to those individuals consuming a high GL diet.

**Method/Design:** In a randomised blinded cross-over trial, 24 healthy male individuals were asked to consume two diets, one low GL and one high GL for a twelve hour period on two occasions at least seven days apart. Diets were matched for macronutrient content and fibre and supplied an energy content of approximately 9000kJ/day with 15% protein, 30% fat, 55% energy and 25g fibre per day in line with the New Zealand dietary recommendations. Over the test period, participants were monitored for their blood glucose response and completed subjective ratings (VAS) of satiety. Prior to consuming each meal, participants also filled out a state-trait anxiety tests and were assessed for cognitive function using serial sevens/simple word recall. Subjects also completed a three day diet record prior to each intervention.

**Results:** The results of this study are currently being analysed and will be reported.

**Conclusions:** N/a

**Key Words:** Glycaemic Load  
Satiety

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**27/262. Nutrition in the Prevention of Non-Communicable Diseases**  
**Comparison of energy and macronutrient intake among those susceptible or resistant to obesity**

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**Introduction:** Despite living in an obesogenic environment not all individuals become overweight/obese, some remain lean with relative ease. Others report having to consume smaller amounts of food to maintain a healthy body weight. Information from the former group may allow us to develop novel strategies to benefit those who continually struggle with weight management.

**Objectives:** To examine the energy and macronutrient intake of spenders (self-defined as 'eating as much as they wish without weight gain' versus conservers (self-defined as 'eating small amounts in order to manage their weight').

**Method/Design:** Expenders (n=32) and conservers (n=25) completed a 4 day weighed food record. Nutrient composition was calculated using nutrient analysis software and New Zealand food composition data. Body composition was measured using dual-energy x-ray absorptiometry (DXA). Participants also completed the Three Factor Eating Questionnaire (3FEQ).

**Results:** Preliminary analyses indicate there are significant dietary differences between groups. When expressed relative to body weight and lean body mass (LBM) respectively, conservers reportedly consumed significantly less total energy (p<0.001, p<0.001), protein (p<0.001, p=0.033), fat (p=0.001, p=0.002), and carbohydrate (<0.001, p=0.001). This observation is in agreement with the conservers' self-reported need to consume small amounts of food to maintain a healthy body weight. Dietary restraint (p=0.001) and disinhibition (<0.001) were significantly higher among conservers. Dietary intakes in relation to physical activity and food variety will be explored.

**Conclusions:** Despite having similar LBM and a significantly higher body fat, conservers still reported consuming less total energy. The lower than predicted energy intake in conservers may be due to prolonged periods of dietary restraint followed by episodes of potentially obesogenic disinhibition. Strategies to manage energy intake by promoting intuitive eating and maintaining satiation may aid these individuals in achieving weight control.

**Key Words:** obesity resistance, obesity susceptibility, dietary intake, dietary restraint

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**27/272. Nutrition in the Prevention of Non-Communicable Diseases**  
**Nutritional risk and frailty in institutionalized older people from Pachuca, Hidalgo, Mexico**

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Pachuca. México.

**Introduction:** Nutritional risk in people over 60 years has been associated with increased morbidity and mortality. One result of malnutrition in this group is frailty.

**Objectives:** Determine the association between nutritional risk and frailty in institutionalized elderly in Pachuca, Hidalgo.

**Method/Design:** The design was cross-sectional survey. Included 48 subjects  $\geq 60$  years. We applied the MNA<sup>®</sup> screening to classify as normal ( $\geq 12$  points), possible malnutrition ( $<12$  points), and overall assessment of the MNA<sup>®</sup> they were classified in, good nutritional status ( $\geq 23.5$  points), risk of malnutrition (17-23.5 points) and malnutrition ( $<17$  points). Frailty was determined by: unintentional weight loss, feeling of general exhaustion, muscle weakness, slow walking speed, low physical activity, being frail ( $\geq 3$  criteria), prefrail (1-2 criteria) and non-frail (any criteria). The association between frailty and nutritional risk was assessed with nonparametric tests at confidence level of 95% in software SPSS, v.17.0

**Results:** The prevalence of nutritional risk screening was 83.3% and overall assessment was 14.6%; frailty 91.7%, prefrail 8.3%. The older than 84 years were the most frail. The nutritional screening nutritional risk was weakly associated with frailty, ( $r = 0.27$ ,  $p = 0.06$ ). Muscle weakness was correlated with nutritional risk screening ( $r = 0.32$ ,  $p = 0.023$ ).

**Conclusions:** There a high prevalence of frailty in elderly institutionalized keeps associated to nutritional risk.

**Key Words:** nutritional risk, frailty, elderly

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### 27/291. Nutrition in the Prevention of Non-Communicable Diseases Effect of protein intake on BMI and adiposity early in life: the EU Chop Project

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**Introduction:** Higher protein intake during the first year of life is associated with increased body mass index (BMI) in childhood. However, the relationship between protein intake and body composition is unclear.

**Objectives:** To assess whether the higher BMI associated to higher protein intakes corresponds to an increased fat mass and to explore the role of body composition on later anthropometrical development.

**Method/Design:** We studied 41 infants, randomized at birth to a higher or lower protein content formula (HP,  $n = 17$  and LP  $n = 24$ ,

respectively) and 25 breastfed infants (BF) were included for comparison. Anthropometry was assessed at birth, 6, 12 and 24 months. At the age of 6 months fat mass (FM) and fat free mass (FFM) were assessed using the doubly labelled water technique.

**Results:** BMI z-score (BMI-z) was significantly higher in HP at 6 and 12m than in LP infants ( $0.53 \pm 0.91$  vs.  $-0.31 \pm 0.86$ ,  $p < 0.01$ , and  $0.86 \pm 1.01$  vs.  $0.13 \pm 1.07$ ,  $p < 0.05$ , respectively). At 24m BMI-z tended to be higher in HP infants ( $0.75 \pm 1.01$  vs.  $0.25 \pm 0.92$ ,  $p = 0.122$ ). BMI-z of BF infants ( $-0.18 \pm 0.94$  at 6m;  $0.26 \pm 0.82$  at 12m;  $0.32 \pm 1.15$  at 24m) were similar to the LP and significantly lower than the HP ( $p < 0.05$ ) at 6 and 12m. There were no significant differences in FFM z-scores (FFM-z) between HP and LP infants ( $0.32 \pm 1.75$  vs.  $-0.31 \pm 1.17$ ) and FM z-scores (FM-z,  $0.54 \pm 2.81$  vs.  $-0.02 \pm 1.65$ ), although we observed a trend towards increased FM-z with higher protein intake. Correlations of FM-z at 6 months with BMI-z at 6, 12 and 24 months were  $r = 0.475$ ,  $p < 0.001$ ;  $r = 0.332$ ,  $p = 0.007$  and  $r = 0.247$ ,  $p = 0.051$ , respectively, while FFM-z had no association with BMI-z at any time point.

**Conclusions:** A higher protein intake early in life was positively associated with BMI and increased fat deposition, which supports the hypothesis that high early protein intake is a determinant of later obesity risk.

**Key Words:** Protein, programming, infant, obesity, doubly labelled water

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### 27/302. Nutrition in the Prevention of Non-Communicable Diseases Amino Acids and Incidence of Hypertension in a Dutch Older Population: the Rotterdam Study

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**Introduction:** Epidemiological studies have shown an association between dietary protein and hypertension, which may be attributed to specific amino acids (AAs).

**Objectives:** We examined the relation of dietary arginine, cysteine, lysine, proline and tyrosine with incident hypertension in 1958 men and women from the Rotterdam Study, aged  $\geq 55$  years, who were not treated with antihypertensive medication and were normotensive at baseline.

**Method/Design:** Hazard ratios (95%CI) were calculated in tiles of AA intake (expressed as percentage of total protein intake), using a Cox proportional model with adjustment for age, gender, BMI, smoking, alcohol intake, education, and intake of energy and several nutrients.

**Results:** Mean systolic and diastolic blood pressure levels were  $122 \pm 12$  mmHg and  $69 \pm 9$  mmHg and dietary protein intake was  $82 \pm 20$  g/day ( $\sim 17$  en%). Arginine (with nuts being the main source) contributed  $5.3 \pm 0.4\%$  of total protein intake, cysteine contributed  $1.4 \pm 0.1\%$  (main source: grain), lysine  $6.8 \pm 0.4\%$  (main source: meat), proline  $7.4 \pm 0.6\%$  (main source: dairy and grain), and tyrosine

3.7±0.1% (main source: dairy). Intake of these AAs was not significantly associated with incident hypertension (HRs ranging from 0.84 – 1.15; *ptrend*>0.15). We observed, however, a tendency towards an increased risk for lysine (HR upper tertile versus lower tertile 1.15; *ptrend*=0.21) and towards a decreased risk for tyrosine (HR 0.86; *ptrend*=0.15).

**Conclusions:** We found no significant associations between AAs, and incidence of hypertension in this older population. There was, however, a tendency towards an adverse effect of lysine and a beneficial effect of tyrosine, which warrants further investigation in larger prospective studies.

**Key Words:** hypertension, blood pressure, dietary intake, population-based study, arginine, cysteine, lysine, proline, tyrosine

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### 27/325. Nutrition in the Prevention of Non-Communicable Diseases Vitamin D supplementation and mortality in patients with end-stage renal disease

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**Introduction:** Patients with end-stage renal disease have an increased risk for mortality. One reason could be that vitamin D deficiency is common in this group of patients. It is unknown whether vitamin D supplementation can reduce mortality.

**Objectives:** We investigated in an observational prospective multi-centre study whether vitamin D supplementation was associated to mortality during follow-up in 650 patients with end-stage renal disease. Median follow up was 2.1 years.

**Method/Design:** Vitamin D supplementation, all other medication and specific treatment was assessed by personal interviews and from the patients' records at the beginning of the study and then annually during follow up. Deaths and causes of deaths were recorded from the patients' records in the dialysis centers.

**Results:** At baseline, 67% of patients received various forms of vitamin D supplements (cholecalciferol, calcitriol, analogs of vitamin D). During follow up, 194 patients died. Patients receiving any vitamin D supplement had a reduced risk of mortality (hazard ratio 0.74, 95% confidence interval 0.55-0.99). Analysis for the different forms of vitamin D showed that only patients treated with cholecalciferol had a reduced risk of mortality (HR 0.62, 95% confidence interval 0.41-0.93).

**Conclusions:** Vitamin D was associated with reduced mortality in patients with end-stage renal disease in an observational study. Randomised clinical trials that investigate the effect of vitamin D supplementation are urgently warranted.

**Key Words:** vitamin D end-stage renal disease mortality

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### 27/330. Nutrition in the Prevention of Non-Communicable Diseases Tracking and clustering of dietary factors in the prospective dietary intervention trial in childhood and adolescence

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**Introduction:** It has been emphasized that primary prevention of diet-related diseases should start early in life because of possible tracking of the eating habits until adulthood.

**Objectives:** To evaluate the effect of dietary intervention on the tracking and clustering of following dietary factors: unsaturated to saturated fat ratio (U:S -ratio), fruit and vegetable (F&V) consumption and dietary fiber intake from grain products.

**Method/Design:** In the prospective, randomised STRIP study a cohort of Finnish children (n=1062) with their families took part in a nutrition intervention focused mainly on the dietary fat quality since the child's age of 8 months. The dietary intake was measured yearly by a 4 day food record between the ages of two and eighteen years. In the present study dietary intake was evaluated in 151 intervention and 207 control children with > 50% of food records within each of the four intervals used (2-6y, 7-11y, 12-16y, 17-18y). Constantly high/low intake was analysed in two steps: first within the separate intervals (> 50% of the age points in the highest/lowest tertile and never in the opposite tertile) and then during the whole time range (high/low intake in >50% of the intervals and never the opposite). The intervention and clustering effect was analysed using Cochran-Mantel-Haenszel statistics.

**Results:** The percentages of children with constantly high or low intake were between 23.1 and 25.9%, depending on the dietary factor studied. Of the intervention and control children, 48.7% and 4.4% had constantly high U:S -ratio, and 2.6% and 43% constantly low U:S -ratio, respectively (*p*<0.001). The constantly low and high U:S-ratio clustered with respective levels of F&V consumption and fibre intake (*p*<0.001).

**Conclusions:** The intervention influenced constant dietary habits, especially improving fat quality. Further, clustering of healthy or unhealthy eating habits was observed.

**Key Words:** children, adolescents, dietary intervention, tracking, clustering

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**27/333. Nutrition in the Prevention of Non-Communicable Diseases**  
**Five-year changes in dietary indexes are associated with changes in cardiovascular risk factors**

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**Introduction:** The sensitivity of dietary indexes to measure changes in overall dietary habits is unclear.

**Objectives:** The objective of the study was to investigate whether five-year changes in the Dietary Quality Score(DQS), Healthy Eating Index(HEI), Dietary Quality Index(DQI) and the Mediterranean diet score were associated with changes in dietary related cardiovascular(CVD) risk factors.

**Method/Design:** A random sample of 13.016 men and women aged 30-60 years were invited for a five-year lifestyle intervention programme. A total of 4.562 were included in the statistical analysis. The association between changes in dietary indexes and changes in CVD risk factors was investigated in multiple linear regression models.

**Results:** Improved dietary habits according to the DQS at five-year follow-up was significant negatively associated with changes in weight(p=0.01), waist circumference(p=0.009), total cholesterol(p=0.02), LDL cholesterol(p=0.006). The Mediterranean diet score was significantly associated with weight(P=0.001) and diastolic blood pressure(p=0.02), the DQI was borderline significant associated with weight and waist circumference, whereas no significant association was found for the HEI.

**Conclusions:** Changes in the simple DQS were stronger associated with changes in CVD risk factors than the more complex dietary indexes

**Key Words:** Dietary Index, Dietary Change, Cardiovascular risk, Dietary measures

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**27/334. Nutrition in the Prevention of Non-Communicable Diseases**  
**Iron deficiency and iron deficiency anemia in children 1 to 5 years in Sofia**

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**Introduction:** Iron deficiency (ID) is widespread worldwide, affecting particularly children.

**Objectives:** To assess the prevalence of ID in children aged 1 to 5 years in Sofia and its relation to growth and health of children.

**Method/Design:** In 2007 a cross-sectional study on nutrition and nutritional status of a representative sample of 671 children under 5 years of age in Sofia was conducted. Anemia among children was assessed by hemoglobin concentration from finger-prick blood samples. In a sub-sample of 189 children aged 1 to 5 years the following indicators were investigated: evaluation of iron status (Fe, TIBC, Ferritin, sTf; complete blood count), CRP; serum levels of vitamin A, Zn, Se. Weight and height of every child were measured using standard methodology. Indices Height-for-age, Weight-for-age, Weight-for-height and Body mass index-for-age, WHO Child Growth Standards were applied for nutritional status assessment.

**Results:** The prevalence of anemia in the studied children was 5.9%. Iron deficiency prevalence in children was 20.1%: pre-latent iron deficiency was 6.35%, latent iron deficiency - 8.47% and iron deficiency anemia (IDA) - 5.29%.

Iron deficiency in children was associated with intake of vitamin&mineral supplements and with higher intake of heme iron. The prevalence of underweight and acute respiratory diseases in children with ID was twice as high versus those without ID.

**Conclusions:** Children aged 1 to 5 years in Sofia are a risk population group for ID and IDA. Reliable data on the prevalence, magnitude and negative impact of ID on the health and growth of children as a basis for an effective nutritional policy was provided.

**Key Words:** iron deficiency, children, survey

### 27/338. Nutrition in the Prevention of Non-Communicable Diseases **Changes in alcohol intake as a determinant for the cardiovascular risk two years later**

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**Introduction:** The role of alcohol in cardiovascular disease (CVD) is still debated. The benefits of a moderate alcohol intake found in observational studies may be overstated due to confounding factors. In controlled trials alcohol has been found to have favourable short-term (weeks) effect on e.g. high-density lipoprotein (HDL) levels and insulin resistance. The long-term effect of changes in alcohol intake is however unclear.

**Objectives:** The objective was in an intervention study, to investigate the effect of longterm (three years) and sustained changes in alcohol intake on the risk of CVD two years later.

**Method/Design:** A random sample of 13.016 men and women aged 30-60 years were invited for a five-year lifestyle intervention programme including repeated health examinations. A total of 6.784 participated at baseline. Alcohol intake was assessed by questionnaire at baseline, one-, three and five-years follow-up. Fasting serum lipids, HbA1c, blood pressure, weight and waist circumference were assessed at the health examinations and the absolute risk of ischemic heart disease (Copenhagen Risk Score, CRS) was estimated. Abstainers and participants that changed their alcohol intake more than three drinks per week from three- to five-years follow-up were excluded, leaving 2.507 for the analyses.

The associations between three-year changes in alcohol intake and several cardiovascular risk factors (HDL and non-HDL cholesterol, systolic and diastolic blood pressure, weight, waist circumference and HbA1c, and CRS) at five-year follow-up were explored by a series of linear regression models with the five-year follow-up values of each cardiovascular risk factor as outcome variable. The alcohol variables were tested for linear association with the response variable and interactions between alcohol intake and both sex, age and high/moderate alcohol intake were explored

**Results:** Decreased intake of alcohol intake during the first three years of intervention was significantly associated with a decreased CRS at five-year follow-up (P=0.03). In participants with an alcohol intake above the recommended level (♀:14 drinks/week; ♂:21 drinks/week) a decreased intake of alcohol was associated with increasing HDL cholesterol (P=0.04), whereas no significant association was found in participants with a lower intake. In participants aged 55 or older at baseline changes in total alcohol intake was inversely associa-

ted with the level of HbA1c at five year follow-up (P=0.001) whereas no significant association was found for younger participants.

**Conclusions:** In conclusion increased intake of alcohol over a three-year period was found to be associated with changes towards an unfavourable IHD risk profile but seems to improve the glycemic control in the oldest participants. Surprisingly, no association between change in alcohol and HDL cholesterol was found in individuals with a moderate intake, whereas HDL was inversely associated with change in alcohol intake in individuals with a high intake

**Key Words:** Alcohol; Cardiovascular risk; lifestyle intervention;

### 27/345. Nutrition in the Prevention of Non-Communicable Diseases **Quantifying the impact of fulfilling fruit and vegetables recommendations on diet cost and nutritional quality**

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**Introduction:** In France, a consumption of 400g of Fruit and vegetables (FV) is recommended.

**Objectives:** The aim was to quantify the variations in nutritional quality and diet cost induced by increasing FV consumption up to 400g/d, with or without replacement with high-fat high-sugar (HFHS) foods.

**Method/Design:** The sample of 1918 adults participating in the French INCA2 survey was split into individuals consuming less than 400g/d of FV (LFV) and individuals consuming more than 400g/d (HFV). For each observed LFV diet, 3 diets were obtained by applying 3 different individual diet models. First, the M1 models increased the FV content of each LFV diet up to 400g/d. Then, the M2a (iso-energy) and M2b (iso-weight) models reduced the content of HFHS foods to compensate respectively for the increases in energy and weight induced by M1. Overall nutritional quality was estimated by the Mean Adequacy Ratio (MAR), the LIM (score of limited nutrients) and the energy density (ED, based on solid foods only) of diets. The mean retail prices of foods in France were used to estimate diet cost.

**Results:** LFV consumers represented 49% of the sample. On average, LFV diets had a MAR of 77%, a LIM of 118%, an ED of 185kcal/100g, and they cost 7.5€/d. The M1 model induced a mean increase of 67kcal/d and 163g/d. Compared with the LFV diets, the M1, M2a and M2b models improved nutritional quality [MAR increased (81%, 81%, 80%), ED decreased (165, 163 and 154 kcal/100g), LIM decreased (115%, 115%, 113%)] and increased diet cost (7.9€/d, 7.9€/d, 7.8€/d). Yet, HFV diets had a better nutritional quality (MAR=85%, LIM=103%, ED=148 kcal/100g) and a higher cost (8.5€/d) than modeled diets.

**Conclusions:** Increasing FV intake will improve nutritional quality but will also increase diet cost, even when the FV increase is compensated for by a decrease of HFHS foods.

**Key Words:** nutritional policies, individual diet modelling, fruit and vegetables

**27/348.** Nutrition in the Prevention of Non-Communicable Diseases  
**One weekly seafood serving does not provide sufficient Vitamin D, Omega-3 and iodine**

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**Introduction:** Nutrition has a significant influence on development and progression of certain diseases, and a relationship between poor diet and mortality in elderly women is well recognized. Thus nutritional assessments are crucial in the group of postmenopausal women in which chronic illness, like osteoporosis, often appear for the first time. Seafood is regarded as important in a balanced diet and contributes with nutrients like vitamin D, marine omega-3 fatty acids (EPA and DHA) and iodine. There is emerging evidence for a role of these nutrients in bone health and/or mental health.

**Objectives:** The aim of the present study was to record the food intake among Norwegian post-menopausal women with emphasis on seafood, and record vitamin D, omega-3 and iodine status.

**Method/Design:** Inclusion criteria were healthy post-menopausal Caucasian women (50 -65 years) without osteoporotic fracture. Participants (n=123) were recruited through newspapers, and were asked to fill in two food frequency questionnaires (FFQ), one focusing especially on seafood. Serum 25 hydroxy vitamin D (25OHD), RBC fatty acids and urinary iodine excretion were determined.

**Results:** More than 90% of the participants had seafood for dinner more than once a week. However, when excluding the vitamin D contribution from supplements, only 27% of the participants had an adequate vitamin D intake. The omega-3 status was sufficient among most of the participants: 80% had an omega-3 index above 8, which is considered protective against cardiac disease, whereas only 20% had an omega-3 index between 4-8. However, the use of supplements must also be taken into consideration. 83% of the participants were vitamin D sufficient (25OH vitamin D > 50 nmol/L), whereas the median urinary iodine was 58 µg/L, which indicates mild deficiency.

**Conclusions:** One seafood serving a week does not provide enough vitamin D, omega-3, and iodine to achieve a sufficient nutritional status.

**Key Words:** seafood, postmenopausal, vitamin D, omega-3, iodine

**27/351.** Nutrition in the Prevention of Non-Communicable Diseases  
**Effects of vegetable protein diet, physical activity and anabolic steroids on urinary calcium in rats**

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**Introduction:** High protein diet can affect the kidneys and causing lithogenesis. The presence of calcium in urine is associated with higher risk of kidney stones.

**Objectives:** We aimed to analyze the effects of high protein diet, anabolic steroids and resistance training on renal stones risk.

**Method/Design:** A total of 80 adult male Wistar rats were randomly distributed in 8 experimental groups (n=10): high vegetable protein diet or normal vegetable protein diet, with or without steroids and with or without resistance training. Diets were based on commercial hydrolyzates of soybean. The exercised groups following a training protocol previously described by Aparicio et al. (2010). Once a week, nandrolone was injected to the animals from the steroids' group. Experiments lasted for three months during which monthly urinary volume was controlled and collected. Urinary calcium was determined by atomic absorption spectrophotometry.

**Results:** The highest level of calcium urinary was observed in rats fed normal vegetable protein diet with physical activity and without steroids treatment (1.67±0.37 mg Ca/day), and the lowest level was observed in rats fed normal protein diet without training and treated with steroids (0.14±0.02mg Ca/day).

Differences were observed between rats trained or not (1.67±0.37 vs. 0.59±0.10 mg Ca/day, P<0.01). Furthermore, we have found differences between rats which were injected with anabolic steroids (0.14±0.02 vs. 0.59±0.10 mg Ca/day, treated or not respectively, P<0.001). However, no differences between different protein dietetic treatment were observed on the calcium urine excretion (0.59±0.10 vs. 0.79±0.19 mg Ca/day, in normal and high protein diet respectively, P=0.374).

**Conclusions:** Anabolic steroids could have a protective effect on lithogenesis, nevertheless physical activity doesn't protect against urinary calcium losses.

**Key Words:** Soybean protein diet, calcium, urine, anabolic steroids, rats.

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**27/356. Nutrition in the Prevention of Non-Communicable Diseases**  
**Olive oil and local renal renin angiotensin system. Effect on angiotensinase activities in SHR rats.**

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**Introduction:** High fat diets are associated with development of obesity and hypertension, but the source of fat may be critical in these pathologies. In fact, virgin olive oil (VOO) has demonstrated a protective role against the onset of hypertension. The presence of a local renin-angiotensin system (RAS) in kidney, has led to the identification of new roles for angiotensins as paracrine and autocrine systems. AngII is the most active peptide of the system, but during recent years, new pathways for angiotensins metabolism and new bioactive peptides have been described.

**Objectives:** The aim of this work was to analyze the effect of a diet supplemented with VOO (20%), compared with a standard diet, on several aminopeptidase activities (AP) involved in the angiotensin metabolism in renal cortex, and the relationship with the level of blood pressure in spontaneously hypertensive rats (SHR).

**Method/Design:** Two groups of three months old SHR (n=8), were fed during 12 weeks with two different diets: standard chow (Std) and a diet supplemented with 20% VOO. Samples of renal cortex were obtained at the end of experimental period. Aminopeptidase activities were determined by fluorimetry using arilamide derivatives as substrates.

**Results:** Alanyl-, Glutamyl- and Aspartyl, AP were measured in membrane-bound fractions of renal cortex homogenates. Results indicate a significant increase for Alanyl- and Aspartyl- AP in VOO animals compared to the standard ones. No changes were observed for Glutamyl-AP

**Conclusions:** The higher levels of Aspartyl- and Alanyl- AP in VOO group could be related with an increase in the metabolism of AngI to Ang2-10 and of AngIII to AngIV. Therefore, these results could indicate an increase in AngIV levels in renal cortex. On the other hand, since this peptide has natriuretic effect, these results could explain the lower levels of blood pressure observed in the VOO diet group.

**Key Words:** High Fat Diets, Virgin Olive Oil, Blood Pressure, Angiotensins

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**27/361. Nutrition in the Prevention of Non-Communicable Diseases**  
**High fat diets and plasmatic levels of hormones involved in body weight and energy homeostasis**

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**Introduction:** High fat diets are associated normally with the development of obesity, insulin resistance and abnormalities in the regulation of food intake. The long term administration of this diet plays an important role in the development of insulin and leptin resistant. However, it seems that the type of fat is critical for these effects.

**Objectives:** The main objective of this work was to analyze the effect of high fat diets, with different fatty acid profile and polyphenols contents, on fasting levels of insulin and leptin.

**Method/Design:** Four groups of male Swiss Webster mice (n=9) were fed for 12 weeks with different diets: standard (3% fat), and supplemented (20%) with olive oil (OO), virgin olive oil (VOO) or butter (B). After experimental period, only B group researched significant higher body weight compared with standard diet. Plasmatic basal levels (8 h fasting) of insulin and leptin were determined by Luminex Assay.

**Results:** Data indicate significantly lower levels of fasting insulin in OO and VOO diet compared with standard, but not difference were found between standard and B diet. Similarly, the lower levels of plasmatic leptin corresponded to OO and VOO diets, with statistically significant differences compared to standard and B groups.

**Conclusions:** These results support a specific effect of the fat type on basal levels of hormones involved in control of food intake and energy balance. The lower levels of plasmatic basal insulin and leptin of monounsaturated diets (OO and VOO) could be related with the beneficial effects of this fat in the control of body weight and energy balance.

**Key Words:** Insulin, Leptin, Olive Oil, Food Intake, Energy Balance

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**27/364. Nutrition in the Prevention of Non-Communicable Diseases**  
**Association of total fat intake and mortality from CVD differs in regions of the EU**

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**Introduction:** Excess fat intake, regardless of its quality, is considered a risk factor for cardiovascular diseases (CVD).

**Objectives:** To explore associations between total fat intake and mortality from CVD in EU countries.

**Method/Design:** An ecological study among 20 EU countries was performed. Information on total fat intake (including data from 64,383 individuals, 43% men, 57% women) was taken from the European Nutrition and Health Report 2009. Standardized death rates (SDR) for CVD were extracted from the European Mortality Databank of the WHO and from the Eurostat databank.

**Results:** Total fat intake in men ranged from 28%E to 45%E, in women from 30%E to 47%E. SDR for diseases of the circulatory system (all causes per 100000) ranged from 157 to 717 and 96 to 472 in men and women, respectively.

Fat intake and SDR from CVD showed no significant correlation neither in men ( $rs=-.438$ ,  $p=.054$ ) nor in women ( $rs=.269$ ,  $p=.252$ ). Two groups of countries were identified, in which the association of total fat intake and CVD mortality differed: In the Central and Eastern European countries (CEE; Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania), the correlation was high and statistically significant ( $rs=.857$ ,  $p=.014$  in both men and women); those countries showed higher mortality rates. In the rest of the investigated European countries (Austria, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, United Kingdom), no significant association could be found, which means, that the mortality from CVD remains within more or less the same range, independently from total fat intake.

**Conclusions:** This study showed that total fat intake and CVD mortality were highly correlated in CEE countries, but there was no association in the other EU countries, which might be due to better health care systems as well as early detection and treatment of diagnosed CVD.

**Key Words:** Fat Intake, Cardiovascular Diseases, Europe

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### 27/376. Nutrition in the Prevention of Non-Communicable Diseases **Rye Bread Intake Increases Significantly Oxidation Resistance Of LDL**

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**Introduction:** Elevated LDL cholesterol concentration is a well-established risk factor for cardiovascular disease. However, it is the oxidized LDL -not the native LDL- that is responsible for the macrophage-induced foam cell formation and thus initiation of atherosclerosis. Therefore the prevention of oxidation of LDL is an important target in dietary and drug trials. Whole grain cereals are associated with decreased risk for cardiovascular disease, and particularly whole grain rye is a rich source of vitamin E and phytochemicals like lignans and alkylresorcinols, which may contribute to the observed health-effects.

**Objectives:** Our aim was to study the separate effect of rye bread intake (null versus high intake) on the oxidation resistance of LDL particles while otherwise habitual diet is consumed.

**Method/Design:** Sixty-eight healthy subjects volunteered for this dietary intervention study, during which the intake of rye bread

was at baseline 0 g/d (one week), and thereafter increased stepwise (99 g/d for two weeks) to the final dose of 198 g/d (two weeks). Stepwise increase of rye bread was used to avoid stomach discomfort typical for suddenly introduced high doses of rye. 3-day dietary records were employed to estimate the intake of nutrients. The resistance of LDL particles towards Cu<sup>2+</sup>-induced oxidation was determined *ex vivo* as the lag phase prior to the lipid peroxidation, monitored with spectrophotometer at 234 nm.

**Results:** A significant ( $p<0.001$ ) prolongation of the lag phase was observed from baseline to the end of the study, females responding slightly better than males. It is not yet known which phytochemicals in rye contribute to the antioxidant effect observed in this study and therefore further studies are currently carried out.

**Conclusions:** Rye bread intake causes significant increase in the oxidation resistance of LDL particles, which might be beneficial in the prevention of cardiovascular disease.

**Key words,** rye, phytochemicals, ldl cholesterol, oxidation resistance, cardiovascular disease

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### 27/378. Nutrition in the Prevention of Non-Communicable Diseases **Taioba (xanthosoma sagittifolium): effects on the lipid and glycemic profiles of healthy rats**

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**Introduction:** Taioba is an underexploited Aracea plant of easy cultivation in tropical America of little known nutritive value. Although the underground tubers are readily consumed by locals, the leaf has been neglected by micronutrient deficient populations.

**Objectives:** To investigate the potential hypocholesterolemic and hypoglycemic effects of the Taioba leaf in normal rats, in comparison with inulin.

**Method/Design:** 45 Young male Wistar rats were divided into five groups (1 - Standard AIN 93-G, 2 - Standard modified by substituting the 2.5% of the cellulose with 2.5% inulin, 3 - Standard modified by substituting the 5% cellulose for 2.5% cellulose + 2.5 Taioba flour (TF), 4 -Standard modified by adding 2.5% inulin, and 5 - Standard modified by adding 2.5% TF). Triacylglycerol and total cholesterol serum concentration were determined by enzymatic colorimetric method, the LDL-cholesterol was estimated by the Friedewald formula and the rate of glucose utilization was determined by glucose tolerance test (GTT).

**Results:** Mean weight gains and diet consumption of the animals was similar for all groups. No significant differences were detected for total serum cholesterol ( $p=0.52$ ), LDL-cholesterol and triacylglycerols ( $p=0.48$ ) comparing group 1 with the groups that received inulin and TF. Fecal mass outputs were greater in both groups consuming TF ( $p\leq 0.01$ ). Mean glycaemic levels were slightly lower in groups 2 and 3 than in groups 1, 4 and 5, but without being significant ( $p=0.68$ ). The groups receiving inulin, followed by those consuming

TF, showed greater ability to clear the glucose load as indicated by reduced plasma glucose level at all time points measured, in comparison to group 1.

**Conclusions:** While neither inulin nor the TF differed significantly from cellulose in their capacity to alter either the lipid or glycaemic status of normolipidemic Wistar rats, TF produced a higher faecal output than cellulose or inulin, without altering food intake.

**Key Words:** Taioba (*Xanthosoma Sagittifolium*); Rats; Fiber; Cholesterolemia; Glycemia.

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### 27/381. Nutrition in the Prevention of Non-Communicable Diseases **Dietary Iodine intake and Iodine status of lactating women in the Saharawi refugee camps**

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**Introduction:** People living in long-term refugee camps in the Algerian desert are exposed to high iodine intakes from water and animal milk. At the same time enlarged thyroid volume has been shown in 22% of the women and in 56% the children.

**Objectives:** The aim was to investigate the iodine intake of lactating women, the urinary iodine concentration (UIC) and breast milk iodine concentration (BMIC).

**Method/Design:** In 2010 a study was conducted to explore 110 women's iodine intake by 24h recalls of iodine rich food. To assess the iodine intake, samples of public water (n=24), camel milk (n=34) and goat milk (n=13) as well as casual urine samples (n=110) and breast milk samples (n=110) were collected. Iodine concentration in water and urine samples was determined by Sandell-Kolthoff reaction, whereas milk samples were determined by Inductively Coupled Plasma-Mass Spectrometry (ICP-MS).

**Results:** Median iodine concentrations of camel milk, goat milk and drinking water were 2020 µg/L, 952 µg/L and 102 µg/L, respectively. Estimated dietary iodine intake was 409 µg/day and correlated with BMIC (rs=0.47, p< 0.001) and UIC (rs=0.25, p=0.009). The correlation between BMIC and UIC was significant (rs= 0.20, p=0.039). The water intake was the major iodine source contributing with 72% of the iodine intake.

**Conclusions:** The median BMIC was higher than the median UIC which indicate that dietary iodine influence BMIC at a larger degree than UIC. There are no upper levels of UIC or iodine intake for lactating women. Taking the daily recommendations of iodine intake for lactating women (250 µg/day) and children 0-59 months (90 µg/day) into account, the women's UIC and BMIC indicate a very high iodine exposure both for the women and the children.

**Key Words:** iodine, urine, breast milk.

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### 27/384. Nutrition in the Prevention of Non-Communicable Diseases **Iodine status and thyroid function among lactating women in the Saharawi refugee camps, Tindouf, Algeria**

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**Introduction:** Insufficient iodine intake as well as excess iodine intake may cause thyroid diseases. Endemic goitre and high urinary iodine concentration (UIC) probably caused by iodine excess has been demonstrated among Saharawi refugees. To what extent long-term excess iodine intake have influenced the thyroid function of the refugees is unknown.

**Objectives:** The main objective was to assess iodine status and thyroid function among lactating women in the Saharawi refugee camps.

**Method/Design:** A baseline survey for a cohort study was performed among 111 lactating Saharawi women (18-50 years) living in the Algerian desert. Samples of breast milk, public drinking water, milk and casual urine samples were collected for determination of iodine concentrations. Dietary iodine intake was registered using 24-h recall with weighed amounts. Thyroid function was assessed through serum levels of thyroid-stimulating hormone (TSH), thyroglobulin (Tg), tyroxine (T4), antithyroid peroxidase antibody (TPOAb) and anti-thyroglobulin (TgAb). In selected samples triiodothyronine (T3) and anti-TSH receptor antibody (TRAb) were determined.

**Results:** Median UIC was 350 µg/L and median iodine concentration in breast milk was 479 µg/L. Median iodine concentration in drinking water, goat- and camel milk was 102, 952 and 2020 µg/L, respectively. The median dietary intake of iodine among the women was 407 µg/day. Thyroid function abnormalities were found in 23% of the women: 12% had subclinical hypothyroidism, 5% subclinical hyperthyroidism, 5% autoimmune thyroiditis, 4% hypothyroidism and 1% autoimmune hyperthyroidism. Further, 16% of the women had elevated serum Tg levels, which might indicate hyperfunction of the thyroid gland.

**Conclusions:** The lactating women had high levels of iodine in breast milk, probably caused by excessive iodine intake through water and milk. Median UIC indicated excessive iodine intake. The high prevalence of thyroid abnormalities indicates that the excess iodine intake might have influenced the thyroid function negatively.

**Key Words:** Iodine excess, thyroid function, Saharawi refugees, lactating women, urinary iodine



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**27/413. Nutrition in the Prevention of Non-Communicable Diseases**  
**Pomegranate seed oil improved lipid profile more effective than CLA in laboratory rats**

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**Introduction:** CLA is the general term referring to a group of positional and geometric isomers of linoleic acid (LA, cis-9,cis-12 C18:2n-6). Recently, not only for CLA but also for conjugated linolenic acid (CLnA) several unique biological effects have been found. CLnA is one of the highly unsaturated forms of conjugated fatty acids with triple bonds that occurs in multiple positional and geometric isomers (cis and trans) of linolenic acid (LnA, cis-9,cis-12,cis-15 C18:3n-3). CLnA has been found abundantly in some seed oils, such as Pomegranate seed oil (cis-9,trans-11,cis-13; C18:3).

**Objectives:** The objective of this study was to evaluate the effect of Pomegranate seed oil as a source of CLnA compared to CLA (cis-9,trans-11) on body weight and serum lipid profile in rats.

**Method/Design:** Twenty four Wistar rats were randomly assigned to four experimental groups and fed for the next four weeks. The experimental diets were: I – Control (AIN-93G), II – Flaxseed oil (as a source of LnA), III – Pomegranate seed oil (as a source of CLnA) and IV – CLA (cis-9,trans-11). Experimental diets were supplied with seed oils equivalent to an amount of 1% of studied fatty acids. Plasma samples were analyzed using kits for total cholesterol (TC), triacylglycerols (TAG) and HDL cholesterol. LDL+VLDL cholesterol level was calculated.

**Results:** The experimental treatments had no effect on body weight. No differences on plasma TC in experimental groups were observed. At the same time, the LDL+VLDL cholesterol and TAG were significantly decreased in animals fed Flaxseed oil, Pomegranate seed oil and CLA compared to Control (LDL+VLDL: 0.4, 0.4, 0.5, respectively vs 0.9mmol/L; TAG: 1.6, 1.8, 2.2, respectively vs 3.0mmol/L). Additionally, Flaxseed oil significantly increased HDL cholesterol level compared to Control group (1.7 vs 1.1mmol/L).

**Conclusions:** In conclusion, Pomegranate seed oil improved the lipid profile more effectively than CLA in laboratory rats.

**Key Words,** Pomegranate Seed Oil, Conjugated Linolenic Acid, Conjugated Linoleic Acid, Rats, Lipid Profile

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**27/417. Nutrition in the Prevention of Non-Communicable Diseases**  
**A high-fat isocaloric pair-feeding induces changes in lipid metabolism without changes in body weight**

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**Introduction:** Dietetic obesity is caused by a prolonged imbalance between caloric intake/energy waste which causes an increase

in fat mass. The intake of hypercaloric high-fat diets is one of the main causes of obesity.

**Objectives:** To assess the effect of feeding with a high-fat diet in isocaloric amounts to a control, standard diet on metabolic and biometric parameters.

**Method/Design:** Male Wistar rats were pair-fed (isocaloric feeding) for 4 months with a normal-fat (NF) and a high-fat (HF) diet –10% and 60 % calories from fat, respectively–. Body weight and composition and food intake were periodically registered. Morphological analysis was performed in different adipose depots. Circulating glucose was measured with a glucometer and insulin, leptin and NEFA levels by enzymatic colorimetric kits. Liver lipid content was measured by Folch's method. mRNA expression of key genes in lipid metabolism was measured in liver by Q-PCR.

**Results:** There were no differences in body weight and daily caloric intake between animals fed NF or HF diets. However, HF-fed animals showed higher fat mass content and adiposity index, lower lean mass, higher liver lipid content, higher size of visceral adipose depots and higher area in subcutaneous adipocytes. HF-diet resulted in increased circulating glucose, insulin and HOMA index; a tendency to higher serum NEFA levels was also observed. In liver of the HF-fed rats, a decrease was observed in expression of key genes involved in lipogenesis, fatty acid synthase (Fasn), acetyl-CoA carboxylase-1 (Acc1) and sterol regulatory element-binding protein-1 (Srebp1), while an increase was found for the lipolytic gene carnitine palmitoyl-transferase 1a (Cpt1a).

**Conclusions:** Disorders related to metabolic syndrome can be developed by the intake of a high-fat diet without overweight/obesity due to a high caloric intake. Thus, macronutrient composition, and not only the caloric amount of the diet, plays a crucial role in the appearance of metabolic patterns characteristic of obesity.

**Key Words:** High-fat diet, lipid metabolism, fat mass, pair-feeding.

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**27/418. Nutrition in the Prevention of Non-Communicable Diseases**  
**Defining impaired metabolic flexibility using a high-fat challenge test**

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**Introduction:** Effects of dietary interventions in healthy subjects are generally subtle and difficult to assess using established biomarkers of disease risk. The ability to adapt to external challenges has recently been hypothesized to provide a more adequate measure of health. Our goal is to develop a nutrigenomics-based macronutrient challenge test system which can be used to investigate the effect of dietary interventions on "metabolic flexibility". In this study we aim to assess whether response to an acute high-fat challenge can be used to distinguish apparently healthy individuals with aspects of metabolic syndrome from healthy individuals. Furthermore, we aim to induce temporarily diminished flexibility in healthy subjects by overfeeding

them with a high-fat high-caloric (HFHC) diet.

**Objectives:** 1) To quantify metabolic and inflammatory processes in response to a high-fat challenge test; 2) to compare these responses in apparently healthy subjects before and after HFHC diet and between subjects with characteristics of the metabolic syndrome and apparently healthy subjects.

**Method/Design:** Ten healthy males will receive a HFHC diet for four weeks, consisting of a metabolic overload (~1250 kcal/day). Ten males with characteristics of metabolic syndrome will not receive the HFHC diet. Response to the high-fat challenge will be measured in blood samples taken at 6 time points and by indirect calorimetry.

**Results:** The responses to the challenge were quantified by analysis of a broad range of plasma metabolites, plasma proteins and genes in blood cells, in order to assess to which extent the processes fatty acid oxidation, insulin sensitivity / lipid metabolism, adipose tissue inflammation, vascular function and gut permeability are relevant for investigating and quantifying (differences in) metabolic flexibility.

**Conclusions:** This study identified relevant processes to study in a high-fat challenge, thereby improving the challenge test system to investigate the effect of dietary interventions on metabolic flexibility as a marker of health.

**Key Words:** metabolic flexibility, challenge test, high-fat, nutrigenomics, health

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#### 27/420. Nutrition in the Prevention of Non-Communicable Diseases **Normal weight adiposity and cardiovascular risk factors in a Swedish population**

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**Introduction:** Body mass index (BMI) is a commonly used indicator of excess body fat because it is a simple and cheap measurement. However, BMI provides only a surrogate of body fat, and individuals with excess body fat might be misclassified regarding risk for obesity related diseases.

**Objectives:** The aim was to examine how well BMI reflect cardiovascular risk associated with excess adiposity in a Swedish population by examining the association between body fat, BMI and cardiovascular risk factors.

**Method/Design:** The subjects (n=3016) consist of women and men, aged 25-74, living in Western Sweden, participating in the randomly selected INTERGENE study cohort. Medical examination included measurement of weight and height, and body composition by bioelectrical impedance. Normal weight adiposity was defined as the combination of BMI<25 and percentage body fat  $\geq$  35 for women and  $\geq$  25 for men. Associations with blood pressure, blood lipids and apolipoproteins were analysed in general linear models adjusted for age.

**Results:** All individuals in the obese (BMI $\geq$ 30) group were correctly classified to adiposity while a wide range of body fat was observed among the normal weight subjects. In total, 9% of the participants were categorised as normal weight with adiposity. The normal weight participants with adiposity had in comparison with the normal weight lean group higher levels of LDL, ApoB and ApoB/ApoAI ratio. In normal weight men adiposity was also associated with higher blood pressure and lower HDL, and among normal weight women with higher serum triglycerides. Furthermore, percentage of body fat was associated with blood pressure, blood lipids and apolipoproteins in the subgroup with BMI<25 when adjusting for BMI.

**Conclusions:** Higher percentage of body fat was associated with less favourable risk factor profile even in those without overweight, especially in men. Thus, BMI does not fully mirror the cardiovascular risk associated with excess adiposity.

**Key Words:** Body fat, Body mass index, Obesity, Adiposity, Cardiovascular risk factors

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#### 27/424. Nutrition in the Prevention of Non-Communicable Diseases **Pharmacokinetics of flavonoids from cranberry juice cocktail in humans**

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**Introduction:** Data on the pharmacokinetics of cranberry bioactives are required to better understand their impact on pertinent disease risk factors and inform the design of relevant clinical trials.

**Objectives:** Characterize the pharmacokinetic profiles of bioactives from cranberry juice cocktail (CJC).

**Method/Design:** A single-dose pharmacokinetic study of the bioavailability of flavonoids and phenolic acids from CJC was undertaken in 10 healthy adults, age 50-70 y with BMI=18.5-29.9. After a 2-d run-in period following a low polyphenol diet, fasted subjects consumed 237 mL low-calorie CJC (54% juice).

**Results:** In plasma, there were marked variations in maximal concentration (C<sub>max</sub>) and time to reach C<sub>max</sub> (T<sub>max</sub>) of cranberry bioactives which included: sinapic acid with 18.6 ng/mL at 30 min, homovanillic acid with 54.1 ng/mL at 6 h, protocatechuic acid with 1.3  $\mu$ g/mL at 10 h, myricetin with 18.3 ng/mL at 2 h, quercetin with 0.4  $\mu$ g/mL at 8 h, and kaempferol with 18.4 ng/mL at 2 h. Proanthocyanidin (PAC) A2 dimers were detected in plasma only after samples were pooled, although the concentration was below the limit of quantification. In urine, 13 phenolic acids, 2 flavanols, 3 flavonols, 6 anthocyanins, and 7 anthocyanin glucuronides were quantified. The C<sub>max</sub> and T<sub>max</sub> among the cranberry cyanidin and peonidin glycosides in urine were 0.2-0.9 ng/mg creatinine at 2.2-3.4 h. The C<sub>max</sub> and T<sub>max</sub> of 4 cyanidin glucuronides and 3 peonidin glucuronides were 0.9-41.1 ng/mg creatinine at 3.0-5.1 h. The variations in C<sub>max</sub> and T<sub>max</sub> for phenolic acids and other flavonoids were more pronounced with concentrations of 0.1-21.1  $\mu$ g/mg creatinine at 3.8-18.8 h. The C<sub>max</sub> and T<sub>max</sub> of PAC A2 dimers were 24.4 ng/mg creatinine at 11.0 h.

**Conclusions:** These data suggest that different phenolic constituents, including PAC A2 dimers, in CJC are absorbed and metabolized at different locations in the gastrointestinal tract in healthy older adults.

**Key Words:** Cranberry, Flavonoids, Pharmacokinetics, Humans

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**27/426.** Nutrition in the Prevention of Non-Communicable Diseases  
**Anti-inflammatory properties of short-chain fatty acids**

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**Introduction:** High-fiber diets are associated with decreased plasma inflammatory markers. Fermentation-derived short-chain fatty acids (SCFAs), e.g. propionic acid (PA), may be responsible.

**Objectives:** Since obesity is linked to chronic low-grade inflammation of adipose tissue we hypothesize that SCFAs may improve the inflammatory profile in obese subjects.

**Method/Design:** Human adipose tissue explants were incubated with 3 or 10 mM PA. Gene expression of metabolic genes was determined by real-time PCR; cytokines and chemokines were determined by multiplex-ELISA. Similar experiments were performed in THP-1 monocytic cells, differentiated to macrophages and stimulated with LPS in the presence or absence of 10 mM propionate. A HEK293 RE luciferase NF- $\kappa$ B reporter cell line was used to determine effects of SCFA on NF- $\kappa$ B transcription factor involved in cytokine production.

**Results:** Incubation of omental adipose tissue with 10 mM PA significantly reduced secretion of inflammatory proteins like TNF- $\alpha$  and RANTES, whereas expression of the metabolic genes LPL and GLUT4 was increased. Similar results were observed in THP-1 macrophages. In the NF- $\kappa$ B reporter cell line we observed a dose-dependent inhibition of NF- $\kappa$ B, by SCFA with IC<sub>50</sub> of 78.3  $\mu$ M, 370.3  $\mu$ M and 3337.8  $\mu$ M for butyrate, propionate and acetate, respectively.

**Conclusions:** PA appears to directly reduce inflammation in adipose tissue and to increase the expression of metabolic genes involved in lipogenesis and glucose uptake. This is at least partly caused by the effect on macrophages results indicate that the transcription factor NF- $\kappa$ B is involved. Thus our data suggest that PA may reduce inflammation and improve insulin sensitivity in adipose tissue of obese subjects.

**Key Words:** Dietary fiber, Short-chain fatty acids, Propionic acid, Adipose tissue, Inflammation.

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**27/428.** Nutrition in the Prevention of Non-Communicable Diseases  
**Prevalence of overweight and obesity in children aged 4 and 7 years**

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**Introduction:** The prevalence of overweight and obesity in children has increased over several decades. Children obesity, as well as adult obesity, is connected to certain number of cardiovascular risk factors including insulin resistance, dyslipidemia, and increased blood pressure. Permanent monitoring of the nutritional status in children is very important for early detection risk factors in children in order to take preventive activity to optimize nutrition status.

**Objectives:** To estimate the prevalence of overweight and obesity in children of 4 and 7 years.

**Method/Design:** This investigation comprised 406 children, 215 children of 4 years age, and 191 of 7 years. Anthropometric measurement included: body height, body weight, and calculation of body mass index (BMI). Overweight and obesity were defined according to the 2000 Centers for Disease Control and Prevention growth charts.

**Results:** In both age groups, according to BMI distribution, about 1/4 of children are overweight or obese (26.4% of 4-years and 25.1% of 7-years). In younger group, there were more overweight and obese boys than girls (24.5% vs. 18.1%), but in older group, prevalence of overweight and obese girls was higher (30.7% vs. 20.4%). We found statistically significant difference between prevalence of overweight and obesity in girls of different age (18.1% in 4-years group vs. 30.7% in 7-years group;  $p=0.04$ ), but not in boys.

**Conclusions:** According to our results, the gender played the important role in nutritional status in preschool-aged children. There is a high prevalence of overweight and obese individuals among preschool children. Data provided by this study suggests the urgent need to design preventive interventions in that vulnerable population.

**Key Words:** Children, Overweight, Obesity,

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**27/430.** Nutrition in the Prevention of Non-Communicable Diseases  
**Swedish television food advertising to children is dominated by sugary foods and alcohol**

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**Introduction:** An association between television viewing and child obesity has been demonstrated. Also, it has been shown that

food marketing influences children's food preferences, purchase requests and consumption. The present material was recorded as part of a comparative international study on food commercials to children across 11 countries.

**Objectives:** The aim of the present study is to offer an extended analysis of the amount and content of Swedish television food advertising to children.

**Method/Design:** The three most popular commercial TV channels with children 3-12 years, TV3, TV4 and Channel 5, were recorded for two weekdays and two weekend days during children's peak viewing times (n=66 h). The recordings were scanned and advertisements coded according to predefined criteria. Food advertisements were classified as either core (nutrient dense), non-core or miscellaneous, and further sub-divided into 28 individual food categories.

**Results:** A total of 2409 advertisements were identified and food was the most frequently advertised product with 6 ads per hour per channel (18%). The majority of food ads (84%) were broadcast within programs (e.g. drama, comedy, talk shows and entertainment) and the proportion of non-core, core and miscellaneous foods was 67%, 23% and 10% respectively. Remarkably, the four most frequently advertised food groups were fast food (15%), alcohol (14%), confectionary (11%) and sugary drinks (10%).

**Conclusions:** According to television ratings, children aged 3-12 years on average view television 100 minutes a day, of which 66 minutes are dedicated to commercial channels. Thus, they are exposed to about 50 food ads weekly. Although Sweden is seen as a progressive country due to legislation that limits television advertising to children, still a lot of food advertising reaches children. Since the majority of food commercials when many children view television are for unhealthy foods, television food marketing ought to receive attention and restrictive measures should be discussed.

**Key Words:** Food promotion, commercials, TV, children, fast food

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**27/431. Nutrition in the Prevention of Non-Communicable Diseases**  
**Assessment of nutritional status and consumption of savoury snack and sandwich cookie by Brazilian students**

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**Introduction:** The prevalence of children overweight has grown at an alarming rate. From an early age the child is exposed to food stimuli, such as taste, smell and vision, all fundamental in choosing food.

**Objectives:** To assess the nutritional status of schoolchildren and associate it to gender, school and determine the frequency of consumption of savoury snack and sandwich cookie.

**Method/Design:** Cross-sectional study with children aged 6 to 10 years enrolled in a private school in the city of Taubaté (Brazil). Anthropometric data was collected, the BMI was calculated and

nutritional status was assessed according to criteria of World Health Organization. The data of frequency of consumption of savoury snack and sandwich cookie was collected. To examine the association between nutritional status and gender and school grade, it was performed the chi-square test, with significance level  $p < 0.05$ .

**Results:** The study included 152 children, 78 boys and 74 girls. Most of the population (55.9%) presented eutrophic. It was identified 43.4% of participants with some degree of overweight. There were significant differences in the prevalence of overweight in relation to gender ( $p = 0.008$ ), whereas among boys, 27.6% were overweight and 12.8% among girls. It was observed a greater percentage of overweight students in the second (15.2%) and third grade (11.8%). It was found that the highest prevalence of consumption of sandwich cookie is 1 to 3 times per week (35.5%). For savoury snacks, 57.9% consumed 1-3 times per month and 20.4% 1-3 times per week. Most children presented eutrophic.

**Conclusions:** It was found a large percentage of overweight, especially among boys and students from the 2nd and 3rd grade. The consumption of savoury snacks is more frequent 1-3 times per month, and the sandwich cookies 1 to 3 times per week.

**Key Words:** student, nutritional status, savoury snacks, sandwich cookies

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**27/438. Nutrition in the Prevention of Non-Communicable Diseases**  
**Variety in fruit and vegetable consumption and 10-year incidence of coronary heart disease and stroke**

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**Introduction:** Varied fruit and vegetable consumption provides an intake of a wide spectrum of micronutrients and bioactive compounds. It is unknown whether more variety in fruit and vegetable consumption contributes to the beneficial association of fruit and vegetables with CHD and stroke.

**Objectives:** We examined the associations between variety in fruit and vegetable consumption with 10-year incident CHD and stroke in a population-based follow-up study in the Netherlands.

**Method/Design:** Prospective population-based cohort study of 20,069 men and women aged 20 to 65 years who were free of cardiovascular diseases at baseline. Participants completed a validated 178-item food frequency questionnaire. Variety was defined as the sum of the number of different fruit and vegetables consumed at least once per 2 weeks over the previous year. Hazard ratios (HRs) between variety and incident CHD and stroke were calculated using multivariable Cox proportional hazards models adjusting for age,

gender, lifestyle, dietary factors and quantity of fruit and vegetable consumption.

**Results:** Greater variety in fruit and vegetables was highly correlated with quantity ( $r = 0.81$ ). More variety was not associated with intake of energy and positively with nutrients, and particularly vitamin C ( $r = 0.72$ ). During 10 years of follow-up, we documented 245 cases of CHD and 233 cases of stroke. Variety in fruit and vegetables was not associated with incident CHD. With regard to incident stroke, greater variety in vegetables was borderline significantly inversely associated (HR per 2 items: 0.93; 95% CI: 0.83-1.04), and fruit was not associated (HR per 2 items: 1.05; 95% CI: 0.94-1.17).

**Conclusions:** More variety in fruit and vegetable consumption was accompanied by higher intakes of fruit and vegetables and micro-nutrients. Independently of quantity, no clear associations were found between variety in fruit and vegetable consumption and incident CHD or stroke.

**Key Words:** Fruit, vegetables, variety, coronary heart disease, stroke

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#### 27/444. Nutrition in the Prevention of Non-Communicable Diseases **Nutrient rich foods and all-cause mortality: the Rotterdam Study**

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**Introduction:** Food quality indexes, for example the Nutrient Rich Foods (NRF) index, measure the nutrient quality of individual foods and may also be used to rank foods based on their nutrient composition. It is not yet known whether dietary patterns derived with the NRF index are associated with survival.

**Objectives:** To examine the association between NRF based dietary patterns and all-cause mortality risk.

**Method/Design:** We studied a sample of 2044 men and 2925 women, aged  $\geq 55$  years, participating in a community-based prospective cohort study in Rotterdam, the Netherlands. Data on dietary intake were collected using a semi-quantitative food frequency questionnaire. The NRF9.3 algorithms were used to derive dietary patterns. Subjects were divided into quartiles of the NRF9.3 index score as well as the Nutrient Rich (NR)9 and the Limited Nutrient (LIMt)3 score.

**Results:** During follow-up, 2157 subjects died (1047 men and 1110 women). After adjustment for age, total energy intake, medically prescribed diet, body mass index, smoking history, alcohol consumption, and education level, a high NRF9.3 index score was inversely associated with all-cause mortality risk among women [Hazard Ratio (HR) Q4 versus Q1: 0.78 (95% confidence interval: 0.65 to 0.94); p-value for trend: 0.02]. Furthermore, both the NR9 [HR Q4 versus Q1: 0.74 (95% CI: 0.62 to 0.89); p-value for trend: 0.007] and the LIMt3 score [HR Q4 versus Q1: 1.17 (95% CI: 0.98 to 1.14); p-value

for trend: 0.04] were significantly associated with mortality risk. For men, no significant association between the NRF9.3 index score and mortality was found after adjustment for potential confounders [HR Q4 versus Q1: 0.91 (95% CI: 0.76 to 1.10); p-value for trend: 0.44].

**Conclusions:** Women in the highest quartile of the NRF9.3 index score had a lower risk of all-cause mortality relative to women in the lowest quartile.

**Key Words:** Nutrient Density, Mortality, Prospective Cohort Study

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#### 27/449. Nutrition in the Prevention of Non-Communicable Diseases **Bone mineral density in children with asymptomatic idiopathic hypercalciuria**

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**Introduction:** a lower bone mineral density (BMD) in childhood is related with a higher risk of osteoporosis or fractures in adult age. BMD can be modulated by many factors, such as calcium intake and calcium urinary excretion. Epidemiological studies have shown that up to 30% of children with kidney disease symptoms and hypercalciuria present osteopenia. It is unknown whether children with high calcium excretion, without any other urinary tract failure symptoms have the same risk.

**Objectives:** to determine the prevalence of idiopathic hypercalciuria (IH) in healthy children at 7 years of age and to assess the possible influence of IH on BMD.

**Method/Design:** within the European longitudinal study Childhood Obesity Project (QLK1-2001-00389) an observational analysis was conducted in the Spanish sample at 7 years ( $n = 200$ ). Calcium intake was assessed using a food frequency questionnaire; IH was diagnosed if the ratio calcium/creatinine from two different urine samples was  $\geq 0.56$  (mmolCa•mmolCr-1); BMD was assessed by dual X-ray energy level densitometry.

**Results:** One hundred fifty-six children were studied. The prevalence of IH in the study population was 13.5% (11 males/10 females). Total BMD z-score showed significant differences between children diagnosed of IH ( $-0.13 \pm 0.75$ ) and the rest ( $0.39 \pm 0.78$ ) ( $p < 0.05$ ). Calcium intake did not correlate with BMD.

**Conclusions:** the prevalence of idiopathic hypercalciuria in healthy children in our area is 13.5%. IH in asymptomatic children may affect bone health.

**Key Words:** Idiopathic hypercalciuria, childhood, osteopenia, bone mineral density

### Formulation of improved leafy vegetable sauces to combat micronutrient deficiencies

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**Introduction:** In the food diet of young children in sub-Saharan Africa, cereal-based foods are eaten daily, along with a wide variety of sauces. Due to the low mineral and high chelating factor contents of cereals, a strategy to increase the coverage of micronutrient needs would be to rely on the composition of sauces. This study was carried out in the framework of the European project INSTAPA.

**Objectives:** to formulate leafy vegetable (LV)-sauces rich in iron, zinc and vitamin A contents with maximum bioavailability in order to improve the coverage of these micronutrient needs.

**Method/Design:** Main traditional sauces of Burkina Faso and ingredients used for their preparation (13 spices or condiments and 18 LF) were analyzed for iron, zinc and phytate. Data on Retinol Activity Equivalent (RAE) were taken from food composition tables. With these data, an excel sheet was developed for the formulation of optimized sauces with maximum iron, zinc and RAE contents and minimum phytate contents. Iron and zinc bioavailability was assessed by measurements of in vitro dialysability.

**Results:** The most interesting sauces were those prepared from amaranth, roselle or jute leaves, and were selected for optimization. Changes in the formulations were limited due to sensory constraints, but allowed a substantial increase in iron and RAE contents, from the ranges [1.7-3.1] and [0.04-0.10] mg/100gDM to [2.9-5.0] and [0.11-0.12] mg/100gDM in traditional and improved sauces respectively. Phytate contents were approximately divided by two in improved sauces. However, zinc content remained low in improved sauces ([0.5-0.8] vs [0.4-0.6] mg/100gDM in traditional ones). The mineral dialysability in jute leaf sauce was particularly low and led us to give it up.

**Conclusions:** Two enriched LV-sauces based on amaranth and roselle leaves were designed. The efficacy of their regular consumption by young children on the improvement of their micronutrient status should now be checked.

**Key Words:** Iron, zinc, vitamin A, bioavailability, phytate

### Effect of eugenol treatment on renal parameters after renal ischemia and reperfusion in mice

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**Introduction:** The ischemia (I) is related to the interruption of blood supply in oxygen and nutrients during a determined period of time. In the ischemic injury after renal reperfusion (R) the blood flow is restored in the ischemic tissue, and an increased uremia is observed. Eugenol (EUG) is the main constituent from clove essential oil (*Eugenia caryophyllata* Thunb). It has been demonstrated many biological activities for EUG, such as: immunostimulant, anti-inflammatory and antinociceptive.

**Objectives:** The effect of EUG treatment on the renal function was evaluated in experimental models of renal ischemia and reperfusion.

**Method/Design:** The experimental protocol was approved by the ethical commission of ethics in animal research. Male Swiss mice (20 to 28g) were anaesthetized with ketamine (100mg/Kg; i.p.) and xylazine (10mg/Kg, i.p.) and submitted at the renal pedicle unilateral I/R procedure during 45 minutes. The experimental groups were: a) eugenol (100, 200 or 400 mg/Kg, once a day); b) Sham: animals submitted to I/R procedure; and c) control: non-ischemic animals receiving saline. The animals were treated by gavage during 48 hs. Seric creatinin and urea were determined. The results were expressed as mean  $\pm$  epm, and statistically analyzed by ANOVA ( $P \leq 0.05$ ).

**Results:** No significant differences were observed for creatinin determination in all groups tested: control ( $0.34 \pm 0.01$  mg/dl); Sham ( $0.41 \pm 0.01$  mg/dl); EUG 100mg/kg ( $0.43 \pm 0.01$ ) and EUG 200mg/kg ( $0.41 \pm 0.01$ ). After EUG 400mg/kg dose an increased creatinin level was observed ( $0.63 \pm 1.16^*$  mg/dl;  $P < 0.01$ ) suggesting a possible renal toxicity. After 48hs of EUG treatment urea levels were reduced when compared to sham group. Control:  $52.73 \pm 6.71$  mg/dl; Sham:  $66.27 \pm 5.64$  mg/dl; EUG 100mg/kg ( $38.7 \pm 3.59^*$  mg/dl); EUG 200mg/kg ( $46.9 \pm 2.33$  mg/dl). The urea levels after EUG 400mg/kg treatment were similar to that in the control group ( $61.9 \pm 11.2^*$  mg/dl,  $P < 0.05$ ).

**Conclusions:** EUG treatment (100mg/kg) after I/R restored the renal function in uremic mice but showed renal toxicity effect in high doses.

**Key Words:** Natural Products, Eugenol, Ischemia/reperfusion injury, Nutraceutics.

27/473. Nutrition in the Prevention of Non-Communicable Diseases

### **Effect of aronia melanocarpa juice intake on antioxidative status and platelet function - Ex Vivo Study**

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**Introduction:** The natural juice from *Aronia melanocarpa* fruit is rich in polyphenols most of which are flavonoids (mainly anthocyanins) and tannins. *Aronia* fruits, fruit products and bioactive compounds isolated from this plants are evaluated for their antioxidative, antimutagenic, anticancer, cardioprotective, hepatoprotective, gastroprotective, antidiabetic, anti-inflammatory, antibacterial, antiviral, radioprotective, and immunomodulatory activity.

**Objectives:** The aim of this study is to estimate the effect of consumption of *Aronia melanocarpa* juice on antioxidative status and platelet function of patients with metabolic syndrome (MS).

**Method/Design:** The pilot study comprised 6 volunteers (3 men and 3 women) with metabolic syndrome (ATP III criteria) subjected to dietary intervention by acute intake of 200 ml *aronia* juice supplemented with 15% of grape extract. Routine biochemical parameters, SOD activity, total antioxidative activity of plasma using the ferric reducing/antioxidant power (FRAP) assay and platelet adhesion to vascular endothelial cells in co-culture by in vitro adhesion assay were determined using sera or cells isolated from blood obtained before and 2 hours after the intervention.

**Results:** A slight decrease in serum glucose values for each volunteer was observed after two hours of acute intervention with *aronia* juice in comparison with baseline values. All other biochemical parameters did not change significantly after study cessation. SOD levels in erythrocytes also did not showed significant changes after the consumption. Antioxidant activity of plasma raised after short term intervention with *Aronia melanocarpa* juice in all participants. Also, platelet adhesion to endothelial cells in the presence of trombin was inhibited after the consumption of *Aronia melanocarpa* juices for all tested samples.

**Conclusions:** The results of our pilot study show that *Aronia melanocarpa* juice may be of benefit to patients with MS regarding atherosclerosis and cardiovascular disease prevention by improving

disturbed antioxidant status and platelet hyper-reactivity.

**Key Words,** *Aronia melanocarpa*, antioxidative Activity, platelet, metabolic Syndrome

27/481. Nutrition in the Prevention of Non-Communicable Diseases

### **Different classification of overweight and obesity in children and adolescents: effect on the frequency of overweight and obesity in Delitzsch, Germany.**

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**Introduction:** The definition of overweight and obesity in children and adolescents is based on age- and sex specific percentiles of the body mass index. There is no commonly accepted reference system, and different systems are used in different countries.

**Objectives:** We wanted to investigate the prevalence of overweight and obesity in Delitzsch, a medium sized town in Sachsen, Germany, by applying different reference systems for the definition of overweight and obesity in childhood.

**Method/Design:** We investigated 317 children and adolescents aged 10 to 17 years in the town of Delitzsch, Germany (response rate 39%). Procedures included standardized measurements of weight and height, waist and hip circumference, and skin folds at four sites.

**Results:** According to the national German reference system (Kromeyer-Hauschild 2001), 9.1% of the participants were overweight and 6.9% were obese. When the US-system (CDC, 2000) was applied, 14% were overweight and 9.5% were obese, when the reference system from the International obesity task force (IOTF 2000) was used, 18% were overweight and 1% were obese.

**Conclusions:** Our study showed that the prevalence of overweight and obesity in childhood and adolescence is highly dependent on the used reference system. There is a strong need for an international reference system in order to be able to compare the prevalence of overweight and obesity in childhood in different countries.

**Key Words:** childhood obesity, reference systems, international comparison

27/483. Nutrition in the Prevention of Non-Communicable Diseases

### **Women's fish and fish oil intake in adolescence and midlife and coronary heart disease risk**

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**Introduction:** The role of lifestyle and diet in the development of coronary heart disease (CHD) is relatively well established in the literature. Consumption of fish and fish oil have specifically been reported to be protective for the development of CHD while data are scarce on the potential protective role of these dietary items in different phases of life. Iceland is a country where fish consumption was especially high in the past and fish oil is still a common food supplement.

**Objectives:** The aim of the study was to examine the association between fish and fish oil consumption in adolescence and midlife and coronary heart disease later in life among Icelandic women.

**Method/Design:** Participants were 3326 Icelandic women aged 69-95 years, who took part in the AGES-Reykjavik study of the Icelandic Heart Association. The women were divided into CHD cases and controls at entry, based on presence of CHD, defined by abnormal ECG, answers to the Rose angina questionnaire and previous heart procedures. Fish and fish oil consumption in adolescence and midlife were evaluated retrospectively by the subjects with a validated food frequency questionnaire, ranking subjects with respect to intake of major foods. Multivariate logistic regression was used to estimate adjusted odds ratios (AORs) and 95% confidence intervals (95% CI) of CHD according to fish or fish oil exposure status. Adjustments were made for major risk factors including BMI, diabetes, hypertension and total serum cholesterol as well as concurrent food intake.

**Results:** Compared to women with no teenage intake of fish oil, women who consumed fish oil 3-6 times per week had a decreased risk of CHD (AOR 0.59; CI 95% 0.40 - 0.91) as did women with daily consumption (AOR 0.75; 95% CI 0.58 - 0.97). Similar findings were observed for midlife consumption for fish oil.

No association was observed for teenage fish intake and CHD. Consumption of more than two portions of fish per week during midlife was associated with increased risk of CHD (AOR 1.65 ; 95% CI 1.08 - 2.52).

**Conclusions:** With few existing studies on early life dietary factors and CHD, our study provides important evidence for the potential preventive role of fish oil consumption on the development of CHD in women. It is hypothesized that the observed risk in relation to fish consumption during midlife may be explained by confounders, such as the common use of stick margarine with fish during this period under study. A population such as ours, lacking a reference group with little fish intake, may not be ideal for studying putative benefits of fish. Other possible factors that warrant further study are cooking methods of fish, other condiments with fish or possible contaminants in fish.

**Key words:** fish oil, fish, coronary heart disease, adolescent diet, midlife diet

## 27/499. Nutrition in the Prevention of Non-Communicable Diseases Weight to height gain ratio: a risk indicator of weight excess at preschool age

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**Introduction:** Birth weight obtained within the first hour after birth reflects the nutritional status of the newborn and is considered an appropriate indicator of health.

**Objectives:** To analyze the usefulness of the weight gain/height gain ratio from birth to 2 and 3 years of age as a risk indicator of weight excess at preschool age.

**Method/Design:** Weight (W), height (H)/length (L) of sample 409 preschool children (PSC) of daycare centers were measured according to internationally recommended rules. The values of W and BMI of PSC were transformed into z-score by the World Health Organization (2006) reference. The Pearson correlation coefficients (rP), linear regressions between anthropometric parameters and BMI z-score of PSC, were statistically analyzed (alpha: 0.05).

**Results:** The mean age of the children's sample was 3.2 years ( $\pm 0.3$ ). The prevalence of weight excess was 28.8% and of overweight plus obesity 8.8%. The correlation coefficients between BMI z-score of PSC and birth weight or BMI at birth were low, 0.09 and 0.10, respectively. There was a high correlation coefficient (rP: 0.79) between the mean monthly gain of W and the BMI z-score of PSC and a higher coefficient (rP: 0.93) between the ratio of mean W gain per H gain (g/cm) and the PSC BMI z-score, coefficients and their difference were statistically significant.

**Conclusions:** Regardless of weight or length at birth, the mean ratios between weight gains per height growth from birth (g/cm) evinced a strong correlation with BMI of PSC, suggesting that this ratio may be a good indicator of weight excess and obesity risk in children at preschool age.

**Key Words:** Birth Weight, Obesity, Weight Excess, Preschool Age



**27/509. Nutrition in the Prevention of Non-Communicable Diseases**  
**Relationship between ischemic cardiomyopathies, E Vitaminemia and lipid risk factors in type 2 diabetics**

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**Introduction:** In diabetes, hyperglycemia is involved in stimulating production of reactive oxygen species, leading most often to oxidative stress; which is particularly implied in the occurrence of cardiovascular complications. The antioxidant effect of vitamin E may confer an important preventive rule, in diabetic patients.

**Objectives:** The aim of this work is to observe a possible relationship between E vitaminemia, exposure to certain risk factors linked to diabetes especially lipidic ones (cholesterolemia, triglyceridemia, overweight or obesity) and frequency of ischemic cardiomyopathies (ICM) in a diabetics population.

**Method/Design:** This is a cross-sectional descriptive and analytical study, covering a group of 100 type 2 diabetics, leaving in the area of Constantine (Algeria).

**Results:** From this study, the following observations were made: A hypovitaminemia E was observed for the quarter of the patients without significant difference between the sexes. In relation with the age we found that, the highest frequencies of hypovitaminemia E were seen in diabetics having 50 years old and more. However, vitaminemia E increased with body mass index (BMI) and lipemia in all patients.

Degenerative complications were observed in 66% of the sample, with a preponderance of ICM in diabetics showing a hypovitaminemia E. Diabetics with normal lipid score and high vitaminemia E, have a significantly lower frequency of ICM compared to those showing a hypovitaminemia E. But, in patients suffering from lipid disturbance, we found that the ICM were significantly more frequent when the vitaminemia E is high.

**Conclusions:** It seems that the antioxidant effect of vitamin E could be efficacy in reducing risk of ICM, only if it was linked by good control of lipidic risk factors.

**Key Words:** Diabetes, Oxidative Stress, E Vitaminemia, Risk Factors, Ischemic Cardiomyopathies.

**27/537. Nutrition in the Prevention of Non-Communicable Diseases**  
**Nutritional status and diabetic risk in Thai people**

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**Introduction:** Type 2 diabetes is a rising health problem worldwide.

**Objectives:** This study aimed to describe nutritional status and risk of diabetes in Thai people living in Bangkok.

**Method/Design:** Through convenience sampling, 105 sample were recruited. Data were collected by using screening questions and nutritional assessment including body composition measurement (body mass index: BMI, waist circumference) and fasting blood sugar.

**Results:** Results revealed that the sample were female (70.5%) more than male (29.5%). Their mean age was 52.35 + 15.5 years, ranging from 17-85 years. According body mass index (BMI), majority of them were malnutrition (60.8%) including undernutrition (3.9%), overweight (20.6%), first degree obesity (30.4%), second degree obesity (4.9%), and morbid obesity (1.0%). Mean waist circumference was 87.47 + 10.37 cm in male and 79.42 + 10.29 cm in female. Fasting blood sugar was at average of 117.4 + 41.9 mg% in male and 121.3 + 45.6 mg% in female. Female had significant higher BMI, waist circumference, and fasting blood sugar than males.

**Conclusions:** Results suggest an approach for health care team to promote diabetic risk reduction particularly in female.

**Key Words:** Nutritional Status, Diabetic Risk, Thai People

**27/542. Nutrition in the Prevention of Non-Communicable Diseases**  
**Comparison of nutritional status in persons with and without diabetic history in first-degree relatives**

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**Introduction:** Prevalence of diabetes is increasing. Family history is a major risk for diabetes.

**Objectives:** The objective was to compare nutritional status in persons with and without diabetic history in first degree relatives.

**Method/Design:** Data regarding body mass index (BMI) and fasting blood sugar (FBS) were collected from 94 participants who participated in health risk screening program at Faculty of Medicine Ramathibodi health fair 2011.

**Results:** There were 41 persons with diabetic history and 53 persons diabetic history in their first degree relatives. The average age was 52.63 + 16.2 years. The mean of BMI was 24.73 + 3.6 kg/m<sup>2</sup> in diabetic history group and 23.89 + 4.2 kg/m<sup>2</sup> in no diabetic history group. The mean FBS was 136 + 52 mg% in diabetic history

group and 106 + 28.3 mg% in no diabetic history group. There was no significant difference in age and BMI but significant difference in FBS between persons with and without family history of diabetes.

**Conclusions:** We concluded that screening for fasting blood sugar should be recommended as a health risk screening especially in persons with diabetic history in their first degree relatives.

**Key Words:** Nutritional Status, Diabetes, First-Degree Relatives

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**27/553.** Nutrition in the Prevention of Non-Communicable Diseases  
**Iron supplementation increases lipid per-oxidation and decreases total antioxidant capacity in anemic women**

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**Introduction:** One of the most important factors in the etiology of chronic diseases is oxidative stress. Free iron ion is one of the promoters of this process.

**Objectives:** The aim of this study was to assess the effects of iron supplementation on lipid per-oxidation and total antioxidant capacity (TAC) in iron deficient anemic women.

**Method/Design:** In a double blind clinical trial, 38 anemic and 36 non-anemic women aged 20-45 years old, were treated with 50 mg iron as ferrous sulfate 3 times per week for 12 weeks. At the beginning and at the end of the trial, a general and 24 hours dietary recall questionnaires were completed. Venous blood samples were withdrawn from non-fasting subjects to measure blood concentration of Hgb, % of Ht and plasma levels of ferritin (Fn). Lipid per-oxidation was assessed by measuring plasma concentration of malondialdehyde (MDA) and TAC was also determined. Paired and independent t-tests were used to determine the statistical significance and P values less than %5 were considered statistically significant.

**Results:** At the beginning of trial, mean levels of Hgb, Ht and Fn of anemic were significantly lower than non-anemic women ( $P<0.0001$ ). After the intervention the mean values of these parameters were significantly increased ( $P<0.0001$ ). Before the intervention the mean plasma levels of MDA in deficient women were significantly lower than non-anemic women ( $1.7\pm 0.5$  vs.  $2.4\pm 0.8$  ng/ml, respectively,  $P<0.0001$ ) and were significantly increased in the anemic women after intervention ( $2.0\pm 0.4$  ng/ml,  $P<0.01$ ). Mean plasma levels of TAC in anemic were significantly lower than non-anemic women before the intervention ( $1.7\pm 0.3$  vs.  $2.0\pm 0.3$   $\mu\text{mol/l}$ , respectively,  $P<0.5$ ) and decreased significantly in the anemic women after intervention ( $1.5\pm 2.0$   $\mu\text{mol/l}$ ,  $P<0.05$ ).

**Conclusions:** Results indicate that iron supplementation in iron deficient women increases lipid per-oxidation and decreases TAC. Therefore, it seems that iron and antioxidant supplements together should be recommended to iron deficient women.

**Key Words:** Anemia, iron supplement, lipid per-oxidation, total antioxidant capacity.

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**227/559.** Nutrition in the Prevention of Non-Communicable Diseases

**High-fat diet: effects on triglycerides, cholesterol and serum lipid profile of growing rats. Preliminary study.**

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**Introduction:** Nutritional imbalances are related to the development of cardiovascular disease.

**Objectives:** To analyze the effect of high-fat diets on serum levels of triglycerides (TG), total cholesterol (TC), HDL and fatty acid profile of growing rats.

**Method/Design:** Weanling Wistar rats (n=24) divided in 3 groups were fed over 10 days; 50% dietary fat provided by butter and cocoa butter(S); 50% dietary fat provided by olive oil and Soy oil(M) and normocaloric diet(C). All diets had 20% protein and were complete in all other nutrients. Fatty acid profile of diets was determined by gas chromatography(GC). At the end of the experiment, rats were sacrificed, blood was obtained and serum levels of TG, TC, HDL (colorimetric methods) and fatty acid profile,  $\omega 3/\omega 6$  and unsaturated/saturated ratios(GC) were determined.

**Results:** Diets (%area): Palmitic: S: 27.79, M: 16.66, C: 10.51; Oleic: S: 23.74, M: 53.10, C: 22.78; Linoleic S: 2.61, M: 19.06, C: 56.31; Linolenic S: 0.38, M: 1.27, C: 5.92;  $\omega 3/\omega 6$  ratio: S 1/8.7, M: 1/15, C: 1/9 and unsaturated/saturated ratio S: 0.54, M: 4.2, C: 5.5. The  $\omega 3/\omega 6$  ratio remained normal in the three diets but unsaturated/saturated ratio is lower than 1.5 in S. Serum (mean $\pm$ SD mg/dL) TG S: 191.9 $\pm$ 66.5 M: 98.1 $\pm$ 49.7 C: 94.1 $\pm$ 37.7; CT S: 83.8 $\pm$ 10.9 M: 78.2 $\pm$ 10.5 C: 81.1 $\pm$ 14.8; HDL S: 32.9 $\pm$ 11 M: 36.8 $\pm$ 9.0 C: 32.9 $\pm$ 9.5. Only serum TG levels in S were statistically different compared to C and M ( $p<0.01$ ). Serum oleic acid levels were statistically different among groups (%area mean $\pm$ SD) S: 20.49 $\pm$ 2.41, M: 20.95 $\pm$ 5.14, C: 11.43 $\pm$ 3.41( $p<0.01$ ), due to differences in dietary fatty acids profile and lipid concentrations.

**Conclusions:** These findings confirm results of other authors, pointing out that high saturated fat diets cause an increase in serum TG concentrations. Moreover, more time is needed to observe some other significant changes in the serum fatty acid profile.

**Key Words:** Lipids, growing rats, fatty acid profile.

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**27/565. Nutrition in the Prevention of Non-Communicable Diseases**  
**Fast food consumption, Body Mass Index and waist circumference among Iranian adolescents**

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**Introduction:** Recently, prevalence of obesity and central adiposity is increased among Iranian adolescents which may be related to dietary intake.

**Objectives:** to determine the relation between fast food consumption and BMI and waist circumference in female adolescents.

**Method/Design:** This cross sectional study was conducted on 140 students aged 10-14 years, selected randomly from among guidance school students in Isfahan. They completed quantitative food frequency questionnaire. Physical activity was assessed by recording daily physical activities. Body mass index was divided, lower than 15th percentile for age and sex, named "low weight", between 15th to 85th percentile named "normal weight", between 85th to 95th percentile "over weight", and equal or more than 95th percentile named "obese".

**Results:** The mean value of BMI and waist circumference was 19.8±3.3 kg/m<sup>2</sup> and 69±9 cm. 35.7% of these adolescents were either obese or overweight. The mean value of fast food intake was 174/6 gr/day. There was inverse association between fast food consumption and BMI and waist circumference (P<0.05). Those in the highest quartile of fast food intake had higher BMI and waist circumference compared to those in the first quartile (P=0.001).

**Conclusions:** There was significant association between fast food consumption and BMI and waist circumference among Isfahan female adolescents. Nutritional Education is needed in this regard.

**Key Words:** Fast food- obesity- central obesity- Body Mass Index- waist circumference

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**27/572. Nutrition in the Prevention of Non-Communicable Diseases**  
**Dietary patterns and risk of hip fracture in older persons: the Three-City Cohort Study**

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**Introduction:** Hip fractures at older ages carry a high risk of disability and mortality. Promoting healthy diets could contribute to

decrease fracture risk in older persons. Dietary patterns must be based on actual dietary intake to better reflect dietary habits.

**Objectives:** The aim of this study was to identify dietary patterns and to analyze their association with incidence of hip fractures in older community dwellers.

**Method/Design:** The sample consisted of 1482 participants from Bordeaux (932 women, 550 men) aged 67 y+ included in the Three-City study, a prospective cohort study of vascular risk factors of dementia. The participants had a dietary survey in 2001-2002 and were followed-up every two years for 8 years. Occurrence of hip fracture was self-reported at each wave. Dietary patterns based on nutrient intake were derived by Principal Component Analysis (PCA) and selected by scree plot examination. Individual scores on PCA components were used as explanatory variables in Cox regression models to estimate relative risk of occurrence of the first hip fracture, adjusting for age, gender, education, marital status, smoking, body mass index, total energy intake, supplementation with calcium or vitamin D, diagnosis of osteoporosis, and falling.

**Results:** Three components with eigenvalues > 1 explained 53% of the variance of dietary intake. The third component, characterized by a high intake of calcium, phosphorus, vitamin D, proteins and lipids, and a low consumption of carotene, folate, fiber and vitamin C, was associated with a significantly decreased risk of hip fracture (RR=0.78, confidence interval 0.62-0.98, p=0.03) in fully adjusted models. The other components were not associated with hip fracture risk.

**Conclusions:** Dietary patterns reflecting actual combinations of nutrients in the diet, although not optimal in terms of recommended dietary intake, may predict lower hip fracture risk in older community dwellers. However, residual confounding by lifestyle cannot be excluded.

**Key Words:** dietary patterns, epidemiology, aging, hip fracture

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**27/580. Nutrition in the Prevention of Non-Communicable Diseases**  
**Detecting and using iodine salt at the ex earthquake area at the elementary school**

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**Introduction:** The effects of Iodine Deficiency Disorders are mental disorder, neuron system disorder, goiter, weakness, growth disorder, fail in reproduction, and increasing death for children. Result of the Iodine Deficiency Disorders in 1997-1998 showed that 4 provinces in Indonesia are "high" endemic area and "middle" with more than 20% prevalence. One of them was West Sumatera with 20.5%. Earthquake on last September, 30, 2009 in West Sumatera with 7.9 magnitudes, has seriously affected people's health, especially baby, under five year old baby, and especially elementary school children.

**Objectives:** To socialize iodine salt to people, to give knowledge to people about the characteristic of iodine salt, to give knowledge about definition, function, deficiency, effect of consuming the iodine too much and the source of iodine, to give the knowledge about iodine

salt and non-iodine salt.

**Method/Design:** Students to bring one spoon of salt from their house. Pre test. Giving information about the iodine salt, post test, check the salt by Yodimates, and palpation.

**Results:** There were 43 students in pre test and post test which represented other students. There was increasing point after the espionage. There were 2 students with uniodine salt, there was a little change for salt. Palpation was done to detect deficiency of iodine disorder for elementary students. There was no edema on the neck of the elementary students.

**Conclusions:** There were increasing grade from pre test and post test after espionage about iodine salt. There were 2 students with uniodine salt. There were no edema on the neck of the elementary students.

**Key Words:** Elementary Students, Iodine Salt, Earthquake

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### 27/582. Nutrition in the Prevention of Non-Communicable Diseases **Mediterranean diet components driving the inverse association with upper-aerodigestive tract cancer**

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**Introduction:** Several dietary factors have been associated with the occurrence of cancers of the oral cavity and oropharynx, larynx and oesophagus, collectively termed upper aerodigestive tract (UADT) cancers.

**Objectives:** Having identified, in the context of the Greek- AR-CAGE (Alcohol Related Cancers and GENetic susceptibility in Europe) project, an inverse association between the traditional Mediterranean dietary pattern and UADT cancer risk, we investigated which components of this diet are mainly responsible for this association.

**Method/Design:** We compared 239 incident UADT cases and 194 hospital controls with admission diagnoses unrelated to tobacco, alcohol or diet, enrolled in the Greek-ARCAGE hospital-based case-control study in Athens. Adherence to Mediterranean diet (MD) was assessed through the MD score. This score ranges from 0 (minimal adherence) to 9 (maximal adherence) and assigns a value of 1 for above median consumption of components characterizing MD (vegetables, legumes, fruits and nuts, cereals, fish, ratio of monounsaturated to saturated lipids and moderate alcohol intake), and a value of 0 for components not characteristic of MD (meat, dairy products and

alcohol intake other than moderate).

**Results:** When we controlled for fruit, vegetable and lipid intake, the effect of the overall Mediterranean diet score was reduced from 30% (95% confidence interval (CI):7%-46%, for a 2-unit increase in score) to 18%. Further adjustment for the remaining individual score components reduced the effect estimate to 9%.

**Conclusions:** Although this residual protective effect was not significant, it may indicate that the preventive potential of the Mediterranean diet, over and beyond that conferred by its individual components, relies also on interactions among these components.

**Key Words:** Diet, larynx, Mediterranean diet, upper aerodigestive tract cancers

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### 27/585. Nutrition in the Prevention of Non-Communicable Diseases **Factors associated with overweight in children: case study in the southern Brazil**

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**Introduction:** Excess weight in childhood is a predictor of co morbidity in adulthood.

**Objectives:** This research aimed to identify factors associated with overweight among schoolchildren.

**Method/Design:** This cross-sectional study involved children of both sexes aged between six and 10.9 years of age, enrolled in 24 public and private schools in the urban region of Maringá, Paraná, southern Brazil. The collection were done in the school environment, with measurement of the weight and height defined by calculating the BMI (Cole et al. 2000; 2007). The socioeconomic status of families was considered the guidelines of ABEP (2008). For the statistical analysis it was used the variance analysis model and the chi-square test, considering  $p < 0.05$ . The total evaluation of variables was done getting adjusted to a model of Multinomial Logistic Regression considering the nutritional condition as response variable and the age, gender, ABEP and BMI as explanatory variables. This project was approved by the Permanent Ethic Committee of Researches involving human beings from UEM.

**Results:** From 5037 schoolchildren, 53.2% were female, age range  $8,7 \pm 1,3$  years old and 24,1% presented excess weight. Overweight children from private schools and better socio-economic conditions showed positive relation with the excess weight ( $p < 0.001$ ) and children younger than 8 years old have more chances of being overweight ( $p = 0,038$ ).

**Conclusions:** The impact of these results accelerates the urgency of preventive actions towards overweight and its intercorrences in precece ages.

**Key Words:** Excess weight, childhood, socioeconomic status

**27/586. Nutrition in the Prevention of Non-Communicable Diseases**  
**Food and nutritional profile of school children from Curitiba, Paraná, Brazil**

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**Introduction:** Food and eating are fundamental aspects of health promotion. During childhood lifelong habits are formed, therefore it is an opportune period to initiate nutritional interventions enabling the acceptance of a more adequate life style.

**Objectives:** To analyze the food and nutritional profile of children between five and eleven years of age in a state school of Curitiba, Paraná, Brazil.

**Method/Design:** The children were weighed at the school on two data collection days. Analysis of the nutritional profile was performed with BMI/age (WHO, 2007). Food intake frequency (PENSE, 2009) was analyzed in two moments. First the students answered the questionnaire in their classrooms. Then the same questionnaire was sent to their parents and collected by the researchers at the school. Socioeconomic conditions (ABEP, 2008) were informed in the questionnaire by the parents.

**Results:** Among the 240 school students that participated in this study 13.0% were obese, 11.7% were overweight and 73.4% were eutrophic. Out of the 47 answered questionnaires, concerning the socioeconomic conditions, most of the families (63.8%) belonged to class C (income between R\$ 726 and R\$ 1195). In relation to the food intake frequency (performed with 73 children and 53 parents) it was possible to observe the disproportion between the answers of the questionnaires of these two groups, demonstrating the lack of perception of the parents towards the children's true food consumption. Within this sample 58.5% stated that they receive benefits from the federal government for food supply.

**Conclusions:** The main factors that generate nutritional risks among the studied population were inadequate eating habits, socioeconomic conditions, difficult access to sufficient and good quality food and the low educational level of the parents. The social characteristics of the sample are directly linked to the results that were obtained.

**Key Words:** health promotion, childhood, food consumer, nutritional status

**27/589. Nutrition in the Prevention of Non-Communicable Diseases**  
**Prevalence of dental caries and its association with cariogenic foods and beverages**

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**Introduction:** It has been suggested that the relationship between diet and dental caries can be confounded by factors such as age, sex, use of fluoride and oral hygiene aids. In addition, the stronger association of sugar consumption with dental caries reported in developing countries has been attributed to higher sugar consumption and lack of preventive oral health programs and local fluoride application in these countries.

**Objectives:** To investigate the relationship between cariogenic food intakes and dental caries and severe caries among primary schoolchildren in Iran

**Method/Design:** The present cross-sectional study included 1271 schoolchildren (634 boys and 637 girls) who were selected by two-stage cluster random sampling. Dental examinations were performed by a registered dentist using disposable plain mirrors and World Health Organization-Community Periodontal Index (WHO-CPI) probes. Diagnostic criteria of the WHO were used to calculate Decayed, Missed and Filled Teeth (DMFT) index for participants. A pre-tested food frequency questionnaire was used to collect dietary data.

**Results:** Mean dmft (primary teeth) decreased significantly with age advancement while there was an increasing trend in mean DMFT (permanent teeth) ( $P < 0.001$ ). The most commonly consumed snack foods and drinks were fresh fruits (75.3%) and tea with sugar (53.9%). When all confounders were controlled, females were more prone to dental caries (OR=2.41) and severe caries (OR=1.68) compared to males. Intake of confectionaries was the strongest factor contributing to the presence of dental caries (OR: 11.15 CI: 3.70 - 15.36) and severe caries (OR: 9.21 CI: 5.40 - 12.19) followed by savory foods (OR: 8.97 CI: 4.64 -12.21).

**Conclusions:** High consumption of sweet snacks, limited access to preventive oral programs and lack of water fluoridation make schoolchildren in developing countries prone to dental caries. It is suggested that preventive oral health programs target various contributing factors to poor oral health in order to be effective.

**Key Words:** Dental Caries, Cariogenic Food Intake, Severe Caries and Children

**27/590. Nutrition in the Prevention of Non-Communicable Diseases**  
**Does adherence to dietary recommendations reduce the risk of esophageal squamous cell carcinoma in a high-risk population?**

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**Introduction:** Esophageal Squamous Cell Carcinoma (ESCC) is a highly lethal malignancy with the highest prevalence reported in Iran. Unlike other countries, ESCC risk in Iran is unrelated to alcohol and tobacco consumption which highlights a strong etiologic role for dietary factors. Dietary Guidelines for American Adherence Index (DGAI) 2005 has been developed to evaluate adherence to latest nutritional recommendations and assess the contribution of dietary patterns to chronic disease risk.

**Objectives:** To evaluate the association of adherence to dietary guidelines, as measured by the DGAI 2005 and its subscores (healthy choice and food group subscores) with the ESCC risk in a high-risk Iranian population

**Method/Design:** This case-control study was conducted on 47 cases with incident histologically-confirmed ESCC and 96 hospital controls aged 40-75 years. Dietary data were collected in face-to-face interviews using a validated 168-itemed food frequency questionnaire. Data on other variables (physical activity, socio-demographic factors and dietary habits) were also collected using pre-tested questionnaires. DGAI 2005 was used to score the prevailing dietary intakes of participants according to the latest dietary recommendations.

**Results:** The mean DGAI score for this population was low (9.54 out of possible 19 scores) and control group scored significantly higher in both healthy choice and food group subscores of DGAI ( $p < 0.001$ ). Being in the highest tertiles of DGAI, food intake and healthy choice subscores reduced the ESCC risk by 38%, 42% and 21% respectively. Consuming salty, peppery and sour foods in combination increased the ESCC risk by 7.23 followed by consuming fried/barbecued meals (OR: 3.79) and high temperature food/beverages (OR: 3.68).

**Conclusions:** Consuming a diet in accordance with the latest dietary guidelines might lower the risk of ESCC in a high-risk population. Preventive strategies to reduce ESCC risk should focus

on overall dietary patterns and dietary habits, instead of individual dietary factors, to be effective.

**Key Words:** Esophageal Squamous Cell Carcinoma, Dietary Guidelines for Americans Adherence Index (DGAI) 2005 and Case-Control Study

**27/591. Nutrition in the Prevention of Non-Communicable Diseases**  
**Dietary patterns in relation to gallstone disease risk among Iranian women**

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**Introduction:** Gallstones is one of the most prevalent gastrointestinal disorders with an escalating prevalence worldwide. Although some of gallstone risk factors are unalterable (age, female gender, genetics and serum triglyceride), others such as unbalanced diet, obesity, low physical activity, gravidity and rapid weight loss are modifiable. Dietary factors have been suggested as key modifiable contributors of lithogenesis through different mechanisms.

**Objectives:** To examine the association of dietary patterns, as identified through factor analysis, with gallstone disease among Iranian women

**Method/Design:** This was a case-control study conducted on 101 female cases and 204 female hospital controls aged 40-65 years. Trained dietitians collected the dietary data using a validated food frequency questionnaire and dietary patterns were identified using principal component analysis. Data on lifestyle characteristics, socio-demographic status and dietary habits were also collected using pre-tested questionnaires.

**Results:** Gallstone cases were less educated, less physically active and consumed more total energy Compared to the control group ( $P < 0.02$ ). Having  $\geq 3$  live births increased the risk of gallstone by more than 5 times, followed by having rapid weight loss, being single, having familial history of gallstone and consuming high total energy ( $p < 0.001$ ). Two distinct dietary patterns were identified in women (healthy and unhealthy). After adjustment for several confounding variables, healthy dietary pattern was associated with a decreased risk of gallstone disease (OR: 0.14; 95%CI: 0.048-0.4); while unhealthy dietary pattern was associated with an increased risk (OR: 3.77; 95%CI: 1.52-9.36).

**Conclusions:** Gallstone cases were less educated, less physically active and consumed more total energy Compared to the control group ( $P < 0.02$ ). Having  $\geq 3$  live births increased the risk of gallstone by more than 5 times, followed by having rapid weight loss, being single, having familial history of gallstone and consuming high total energy ( $p < 0.001$ ). Two distinct dietary patterns were identified

in women (healthy and unhealthy). After adjustment for several confounding variables, healthy dietary pattern was associated with a decreased risk of gallstone disease (OR: 0.14; 95%CI: 0.048-0.4); while unhealthy dietary pattern was associated with an increased risk (OR: 3.77; 95%CI: 1.52-9.36).

**Key Words:** Dietary Patterns, Gallstone Disease, Factor Analysis and Women

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**27/592. Nutrition in the Prevention of Non-Communicable Diseases**  
**Nutrient intakes and risk of esophageal squamous cell carcinoma in a high-risk population**

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**Introduction:** Esophageal squamous cell carcinoma (ESCC) is the sixth most common cancer in the world with the highest prevalence reported in Iran. Unlike other countries, the ESCC risk in Iran is unrelated to smoking and alcohol intake, and it is hypothesized that gross nutritional deficiencies play etiological roles in this high prevalence rates.

**Objectives:** To investigate dietary factors affecting ESCC risk and to examine the dietary compliance of participants with WHO/FAO nutritional guidelines and recommended daily allowances (RDA).

**Method/Design:** In this hospital-based case-control study, 47 cases with incident ESCC and 96 hospital controls were interviewed and validated food frequency questionnaires were completed. Data were modeled through logistic regression, controlling for gastrointestinal reflux, medication use, BMI, smoking, physical activity, education level and tobacco use. The residual method was used to adjust nutrient intake tertiles for energy intake.

**Results:** Being in the highest tertile of saturated fatty acid, cholesterol, protein and total fat residual intakes was associated with an increased risk of 2.21, 1.59, 1.50 and 1.07 respectively. In addition, being in the highest tertile of carbohydrate, dietary fiber and (n-3) polyunsaturated fatty acid (PUFA) intake reduced the risk of ESCC by 66%, 62% and 59% respectively. Controls consumed more than

600 times selenium, 5.5 times  $\beta$ -carotene and 2 times vitamin E and  $\alpha$ -tocopherol as the amount ESCC cases consumed. Folate, vitamin E, selenium and vitamin B6 had the strongest protective effect on the risk of ESCC ( $p < 0.04$ ). Almost all participants failed to meet the dietary recommendations of WHO/FAO for (n-3) PUFAs and free sugar intake ( $p < 0.001$ ).

**Conclusions:** This study revealed high rates of non-compliance with dietary recommendations among participants, especially the ESCC cases. This suggests that vitamin/mineral deficiency may play an important role in higher incidence of ESCC in high-risk regions of the world.

**Key Words:** Esophageal Squamous Cell Carcinoma, Macronutrients, Vitamins and Minerals

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**27/593. Nutrition in the Prevention of Non-Communicable Diseases**  
**Adherence to Mediterranean-style dietary pattern in relation to the risk of esophageal squamous cell carcinoma**

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**Introduction:** Iran has the highest incidence of esophageal squamous cell carcinoma (ESCC) in the world while the lowest incidence of upper aerodigestive tract (UADT) cancers has been reported in the Mediterranean countries. Given that smoking and alcohol consumption in Mediterranean region are much higher than other parts of the world, it is hypothesized that the Mediterranean dietary pattern adhered widely in this region is responsible for conveying protection against UADT cancers

**Objectives:** To examine the association of compliance with the Mediterranean dietary pattern as measured by the Mediterranean-style dietary pattern score (MSDPS) and risk of ESCC in Iranian population

**Method/Design:** This case-control study was conducted on 47 ESCC cases and 96 hospital controls aged 40-75 years. Participants were interviewed using validated questionnaires and dietary patterns were characterized using MSDPS.

**Results:** Generally the mean MSDPS in this population was low ( $30.84 \pm 8.58$  out of possible 100 scores). MSDPS showed content validity through having expected positive associations with several lifestyle characteristics and dietary intakes. Being in the highest quartile category of MSDPS, compared to the lowest, was independently associated with 37% reduction in risk of ESCC. Two-unit and three-unit increase in the MSDPS resulted in 41% and 47% reduction in

risk of ESCC respectively. Higher intakes of olive oil (OR=0.15, 95% CI: 0.01-0.49), fish and other seafood (OR: 0.48, 95% CI: 0.23-0.98), whole grain (OR=0.57, 95% CI: 0.28-0.76) and fruits (OR=0.77, 95% CI: 0.38-0.86) were significantly associated with reduced ESCC risk. In contrast, higher sweet (OR: 1.86, 95% CI: 1.04-2.12) and meat intakes (OR: 1.61, 95% CI: 1.25-2.49) were associated with higher ESCC risk.

**Conclusions:** Consuming a diet in line with the principles of Mediterranean dietary pattern may protect against ESCC. Preventive strategies to reduce ESCC risk in high-risk countries should focus on overall dietary pattern and dietary habits to be effective.

**Key Words:** Esophageal Squamous Cell Carcinoma, Mediterranean-Style Dietary Pattern Score and Dietary Patterns

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**27/601.** Nutrition in the Prevention of Non-Communicable Diseases  
**Longitudinal associations of alcohol consumption with depression: a systematic review**

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**Introduction:** Alcohol consumption is a culturally extended practice, with an increasing trend worldwide. Alcohol-related problems are highly prevalent. Numerous studies have associated alcohol consumption with depression, which is the most frequent mental disease all over the world. A wide array of biological mechanisms has been proposed to account for this association.

**Objectives:** We aimed to systematically review the available evidence on the association of alcohol consumption and the development of depression.

**Method/Design:** We searched MEDLINE for longitudinal studies that investigated this hypothesis. Retrieved articles were classified based on some criteria according to its longitudinal nature and the quality of the analysis

**Results:** A total of 27 cohorts and 4 case-control studies were identified, obtaining a wide range of results (OR from 4.56 to 0.6). Of the cohort studies, only 3 of them met the longitudinal criteria (longitudinal nature of the assessment of depression and exclusion of the prevalent cases of depression). These 3 studies found inconsistent results, but their methodology was different (population age, methods for alcohol and depression assessment). We selected a good quality group among all cohort studies, defined as all studies which met more than 50% of the following criteria: adjusting for sex, for other drugs consumption, for previous depression, for other comorbid psychiatric disorders, identify ex-drinkers in the abstainers group, and using the first diagnosis of depression. The 6 articles that finally merited to

be included in this group offered inconsistent results. Case-control studies did not help to clarify the question.

**Conclusions:** There is no conclusive evidence on the association between alcohol consumption and incident depression. Most of the studies have important limitations. Longitudinal studies with good control of confounding are needed to improve the knowledge on this topic.

**Key Words:** Alcohol, Depression, Longitudinal studies, Systematic review

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**27/608.** Nutrition in the Prevention of Non-Communicable Diseases  
**Nutrition related Non-Communicable Diseases Prevention Intervention in Production Sector of Bangladesh: Findings and Lessons Learnt**

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**Introduction:** Based on numerous studies conducted at industrial countries, it was found that incidence of NCD risk factors among the workforce obstructs the rate of production. As RMG sector earns more than 70% of the total GDP in Bangladesh, an initiation was made to implement an intervention among the RMG workers in Dhaka, Bangladesh to reduce the NCD risk factors.

**Objectives:** A study was initiated as a benchmark of the non communicable diseases (NCDs) prevention among readymade garments (RMG) production sector project to describe their health status and feeding behavior.

**Method/Design:** For the baseline benchmark data was collected from 1800 RMG workers working in six garments factories of Dhaka city. The study followed cross sectional design including both quantitative and qualitative method and acquired information through 1800 structured interview, 12 FGD's from workers, 12 KIIs with management and 12 case studies.

**Results:** Majority (60%) of respondents were 20-29 years old, of which 90% were female and around one fifth (23.0%) earned 1.5-2.5 USD a day. One fourth (25.6%) were found underweight (BMI <18.5) and most astonishingly 25.08% were also over weight and obese which implies the presence of double burden of mal nutrition in production sector of Bangladesh. The mean systolic blood pressure was 112.75 mmHg (SD ±13.51) while the mean diastolic blood pressure was 70.98 mmHg (SD ±11.75). In case of blood glucose, around 12.1% were pre-diabetic and 2.6% newly diagnosed case of diabetes.

**Conclusions:** Present scenario of the workplaces of Bangladesh reveals double burden of malnutrition in the production sector of Bangladesh which needs early intervention to reduce increasing cost in health sector.

**Key Words:** NCD risk factor status, production sector, Bangladesh



**27/611. Nutrition in the Prevention of Non-Communicable Diseases**  
**N-3 Long-chain PUFA are not associated with bone mineralization in adolescent boys - a cross-sectional analysis and a 4 month randomized controlled trial**

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**Introduction:** Animal studies and one observational study indicate that n-3 long-chain polyunsaturated fatty acids (PUFA), particularly docosahexaenoic acid (DHA), increase bone formation and reduce bone loss. No randomized controlled trial has investigated this in young individuals.

**Objectives:** The aim was to investigate if bone mass, formation and growth were 1) associated with DHA status and 2) affected by DHA-rich fish oil supplementation, in healthy boys during the adolescent growth spurt.

**Method/Design:** 78 healthy, slightly overweight boys aged 13-15 y were randomly assigned to receive breads with fish oil (1.1 g/d n-3 long-chain PUFA) or control for 16 weeks. Whole-body bone mineral content (BMC), bone area (BA), bone mineral density (BMD), insulin-like growth factor-1 (IGF-1), IGF-binding protein-3, and osteocalcin were measured at week 0 and week 16. Dietary intake, physical activity, and erythrocyte fatty acid composition were also assessed at both occasions.

**Results:** Fish oil strongly increased erythrocyte n-3 long-chain PUFA, compared to control (P=0.0001). At week 0, no associations were found between erythrocyte DHA and BMC, BA, BMD, or the markers of bone growth and formation. Fish oil intervention had no effect on any of the bone measures, compared to control. Dose-response analyses revealed a positive association between changes in erythrocyte n-3 long-chain PUFA and IGF-1 changes during intervention ( $\beta=0.24$ , P=0.03, n=78 for DHA).

**Conclusions:** DHA status and fish oil supplementation were not associated with bone mass or mineralization in adolescent boys. However, the growth factor IGF-1 increased with changes in DHA status.

**Key Words:** n-3 polyunsaturated fatty acids, fish oil, bone mineral density, growth, insulin-like growth factor-1

**27/623. Nutrition in the Prevention of Non-Communicable Diseases**  
**A formulation of olive oils (oHo®) is effective in recalcitrant atopic dermatitis (r-AD)**

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**Introduction:** Atopic dermatitis (AD) is an immune-inflammatory disorder mainly affecting the epidermal barrier. AD patients exhibit frequent colonization by *Staphylococcus aureus*. Mixtures of diverse olive oils (OOs) exhibit more potent antioxidant and antiinfectious in vitro activities than each particular OO. oHo® (Bioaveda, Spain) is the first rational standardized formulation of at least 3 different organic Spanish OOs. The administration of oHo to renal patients ameliorates skin xerosis. oHo also shows potent in vitro microbicidal activities.

**Objectives:** To evaluate clinical efficacy of the oHo formulation in patients with r-AD.

**Method/Design:** 17 patients (8 children, 6 with asthma) with r-AD were included in this study. All patients had been unsuccessfully treated with oral and/or topic corticosteroids, topic inhibitors of calcineurin (TIC), and emollients for at least 2 years before the entry to this study. Eight patients showed skin infections due to *Staphylococcus aureus*. oHo was given daily at doses depending on age and weight. Two topic preparations, a gel and an emulsion made with oHo, were also applied twice a day.

**Results:** Itching disappeared in all patients in a mean of 15 days, and the complete resolution (CR) of eczema was observed in a mean of 45 days after treatments. All patients continue the treatments just to now. Five children with allergic asthma to olive pollen did not show asthma during the following year. Rhinitis disappeared in all cases. A young adult with generalized r-AD and graft vs host skin disease (GvHSD) showed CR after 45 days of treatments.

**Conclusions:** oHo is a safe nutrition and topical intervention in severe r-AD in children and adults. Data on atopic march, although exciting, must be tested in larger-controlled trials. oHo appears also to mitigate the skin side-effects provoked by corticoids or TIC while accelerating the clinical response. Larger controlled studies are now in progress.

**Key Words:** Olive-Oils, oHo, Atopic Dermatitis, *S. Aureus*

**27/624. Nutrition in the Prevention of Non-Communicable Diseases**  
**Vitamin A status in young adults: serum and diet markers and their correlation with visual function.**

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**Introduction:** Vitamin A is essential in visual process and its nutritional status can be evaluated by dietary intake or blood concentrations. In blood, a-carotene, b-carotene and b-cryptoxanthin represent the main provitamin-A-carotenoids. Data in foods can be obtained from specific food composition tables/database.

**Objectives:** 1)Assessment of provitamin-A carotenoids (b-carotene, a-carotene, b-cryptoxanthin) and retinol in serum and diet of young adults, and of visual function. 2)Evaluate correlations among serum and diet markers and visual function.

**Method/Design:** Subjects (n=50; 23men), 25,4±3,2 years-old. Inclusion criteria: normal cholesterolaemia, mixed diet. Exclusion criteria: obesity, dietary supplements, myopia surgery. Study approved by CREC. Methods: HPLC validated method for serum carotenoids. 3-day-records-questionnaires assessed using a food composition database. Contrast Sensitivity (CS) with and without glare (6 stimulus sizes -6.3 to 0.7 degrees) at three spatial frequencies (Takagi, CGT-1000). Statistical analysis: Kolmogorov-Smirnoff, one-way ANOVA, Spearman's correlations.

**Results:** Vitamin A dietary markers concentration (median, µg/day): b-carotene 1196, a-carotene 166, b-cryptoxanthin 36, retinol 273 and vitamin A (retinol-activity-equivalents) 404. Median concentrations in serum (µg/dl): b-carotene 13, a-carotene 3; b-cryptoxanthin 9. No differences were found in any between sexes but serum retinol (63±10 and 51±15µg/dl, men and women, respectively). CS showed differences, when tested with and without glare, at high and medium frequency (25 % and 83% respectively; lower values obtained with glare). Serum provitamin-A-carotenoids concentration showed correlation with their intake (r=0.361, p=0.000). Individually: r=0.494 for b-cryptoxanthin, r= 0.349 for a-carotene and no significative for b-carotene. Serum retinol correlates with provitamin-A carotenoid intake (r=0.197, p=0.045) and with CS at medium frequency (r=0.212, p=0.034).

**Conclusions:** Vitamin A nutritional status assessed by dietary or biochemical markers lead to different results, adequate status considering retinol in serum but inadequate regarding intake. Contrast sensitivity correlates with serum retinol but not with any of the other markers assessed.

**Acknowledgments:** Instituto de Salud Carlos III (AES, PS09/00681). ML.García-González for HPLC assistance.

**Key Words:** retinol, b-carotene, a-carotene, b-cryptoxanthin, diet, serum, contrast sensitivity.

**27/628. Nutrition in the Prevention of Non-Communicable Diseases**  
**Relationship between ischemic cardiomyopathies, e vitaminemia and lipid risk factors in type 2 diabetics ( )**

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**Introduction:** In diabetes, hyperglycemia is involved in stimulating production of reactive oxygen species, leading most often to oxidative stress; which is particularly implied in the occurrence of cardiovascular complications. The antioxidant effect of vitamin E may confer an important preventive rule, in diabetic patients.

**Objectives:** The aim of this work is to observe a possible relationship between E vitaminemia, exposure to certain risk factors linked to diabetes especially lipidic ones (cholesterolemia, triglyceridemia, overweight or obesity) and frequency of ischemic cardiomyopathies (ICM) in a diabetic population.

**Method/Design:** This is a cross-sectional descriptive and analytical study, covering a group of 100 type 2 diabetics, leaving in the area of Constantine (Algeria).

**Results:** From this study, the following observations were made: A hypovitaminemia E was observed for the quarter of the patients without significant difference between the sexes. In relation with the age we found that, the highest frequencies of hypovitaminemia E were seen in diabetics having 50 years old and more. However, vitaminemia E increased with body mass index (BMI) and lipemia in all patients. Degenerative complications were observed in 66% of the sample, with a preponderance of ICM (29%) in diabetics showing a hypovitaminemia E. Diabetics with normal lipid score and high vitaminemia E, have a significantly lower frequency of ICM compared to those showing a hypovitaminemia E. But, in patients suffering from lipid disturbance, we found that the ICM were significantly more frequent when the vitaminemia E is high.

**Conclusions:** It seems that the antioxidant effect of vitamin E could be efficacy in reducing risk of ICM, only if it was linked by good control of lipid risk factors.

**Key Words:** Diabetes ( ) Oxidative Stress ( ) E Vitaminemia ( ) Risk Factors ( ) Ischemic Cardiomyopathies ( )

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**27/635.** Nutrition in the Prevention of Non-Communicable Diseases

**Vitamin D status and its relationship to some of antioxidative factors in patients with diabetes Type II**

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**Introduction:**

There are increasing evidences about the relationship between vitamin D status and the control of diabetes. Diabetes is accompanying with increased production of free radicals and oxidants. Studies showed that vitamin D has an antioxidant property.

**Objectives:** In this study, we aimed to determine the relationship between serum levels of 25(OH) D and glycemic profile and some antioxidant enzymes in diabetes patients compared to healthy subjects.

**Method/Design:** This case control study was conducted on 180 people, 95 type 2 DM and 85 healthy subjects. Biochemical parameters including fasting serum, concentration of 25(OH) D, calcium, phosphorous, PTH, glucose, HbA1c, insulin and activities of superoxide dismutase (SOD), glutathione reductase (GR) and glutathione peroxidases (GSH-PX) and total antioxidant capacity (TAC) were measured.

**Results:** Eighty five percent of type 2 diabetic patients and 79 % of healthy subjects were suffering from vitamin D deficiency or insufficiency. There is an inverse relationship between 25(OH) D and glycemic profile except insulin concentration (for FBS and HbA1c,  $P < 0.05$ ). The activities of GR and GSH-PX were higher in diabetic patients compared to control. Data showed a negative relationship between 25(OH) D and activity of GR and GSH-PX and positive with SOD in diabetic patients. In control group, we observed 25(OH) D had an inverse relationship with SOD and GSH-PX activities and positive with GR activity (for GR,  $P = 0.05$ ). In both two groups 25(OH) D and BMI had an inverse relationship.

**Conclusions:** We concluded that vitamin D has an inverse relationship with glycemic control and probably has an antioxidant effect.

**Key Words:** Vitamin D, Diabetes, Oxidative Stress, Glycemic Profile

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**27/636.** Nutrition in the Prevention of Non-Communicable Diseases

**1,25 dihydroxyvitamin D3 inhibits proinflammatory cytokine and chemokine expression in adipose tissue**

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**Introduction:** Obese people often display a vitamin D deficiency as well as a low grade inflammation characterized by an increased secretion of pro-inflammatory cytokines by adipose tissue, suspected

to contribute to the development of insulin resistance.

**Objectives:** In this context, we aim to evaluate the ability of vitamin D to modulate proinflammatory cytokine expression by adipocytes and adipose tissue in basal conditions and TNF $\alpha$ -mediated stimulated conditions.

**Method/Design:** In order to validate our hypothesis, we incubated human adipocytes and 3T3-L1 adipocytes with 1, 25 dihydroxyvitamin D3, and we evaluated the effect of these vitamin in basal and TNF $\alpha$ -mediated stimulated conditions. Specific markers of inflammation such as IL6, IL1 $\beta$  and MCP-1 were evaluated by real-time qPCR and circulating cytokines determined by ELISA assays or by luminex.

**Results:** In 3T3-L1 adipocytes, a decrease of IL6, IL1 $\beta$  and MCP-1 (mRNA and protein expression) was observed after a 24h incubation with 1, 25 dihydroxyvitamin D3 (VD3), according to a dose response effect. VD3 was also able to reverse the proinflammatory effect of TNF $\alpha$ . These results have been reproduced in human adipocytes and in mice adipose tissue explants *ex vivo*. The molecular mechanism has been studied. RNA interference experiences showed the role of the vitamin D Receptor in this regulation. However, no response element was identified in the human proximal promoters of IL6, IL1 $\beta$  and MCP-1, suggesting thus an indirect mechanism. The involvement of NF- $\kappa$ B signaling pathway has been demonstrated (decrease of IKK $\alpha/\beta$  phosphorylation under VD3 effect). In parallel, we have shown an inhibition of p38 phosphorylation under VD3 effect, which could be related to the increase of Dusp10 expression, a phosphatase involved in p38 dephosphorylation.

**Conclusions:** Together these molecular mechanisms allowed to explain at least in part the decrease of expression of the proinflammatory cytokines observed. The physiological relevance of these results will be tested *in vivo* in mice.

**Key Words:** Adipose Tissue, Inflammation, Vitamin D, Adipocyte, Cytokine

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**27/639.** Nutrition in the Prevention of Non-Communicable Diseases

**In a rat nutritional model of brain neuropathology, resveratrol improves striatal metabolic status. NMR study.**

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**Introduction:** A J curve associates moderate consumption of red wine to a lower incidence of Alzheimer's disease (AD) in which mitochondrial dysfunction is implicated. Resveratrol (RSV), polyphenol of red wine, increases sirtuins1 activity, increasing mitochondrial

biogenesis and activity. A published rat model of vitamin A deprivation (VAD) rapidly impairs brain metabolic profile and anatomy as in neurodegenerative diseases (ND).

**Objectives:** Besides MRI study, NMR spectroscopy evaluates the effects of RSV feeding on brain metabolites in VAD rats.

**Method/Design:** Male Wistar rats were submitted to VAD from weaning (21 dys old) for 15 wks (n=5) vs pair-fed controls (C) (n=5). Trans-RSV was given in drinking water (0.36mg/100g bw per dy) in VAD (VAD+RSV, n=5) and controls (C+RSV, n=5), and via force-feeding (0.02mg/100g bw) from the 11th VAD-wk. Anaesthetized rats were physiologically perfused via portal vein to eliminate blood signal. After decapitation and frozen conservation, proton HRMAS spectroscopy was performed on striatum pieces (20mg) (Bruker AVANCE500, 11.7T). High resolutive spectra were recorded (6min). Longitudinal MRI was performed (Bruker 4.7T, Turbo-RARE-coro Rat sequence). Blood parameters were measured.

**Results:** RSV in VAD tended to (i) improve plasmatic glucose/insulin, and parameters of cytolysis and denutrition, (ii) prevent the increase in ventricular volumes linked to VAD. At the 15thwk, RSV increased striatal Nacetyl aspartate (NAA)/creatine (p=0.004 vs VAD, t-test) and GSH/Cr, (p=0.04 vs VAD). It decreased myoinositol (m-inos)/NAA (p=0.01 vs VAD).

**Conclusions:** RSV feeding maintained insulinosensitivity whereas insulinoreistance seems implicated at the onset of ND, brain regions affected by AD having highest insulin receptor density. RSV improved brain metabolites (i) increase of NAA linked to the energetic metabolism, (ii) increase in glutathione reflecting the antioxidant status and (iii) decrease in m-inos, usually increasing in AD. The effects of a moderate red wine drinking in the prevalence of ND could be explained in part by RSV.

**Key Words:** resveratrol, neurodegenerescence, MRI, NMR spectroscopy, insulinoreistance

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**27/650.** Nutrition in the Prevention of Non-Communicable Diseases  
**Maternal caffeine intake and its effect on pregnancy outcomes**

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**Introduction:** High caffeine consumption is a risk factor for good pregnancy outcomes. For this reason pregnant women should limit caffeine intake to less than 300 mg a day.

**Objectives:** 1. Estimation of the maternal caffeine intake during pregnancy and its influence on pregnancy duration, birthweight and Apgar score of the newborn.

2. To compare caffeine and paraxanthine concentration in venous blood of pregnant women and in umbilical cord blood of newborns.

**Method/Design:** Research was conducted on pregnant women who gave birth at the Clinic of Obstetrics, Gynaecology and Oncology, Medical University of Warsaw. It covered unifetal pregnancies without diseases (n = 509). Research data were collected by direct

questionnaire supplemented with data from patients' records. Caffeine and paraxanthine concentration was analysed in 30 samples of venous blood serum of pregnant women and 30 samples of umbilical cord blood serum. Statistical analysis employed a multivariate logistic regression model and a non-parametric Spearman's rank correlation coefficient.

**Results:** 98.4% of pregnant women consumed no more than 300 mg of caffeine per day. There was no link between maternal caffeine intake during pregnancy and the risk of premature birth, the birthweight or the Apgar score of newborns. There was no difference between caffeine concentration in venous blood of women and umbilical cord blood of their newborns, however paraxanthine concentration was higher in venous blood than in umbilical cord blood (p = 0.04).

**Conclusions:** Caffeine intake no more than 300 mg per day during pregnancy does not affect pregnancy length and the condition of the newborn. Placenta is not a barrier for caffeine to be transmitted from mother's body to the foetus

**Key Words:** caffeine, pregnancy, blood, newborn

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**27/662.** Nutrition in the Prevention of Non-Communicable Diseases  
**Effects of an alkaline mineral water on cholecystokinin levels and gallbladder emptying in young adults**

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Nutrition/Institute of Food Science. Technology and Nutrition (ICTAN). Spanish National Research Council (CSIC). Madrid. Spain.

**Introduction:** Alkaline mineral waters are reported to have beneficial digestive and hypocholesterolemic properties.

**Objectives:** To study the effects of the consumption of 0.5L of a sodium-bicarbonated mineral water on postprandial lipids and cholecystokinin (CCK), and gallbladder emptying in young adults.

**Method/Design:** Twenty-one subjects participated in the study. Inclusion criteria: age >18 and <40 years and BMI >18 and <30 kg/m<sup>2</sup>. Exclusion criteria: diabetes, hypertension, being a usual consumer of carbonic mineral waters, under medication that could affect lipid metabolism, or consumption of functional foods that could affect lipid metabolism. A 4-way randomized controlled crossover trial was applied. Two different mineral waters: alkaline water (BW) (HCO<sub>3</sub>- 2120; Ca<sup>2+</sup> 32.0; Mg<sup>2+</sup> 9.4; Na<sup>+</sup> 1102; K<sup>+</sup> 49.5 mg/L) and control water (CW) (HCO<sub>3</sub>- 104; Ca<sup>2+</sup> 33.4; Mg<sup>2+</sup> 5.0; Na<sup>+</sup> 8.7; K<sup>+</sup> 2.0 mg/L) were consumed with or without a standard meal. Serum triacylglycerols (TAG) and serum cholecystokinin (CCK) samples were obtained at baseline and 30, 60 and 120 minutes. Gallbladder volume was measured at baseline and 15, 30, 60 and 120 minutes after finishing the water with/without meal.

**Results:** There were no significant differences between both waters consumed without meal. With meals, an inverse relation between CCK and gallbladder volume was observed, corresponding to the physiological role of this hormone. BW with meal induced a lower concentration of serum TAG at 30 min (p=0.01) and 60 min

( $p=0.03$ ), lower CCK concentrations at 30 min ( $p=0.002$ ), and higher gallbladder volume at 30 min ( $p=0.03$ ), 60 min ( $p=0.01$ ) and 120 min ( $p=0.04$ ), compared to the CW.

**Conclusions:** Consumption of this bicarbonated mineral water with a meal induces a reduction in gallbladder emptying and lower cholecystokinin levels, which is associated with lower postprandial lipid levels. This water may be used in diets in order to reduce cardiovascular risk.

**Key Words:** Cholecystokinin; Gallbladder Emptying; Humans; Postprandial Lipaemia; Sodium-Bicarbonated Mineral Water

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**27/666.** Nutrition in the Prevention of Non-Communicable Diseases  
**Design and reproducibility of a simplified food frequency questionnaire for assessing iron intake and bioavailability.**

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**Introduction:** Diet is one of the main determinants of iron status in healthy individuals. Bioavailability of iron depends on the type of iron and the presence of inhibitors and promoters of iron absorption. Evaluating the diet with regard to these factors is traditionally done using a 3-day dietary intake record, however this is very time consuming to complete and process.

**Objectives:** To develop a simplified food frequency questionnaire (FFQ) to evaluate iron intake and bioavailability, and to evaluate its reproducibility.

**Method/Design:** The FFQ questionnaire asked the frequency of consumption of foods in main meals (midday/evening). It was considered that breakfast, mid-morning and afternoon snacks do not contribute important amounts of iron. Frequency options were <1/week, 1/week, 2-3/week, 4-6/week, daily, >1/day. A group of 123 Spanish menstruating women aged 18-30 years, with iron deficiency without anaemia, were recruited. To assess reproducibility, the FFQ was administered on two occasions (winter and spring). Reproducibility of the questionnaire was assessed with Spearman's rank correlations.

**Results:** Results show that subjects follow a Mediterranean diet, similar in winter and spring. When studying the reproducibility of this FFQ, significant correlations were found for all food items between the first and second administration of the test ( $p<0.01$ ). Of the 13 items in this FFQ, 12 had Spearman correlation coefficients higher than 0.4, and the average for all items was 0.57. The highest correlations were for tea and/or coffee, vegetables, fruits and salads, whilst the lowest correlation was for dried fruit and nuts. In reproducibility studies, high correlations are usually found for items consumed frequently, which may explain the low correlation found for dried fruits and nuts.

**Conclusions:** This FFQ has good reproducibility after a 3 month period, capturing the habitual diet of the volunteers, and does not seem to be affected by seasonal changes between winter and spring.

Aknowledgements: Project AGL-2009-11437.

**Key Words:** Food Frequency Questionnaire; Iron Bioavailability; Reproducibility; Dietary Assessment; Iron Deficiency.

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**27/668.** Nutrition in the Prevention of Non-Communicable Diseases  
**Evaluation of the antioxidant effect of opioid peptides on intestinal cells**

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**Introduction:** In recent years, nutrition and food sciences have been focused on biologically active peptides that are liberated from food proteins by enzymatic hydrolysis or fermentative process. Some of these peptides have been reported to exert a variety of functions *in vivo*. During last decade much effort has been done on peptides with activities on cardiovascular system, but there is much less data available about the role of food peptides in intestine-modulatory functions. Intestinal epithelial cells are exposed to oxidative stress that has been shown to participate in the aetiology of several human degenerative diseases including inflammation, cardiovascular and neurodegenerative disorders and cancer. Although opioid peptides have been demonstrated to exert an important role in the gastrointestinal tract, no data about their antioxidant protective effects have been reported to date.

**Objectives:** The aim of this work was to evaluate the antioxidant potential of opioid peptides derived from food proteins elucidating their mechanism of action on intestinal cells.

**Method/Design:** Antioxidant activity of opioid peptides was initially assayed using three *in vitro* methods, two of them focused on measuring peroxyl and superoxide radicals scavenging activity, and one assay based on peptides' capacity to reduce  $Fe^{3+}$  to  $Fe^{2+}$ . Peptides showing the highest *in vitro* antioxidant activity were assayed in Caco-2 cell lines stressed with hydrogen peroxide. The protective effects of peptides were estimated by the determination of total glutathione (GSH) and intracellular formation of peroxyl radicals.

**Results:** Opioid peptides showed *in vitro* antioxidant activity through their capacity to scavenge oxygen radicals and reduce iron. Those peptides showing higher activity were assayed in Caco2 cells, demonstrating that they did not affect Caco2 cell viability. Moreover, first results conducted show a promising antioxidant role of opioid peptides on intestinal cells.

**Conclusions:** Our study has demonstrated that opioid peptides derived from food proteins exert potent antioxidant activity through different mechanisms of action. Moreover, protective effects of these peptides against oxidant compounds produced in intestinal cells make them a promising strategy to prevent oxidative stress-related disorders.

**Key Words:** Opioid Peptides, Antioxidant, Intestinal Cells

**27/670.** Nutrition in the Prevention of Non-Communicable Diseases

### **Role of peptide lunasin's antioxidant activity on its chemopreventive properties**

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**Introduction:** Oxidative stress and inflammation are two of the most critical factors implicated in carcinogenesis and other degenerative disorders. Consequently, determination of anti-inflammatory and/or antioxidant properties has been proposed as a good indicator for screening anti-cancer agents. Lunasin is a peptide identified in soybean and other plants which properties against cancer have been demonstrated in both in vitro assays and in vivo mouse models. Different mechanisms of action have been revealed as relevant on lunasin's chemopreventive role, including inhibition of cell proliferation, arrest of cell cycle, apoptosis induction, and modulation of genes and protein expression involved in different carcinogenesis pathways. Preliminary studies have demonstrated lunasin's activity as anti-inflammatory food peptide. However, no data about its antioxidant activity in both in vitro and cell culture experiments have reported to date.

**Objectives:** The main aim of this work was to evaluate the contribution of lunasin's antioxidant activity on its chemopreventive properties.

**Method/Design:** Initially, different in vitro assays were performed to evaluate lunasin's mechanism of antioxidant action. The capacity of this peptide to scavenge radicals and iron, as well as its ability to reduce Fe<sup>3+</sup> to Fe<sup>2+</sup>, and to inhibit linoleic acid oxidation was analyzed. Moreover, macrophages RAW 264.7 cells and intestinal cells were used to determine lunasin's effect in the production of intracellular oxygen radicals species (ROS) as well as in glutathione (GSH) levels.

**Results:** Lunasin demonstrated to exert potent radicals scavenging activity, showing also a moderate capacity to scavenge iron. Studies performed in RAW 264.7 cells showed that this food peptide does not affect cell viability, reducing ROS generation. Preliminary results indicate a similar inhibitory effect of ROS production in Caco2 cells.

**Conclusions:** This study demonstrates that lunasin exerts a notable antioxidant activity through different mechanisms of action, protecting mammalian cells against oxidant compounds produced in excess during metabolic process. This activity might contribute on lunasin's chemopreventive role against cancer and other oxidative stress-related disorders.

**Key Words:** Lunasin, Antioxidant Activity, Macrophages, Intestinal Cells

**27/673.** Nutrition in the Prevention of Non-Communicable Diseases

### **Relationship between Vitamin D and iron status in a group iron deficient women**

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**Introduction:** Iron deficiency anaemia and vitamin D deficiencies are extremely common and widespread nutritional disorders in the world. A relationship between iron deficiency, low 25-hydroxy vitamin D (25OHD) levels and osteoporosis has been suggested.

**Objectives:** To study the vitamin D status in a group of iron deficient women and to know if there is a relationship between 25OHD levels and iron status biomarkers.

**Method/Design:** A group of 124 women were recruited during the winter season. Inclusion criteria: menstruating women, ferritin<40ng/mL, hemoglobin≥11g/dL, 18-45 years, non-smoker, non-pregnant, non-breastfeeding. Serum 25OHD, haemoglobin, serum ferritin, serum transferrin, serum iron and transferrin saturation were determined. Deficient vitamin D status was defined as a circulating 25OHD concentration <50nmol/L, insufficient status was considered 51-74nmol/L, and sufficient >75nmol/L. Bivariate correlations between iron biomarkers and 25OHD were calculated.

**Results:** It was observed that 53 women presented 25OHD deficiency (43%), 60 had insufficiency (48%) and only 11 women (9%) presented sufficient levels of 25OHD. Significant positive correlations between 25OHD and serum iron (p=0.006) and between 25OHD and transferrin saturation (p=0.003) were found.

**Conclusions:** There is high incidence of vitamin D deficiency in this group of iron deficient women. The association found between 25OHD and iron status biomarkers suggests that further studies should be done in order to know the possible metabolic interactions of both nutrients.

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**Key Words:** Iron Deficiency Anaemia, Vitamin D, Menstruating Woman

**27/1067.** Nutrition in the Prevention of Non-Communicable Diseases

### **Lymphocyte subset profiles from infants can be modulated by milk-feeding practices. The proficel study**

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**Introduction:** The pathogenesis of Celiac Disease (CD) involves the interaction among genetic, environmental, and immunological factors. Environmental factors that have a role in the maturation of the immune system in the early stages of life, such as milk feeding practices might potentially participate as risk or protection factors for CD.

**Objectives:** We assessed the effect of the interaction between milk feeding practices and the HLA-DQ genotype on peripheral lymphocyte subsets and their activation markers in infants at familial risk for CD.

**Method/Design:** 170 newborns were classified in 3 different genetic risk groups (high, HR; intermediate, IR; low, LR) after DQB1 and DQA1 typing. Lymphocyte subsets were studied at the age of 4 months by flow cytometry analysis.

**Results:** 79 infants were receiving exclusive breast feeding (BF) and 91 partial breast feeding or formula feeding (FF). Regarding genetic risk, 40 infants were classified in HR group, 75 in IR group and 55 in LR group. Two-way ANOVA for type of milk-feeding and genetic risk group did not show significant interactions between both factors on the lymphocyte subsets analysed. One-way ANOVA for milk-feeding practice alone showed that the percentage of CD4+CD25+ cells was significantly higher in BF group than in FF group (BF, 10.92±2.71; FF, 9.94±2.96; p=0.026), and absolute counts of CD4+CD38+ cells were significantly higher in FF group than in BF group (BF, 2557.95±977.06; FF, 2881.23±973.48; p=0.038). One-way ANOVA for genetic risk alone showed that absolute counts of NK cells were significantly higher in IR group than HR and LR groups (HR, 405.01±239.53; IR, 539.24±340.63; LR, 419.86±262.85; p=0.028). Respect to higher percentage of CD4+CD25+ cells, there are studies with animals that have shown that lactadherine (breast milk protein) is involved in intestinal maturation and induction of CD4+CD25+T cell differentiation, as well as in the protection against Rotavirus infection, a pathogen related with CD development.

**Conclusions:** At 4 months of age prior to gluten introduction in infants at risk for CD there is no interaction between feeding practices and genetic risk in lymphocyte subsets development. In addition, lymphocyte subset profiles in the early stages of life can be modulated by milk-feeding practices and genetic risk separately.

**Key Words:** Lymphocyte subsets, milk-feeding practices, celiac disease risk, infants, HLA genotype.

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**27/686.** Nutrition in the Prevention of Non-Communicable Diseases  
**Iodine intake in schoolchildren living in South of Poland**

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**Introduction:** Most of the Polish territory has been classified as an iodine-deficient area. In 1997 the national programme of obliga-

tory iodination of household salt was implemented. Household salt should contain 2,3±0,77 mg iodine in 100g of salt.

**Objectives:** The aim of the study was to assess iodine content in daily diets of schoolchildren living in the South of Poland.

**Method/Design:** The study was carried out in 2009-2010 among 292 boys and girls aged 9-13 years with the use single 24 hour recall. The data on iodine content in food products were based on the National Food Composition Tables. The mean dietary intake of iodine as well as 5th and 95th percentiles (P5, P95) were calculated including iodised salt. The mean intake was compared to the estimated average requirements (EAR), and the P95 intake to the Tolerable Upper Levels (UL).

**Results:** The mean iodine intake in the group of schoolchildren was 104 µg (130% EAR) and ranged from 77 µg (girls 12 y.) to 156 µg (girls 9 y.). Household salt was the main source of iodine (66%) in boys and girls diets. The mean iodine content in diets excluding the iodised salt ranged from 28 µg (girls 12 y.) to 78 µg (girls 9 y.). The P95 intake of iodine in girls and boys ranged from 157µg to 263 µg and was below the UL.

**Conclusions:** The average iodine intake in studied group of schoolchildren living in South of Poland covers 130% of EAR. Household salt is the main source of iodine in daily diets. Model of iodine deficiency prophylaxis based on obligatory iodination on household salt is effective. However iodination of the household salt is still needed in Poland.

**Key Words:** Iodine, Intake, Iodised Salt, Schoolchildren

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**27/692.** Nutrition in the Prevention of Non-Communicable Diseases  
**Mediterranean diet at low glycemic index and glycated proteins in the blood. A randomized controlled trial**

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**Introduction:** Glycation (non enzymatic glycosilation) is the reaction of condensation between the carbonyl of a reducing sugar and the reactive amino group of a protein. Glycation is a physiological process, depending on age, pharmaceutical treatment, tobacco smoking, dietetic habits. Early and intermediate stages of glycation are rapid and reversible. The latter stages of the process are irreversible and lead to the formation of advanced glycation end products, AGEs. Early and advanced products of glycation have a role in the pathogenesis of many degenerative diseases.

**Objectives:** This study aims to evaluate the effects of three different diets on the main glycated substances in blood glycated hemoglobin, fructosamine, glycated apolipoprotein B, total advanced glycation end products (AGE), and the soluble receptor for advanced

glycation end products (sRAGE).

**Method/Design:** A randomized intervention study was conducted on 150 subjects. Participants were randomized to one of three dietetic schemes, to follow for three months: a Mediterranean diet (M), a Mediterranean low glycemic index diet (MIG), and a low glycemic index diet (IG). Glycated proteins in the blood were measured at baseline and after three months with standard methods. Multiple linear regression was used to control for sex, age, BMI and baseline value.

**Results:** All the diets are effective in decreasing fasting glycaemia, glycated hemoglobin, glycated apoB and fructosamine. No diet is effective in decreasing AGEs and soluble RAGE. MIG diet is better than the other diets in controlling glycated hemoglobin.

**Conclusions:** All the diets are able to control early glycated proteins, no diet is effective on advanced glycated proteins.

**Key Words:** Glycated proteins, Mediterranean diet, low glycemic index diet, randomized trial.

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**27/694.** Nutrition in the Prevention of Non-Communicable Diseases  
**Mediterranean diet at low glycemic index in the treatment of metabolic syndrome. A randomized controlled trial.**

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**Introduction:** - There are few trials that have evaluated the effects of Mediterranean Diet (MD) with different quality of carbohydrate on the risk factors of metabolic syndrome (MS)

**Objectives:** To compare the effects of a generic diet (GD) with a Mediterranean diet (MD), a Mediterranean Diet at Low Glycemic Index (MIG) and a Low Glycemic index diet (IG) on MS.

**Method/Design:** The design is a randomized controlled trial. A sample of 219 patients with MS from a survey of the general population (2973 subjects examined, age range 30-89 years, 1042 with MS, NCEP-ATP III criteria) who gave informed consent were randomized to the four diets. The tests at base line and after 12 weeks of follow up included: medical history, physical examination, anthropometric parameters, routine blood tests, upper abdominal ultrasonography for hepatic steatosis (score 0-6), bioimpedance. The 4 diets were administered using the technique of "traffic lights". The subjects recorded their daily food intake in a standardized way. Statistical analysis was performed using multiple regression with STATA 10.

**Results:** All the diets are effective in controlling MS, waist circumference, blood pressure, fatty liver, liver transaminases, ApoB, blood glucose, glycated hemoglobin, insulin and insulin resistance measured by HOMAtest. Only MD is effective in lowering triglycerides and raising HDL cholesterol. MIG diet seems to be more effective at lowering body fat while maintaining lean body mass. Comparing the different diets, MIG is more effective than the other diets in lowering fasting glucose and glycated hemoglobin, even after controlling for the initial value of the variables.

**Conclusions:** MIG diet seems to be more effective than GD, IG and MD in controlling most of the variables of MS after three months of intervention.

**Key Words:** mediterranean diet, glycemic index, metabolic syndrome

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**27/705.** Nutrition in the Prevention of Non-Communicable Diseases  
**Validation of body fat mass prediction models for Argentinian children using anthropometry**

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**Introduction:** Body composition, particularly body fat, is a known predisposing factor to non transmissible chronic diseases. Several studies have reported body fat as a stronger risk predictor factor than body mass index. However, there are no predictive equations for children body fat in Argentina using anthropometry.

**Objectives:** The aim of this study was to validate anthropometric models to determine body fat mass (FM) in children using the Deuterium Dilution Technique (DDT) as reference method.

**Method/Design:** 140 children aged 6-9 years participated in the study. Weight (kilograms), height (centimeters), waist circumference (centimeters) and triceps, biceps, subscapular and suprailliac skinfolds (millimeters) were measured. Total Body Water was determined by DDT. Children received a weighed oral dose of deuterium oxide (0.3 mL/Kg; 99%) and saliva samples were obtained after an equilibration period of 3 h. Deuterium concentration was determined by mass spectrometry and FM was calculated.

**Results:** There were obtained the following prediction models for FM:



1)  $-2.83+0.25*\text{Weight}+0.09*\text{Sum 4 skinfold thicknesses}$ ,  $R^2:0.86$   
2)  $-5.36+0.31*\text{Weight}+0.35*\text{Triceps Skinfold}$ ,  $R^2:0.84$  3)  $-9.86+0.34*\text{Weight}+0.14*\text{waist circumference}$ ,  $R^2:0.69$ . When the FM predicted by each model was validated against the FM estimated from deuterium dilution, the linear regression had a slope not significantly different from 1.0 and an intercept not significantly different from 0. Bland and Altman test pointed out that the methodological error was randomly distributed.

**Conclusions:** This study developed the first predictive Argentinian equations for total body fat in children and contributes with simple validated methods through nuclear techniques, considered gold standard, being their use of importance to evaluate the impact of programs for the prevention and control of overweight and obesity in children.

Supported by UBACyT B098, OIEA/RLA6059/6064

**Key Words:** Body Fat, Children, Deuterium Dilution, Anthropometry

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### 27/708. Nutrition in the Management of Non-Communicable Diseases **Post menarche nutritional status: follow-up study in two ethnic groups**

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**Introduction:** Overweight is greater among Mapuche indigenous than non-indigenous adults. There is a lack of evidence concerning when weight differences among ethnic groups are produced.

**Objectives:** To analyze the mean and increase of body mass index (BMI), BMI Z-score (ZBMI), waist circumference (WC) and body fat percentage (BF%) from menarche to 36 months post-menarche, in indigenous and non-indigenous girls from Araucanía Region of Chile.

**Method/Design:** This was a concurrent cohort study. 8,504 girls were screened; of these, 114 indigenous and 126 non-indigenous girls who had recently experienced menarche were selected. The anthropometric variables were analyzed at menarche and 6, 12, 18, 24 and 36 months post-menarche. Generalized estimating equations models and multiple linear regression models were used to compare means and increases of the response variables during the study period.

**Results:** Indigenous girls experienced menarche 4 months later than non-indigenous girls, were more likely to live in rural areas and were concentrated in the lower socioeconomic level. At menarche, their mean of BMI, ZBMI, WC and BF% were 1.5 kg/m<sup>2</sup>, 0.32, 2.8 cm and 1.7% greater than the non-indigenous girls ( $p<0.05$  for all). Between 6 and 36 months post-menarche, indigenous girls had mean of BMI, ZBMI, WC and BF% 0.07kg/m<sup>2</sup>, 0.02, 0.70 cm and 0.54%

higher than the non-indigenous girls ( $p>0.05$ ) and the differences in increase of BMI, ZBMI, WC and BF% were -0.15 kg/m<sup>2</sup>, -0.03, 0.25 cm and 0.48% in indigenous compared to the non-indigenous girls ( $p>0.05$ ).

**Conclusions:** At menarche, the indigenous girls present values higher than the non-indigenous girls for all anthropometric variables, both groups' values are above recommended levels. After menarche the increases are similar among the ethnic groups. This reaffirms the need to implement overweight prevention and monitoring programs before the first menstruation and to maintain healthy behaviors thereafter.

**Key Words:** Nutritional Status, Menarche, Indigenous, Adolescence

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### 27/710. Nutrition in the Management of Non-Communicable Diseases **Implementation of good manufacturing practices of institutional kitchens**

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**Introduction:** Inadequate diet is one of the risk factors that should be targeted for the decrease of non-communicable diseases (WHO). Within the concept of an adequate diet, quality and safety is an obvious variable, however, food quality and safety assurance in health-care institutions is still a utopia in Argentina.

**Objectives:** To assess implementation of mandatory regulations to assure food quality and safety in institutional kitchens

**Method/Design:** A self-designed structured questionnaire with closed questions was administered (technical responsibility, site of elaboration, implementation of good manufacturing practices (GMP) and prerequisite programs (PRP) to nutritionists during a training program in 2009 and 2010.

**Results:** Of 131 participants in the survey, 69% had not implemented any of the mandatory regulations according to the Argentine food law, and the remaining 31 % stated to have implemented GMPs. Contradictorily, when referring to the PRP that support GMPs, none of the participants stated to have applied any of the five basic principles (training, health and hygiene measures of personnel, and water and pest and water control in the environment). The results show that 100% of the participants do not assure food quality and safety in their institutions ( 54% does not control the water, 32% does not have any training programs, 29% has not implemented the program for health and hygiene measures of personnel and does not control pests)

**Conclusions:** Multiple institutional kitchens provide food without knowing the risks involved and underestimate the importance of the implementation of regulations. It would be necessary to comply with the obligation to have an adequate number of well-trained nutritionists ( law n° 6463/93) to supervise improvement processes and to implement GMPs controlled by senior management. The results of

the survey highlight the importance to consider GMPs in institutional kitchens in public health policies.

**Key Words:** Food Quality And Safety, Gmp, Institutional Kitchens

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**27/711.** Nutrition in the Management of Non-Communicable Diseases  
**Comparison of obesity indices and dietary intake between patient with and without anxiety disorders**

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**Introduction:** Nowadays the amount and frequency of the daily stressors has been elevated dramatically therefore, the prevalence of anxiety disorders has been increased specially among employees. According to the importance of the type and amount of dietary intakes and obesity on the health condition, it is necessary to find out whether the dietary pattern and obesity indices is different among the patients with anxiety disorders in comparison with healthy subjects.

**Objectives:** This survey was conducted due to compare the dietary intakes and obesity indices between subjects with and without anxiety disorders.

**Method/Design:** Beck anxiety inventory was performed on all male employees (n=753) of Shahid Hasheminejad Gas Processing Company (S.G.P.C.) northeast of Iran, then according to the results,

we categorized them into two groups including cases with anxiety disorders (n=271, 36%) with total score of 8 to 63 in Beck anxiety inventory and healthy subjects (n=482, 64%) with total score of 0 to 7. Then 24 hours recall questionnaire was filled for both groups and outcomes were analyzed with Dietplan6 software. Obesity indices including body fat percentage and body mass index (BMI) were also measured.

**Results:** The analysis of dietary patterns shows that the dietary intake of poly unsaturated fatty acids (PUFA) in grams [35.7(27.9-45.1) vs. 37.2(29.6-46.2), p<0.05] and body fat percentage [23.8(20.5-26.7) vs. 24.8(21.5-27.3), p<0.01] were lower in subjects with anxiety disorders compared with subjects without anxiety disorders; however, other nutrient intakes were not significantly different between two groups.

**Conclusions:** The results of this study confirm that the anxiety disorders are associated with low dietary intake of PUFA and also low body fat percentage.

**Key Words:** Anxiety, obesity, dietary intake.

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**27/712.** Nutrition in the Management of Non-Communicable Diseases  
**Olive oil consumption and incidence of premenopausal breast cancer in the Spanish sun cohort**

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**Introduction:** Breast cancer is the most common cancer in women of Western countries. There are studies in Mediterranean countries indicating an inverse association between olive oil consumption, a constitutional component of Mediterranean dietary pattern, and breast cancer risk. It has been reported that olive oil exerts modulatory effects on breast cancer through a blend of Ras signalling pathways, oxidative stress and DNA damage. Nevertheless, there are inconsistent results and a Greek cohort suggested that the protection might be apparent only for postmenopausal breast cancer.

**Objectives:** We studied the relation of olive oil consumption with breast cancer risk in the context of the Spanish SUN cohort.

**Method/Design:** We followed-up prospectively 7934 premenopausal women for an average of 6.1 years and detected 53 incident breast cancer cases. Diet was assessed at base-line with a semi-quantitative 136-item food-frequency questionnaire previously validated in Spain. Incident cases of breast cancer were diagnosed by a physician and confirmed by review of the participant medical records. The multivariate adjusted HR (Hazard Ratio) for incident breast cancer for each of the 4 upper quintiles of olive oil consumption, taking the lowest quintile as the reference, were assessed using Cox regression models.

**Results:** Increasing olive oil consumption was not associated with lower breast cancer risk in this cohort. The adjusted HR for the highest vs. the lowest quintile of olive oil consumption was 1.08 (95%

CI: 0.46-2.54).

**Conclusions:** No significant association between olive oil consumption and breast cancer was observed in our study. There are other studies reporting an inverse association of olive oil consumption with breast cancer risk only among postmenopausal women, not for premenopausal cancers. Our lack of association could be due to the small number of observed incident cases of breast cancer among postmenopausal women.

**Key Words:** Breast cancer, olive oil

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**27/713.** Nutrition in the Management of Non-Communicable Diseases  
**Association between serum 25 hydroxy vitamin D Levels and anthropometric measurements among Jordanian females**

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**Introduction:** Vitamin D deficiency has been linked to chronic conditions including obesity and autoimmune disorders.

**Objectives:** This study examines serum 25 (OH) D (Vitamin D) levels in relation to anthropometric measurements {waist circumference (WC), percent body fat (%BF) and BMI} among a group of Jordanian females.

**Method/Design:** Eleven female clients (age 29±10 yrs, BMI 27.3±7.4) were interviewed and had been measured for WC, BMI and %BF( measured by Omron HBF-500). Serum 25 (OH) D had been tested in the laboratory. Three clients had been excluded from the study as they were taking Vitamin D supplements. Participants were divided according to serum 25 (OH) D levels into two groups (the lowest levels together and the highest levels together). Comparison between the two groups for WC,BMI, %BF had been made.

**Results:** Participants with higher serum 25 (OH) D levels (36.41±21.41 ng/ml) were younger (age 28.5±12.5 yrs), had smaller WC (87±10cm), lower% BF (41.8±3.6) and higher BMI (27.9±2.6) as they were longer, the mean height was (162.3±2 cm). While participants with lower mean serum 25 (OH) D levels (10.01±4.49 ng/ml) were older (30±8.7yrs), had higher WC (91±26.2cm ),higher %BF (45±8.1%) and lower BMI (26.7±11) as the mean height was (158.5±8.5cm). However, there was no significant difference (p>0.05) between the two groups.

**Conclusions:** These findings suggest that serum vitamin D may be negatively affected by increased total body fat, increased waist circumference and aging but not the BMI in Jordanian females. However, further research with bigger sample size is needed to confirm these findings.

**Key Words:** Vitamin D, Jordan, anthropometry.

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**27/714.** Nutrition in the Management of Non-Communicable Diseases  
**The role of nitrenergic system in antidepressant effects of acute administration of zinc, magnesium and thiamine on progesterone induced postpartum depression in mice**

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**Introduction:** Postpartum depression is a mood disorder that has harmful effects on mothers, infants, family and relationships. Acute decrease of progesterone after delivery has been proposed as a cause for postpartum depression. This hormone can affect neurotransmitters' function. Zinc (Zn) and magnesium (Mg) as trace elements exert their antidepressant effects through neurotransmitter pathways.

**Objectives:** thiamin (Vit B1) deficiency leads to depression in animal models. The aim of this study was to evaluate effects of combination of zinc, magnesium and thiamine on postpartum depression and role of nitrenergic system.

**Method/Design:** One hundred ten female mice in five groups were used. Postpartum depression was conducted using progesterone injections. Combinations of Zinc chloride, magnesium chloride and thiamine HCL were administered 30 minutes before open field and forced swimming test (FST). In order to investigate role of nitrenergic system, L-arginine and LNAME were administered.

**Results:** All treatment groups spent less immobility time than the control group (p< 0.05). Combined administration of Zn+ Mg+ Vit B1 caused the most reduction in immobility time. Administration of L-NAME in Zn+ Mg+ Vit B1 group caused reduction in immobility time while administration of L-arginine caused increase in immobility time in the same group.

**Conclusions:** Zinc, magnesium and thiamine can improve depressive symptoms by nitrenergic pathway. These elements as supplement compounds could be alternatives for antidepressants in postpartum period.

**Key Words:** Nitrenergic system, zinc, magnesium, thiamine, postpartum depression. Abstract

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**27/716.** Nutrition in the Management of Non-Communicable Diseases  
**Adherence to the traditional Mediterranean Dietary pattern and cancer incidence: The SUN project**

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**Introduction:** In the study of avoidable causes of cancer mortality

ty, dietary factors might be involved in approximately 35% of cancer deaths. The adherence to a traditional Mediterranean Dietary Pattern has been previously studied as one of the dietary patterns that may reduce the overall incidence of cancer.

**Objectives:** Our objective was to evaluate the relationship between a MDP and cancer incidence in the SUN cohort

**Method/Design:** Out of 19581 participants included in the cohort up to March 2008 to warrant minimum follow-up of 2 years, 17462 were retained. After excluding those participants with extreme caloric intake or prevalent cancer, 15216 subjects were available for the analysis. Nutritional Information was gathered at baseline with a validated 136-item semi-quantitative food frequency questionnaire. MDP was assessed using the 9-point score proposed by Trichopoulou et al. Participants were classified into three groups according to their adherence to the MDP: 0-3, 4-5 points and 6-9. New cases of cancer were obtained by the follow-up questionnaires mailed every two years and confirmed by the request of the patient's medical information and blindly adjudicated by a medical doctor of the SUN project

**Results:** The SUN cohort is a young Mediterranean cohort. At the end of the follow-up, consisting in 92501 person-year, we observed 256 incident cases of cancer. The results were not significant, showing protective effect (HR:0.87, CI: 0.64-1.17) for the intermediate group. On the contrary no effect was apparent for the high adherence group, (HR:1.03 CI 95%=0.75-1.43). All results were adjusted for smoking status, body mass index, physical activity during leisure time, energy intake and stratified by age.

**Conclusions:** Possibly because of a lack of statistical power and the fact of studying a young population, we found no significant association between a high adherence to the MDP and cancer incidence. A non-significant inverse association was present among intermediate group participants

**Key Words:** Mediterranean Dietary Pattern, cancer

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### 27/726. Nutrition in the Management of Non-Communicable Diseases **Correlation between Thyroid Stimulating Hormone (TSH) and anthropometric measurements among Jordanian females**

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**Introduction:** Obesity is a complex problem, identification of factors related to overweight and obesity may help to tackle this health epidemic. Hypothyroidism had been linked to weight gain in numerous clinical studies.

**Objectives:** This study examines whether Thyroid Stimulating Hormone(TSH)is related to anthropometric measurements among a group of Jordanian females.

**Method/Design:** Forty six females (age: 34.8±12 years, weight: 86.1±15 kg, height: 162.8±5.1 cm) were interviewed during June 2010 and had been evaluated for waist circumference (WC) (measured by anthropometric tape), percent body fat (% BF) (measured by Omron

HBF-500) and TSH had been tested in the laboratory. Pearson's correlation was used to analyze the data.

**Results:** The mean serum TSH value was (1.99±1.36 µIU/L), forty three percent of participants had TSH values between 1.1-2 µIU/L , while 21.7% had TSH values ≤1 µIU/L ml, 15% had TSH values between 2.1-3 µIU/L and 15 % had TSH values between 3.1-5 µIU/L, only 4% had TSH values above 5 µIU/L. The mean WC was (102.3±13.0cm), 41%, 33%, 22% and 4% of participants had WC between 80-95cm, 96-111cm, 112-127 cm and ≥ 128cm respectively. The mean %BF was (47.1±5.1%), 37%, 30%, 26% and 6.5% of participants had %BF between (28-38%), (>51%), (46-50%) and (28-38%) respectively. There was a very weak statistically insignificant positive correlation between TSH and %BF, WC. Those with higher serum TSH values had a higher (% BF: r=+0.97, p>0.05 and larger WC: r=+0.11, p>0.05).

**Conclusions:** There was a positive correlation although weak as data indicated that as TSH values increased, %BF and WC increased among Jordanian females. However, further clinical research is needed to examine TSH and adiposity relation.

**Key Words:** Thyroid Stimulating Hormone, Jordan, Waist Circumference.

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### 27/730. Nutrition in the Prevention of Non-Communicable Diseases **Time trends of selected nutrients intake as risk factors of osteoporosis. The Warsaw adolescents study**

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**Introduction:** Factors such as nutrition and physical activity influence bone development in youth, optimising peak bone mass, what is important in reducing the risk of osteoporosis later in life.

**Objectives:** To determine time trends (1982-2006) in calcium, phosphorus, magnesium, vitamins D and C intake in adolescents. Current intakes were compared with Polish DRI using probability method.

**Method/Design:** Data come from successive surveys of randomly selected samples of adolescents ( aged 11-15 years old), from Warsaw. In total 9747 pupils have been examined, with response rate varying from 55 % to 87 % depending on year. Assessment of dietary intake was done using 24 hour recall method. Current physical activity by questionnaire and in subsample, bone mineral density at the forearm with pDXA technique and vitamin D concentration in serum were examined. Changes the mean daily intake of analysed nutrients in successive surveys, were calculated with use of linear regression models, with use of STATA v.10 programme.

**Results:** In analysis of the occurrence of trends in nutrient intakes among Warsaw adolescents, we observed a significant reduc-

tion especially in vitamin D intake between the first and last study. In spite of a positive changes in calcium, magnesium and vitamin C intake in adolescents, they are not fully satisfactory as increase was not sufficient enough when compared with DRI. A considerable percentage of adolescents under consumed of calcium, magnesium, vitamin D and C.

**Conclusions:** In view of the need of controlling the modifiable risk factors of osteoporosis development from the earliest years of life, further activity is desired to stabilize the health-oriented changes in diets of adolescents.

**Key Words:** Adolescents, nutrients, intake, trends, osteoporosis

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**27/731.** Nutrition in the Prevention of Non-Communicable Diseases

**A multifunctional diet with anti-inflammatory properties has preventive potential against the metabolic syndrome**

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**Introduction:** Different functional foods may ameliorate single features of the metabolic syndrome (MetS). However, little is known about the potential synergistic effect of combining functional food concepts in the diet.

**Objectives:** To assess, in healthy volunteers, the impact of a diet combining multiple functional concepts on risk markers associated with the MetS.

**Method/Design:** Randomized crossover intervention in 44 healthy women and men, considered at risk for developing MetS by virtue of their age (50-73 y.o.) and overweight condition (BMI 25-33). Exclusion criteria were fasting glycemia >6.1 mmol/L and prescribed treatment for any medical condition. The trial compared a multifunctional (active) diet (AD) with a control diet (CD) devoid of the "active" components. Each diet was consumed during 4 weeks with a 4-week washout period. AD included items with potential antiinflammatory action: low glycemic impact meals, antioxidant-rich foods, fish rich in omega-3 fatty acids, viscous dietary fibers (guar gum and betaglucans), barley kernels, almonds, soybeans, soy protein, stanols and a probiotic (*Lactobacillus plantarum* Heal19/DSM15313). The nutritional profile of both diets was close to Nordic dietary recommendations. Constant body weight was enforced along the trial, but a slight reduction occurred over both dietary periods (-0.9 % for CD and -1.8% for AD).

**Results:** CD did not modify the metabolic variables measured whilst AD promoted significant ( $P<0.05$ ) changes in total serum cholesterol (-26% vs baseline), LDL-cholesterol (-34%), triglycerides (-19%), LDL/HDL (-27%), apoB/apoA1 (-10%), fasting insulin (-17%), HbA1c (-2%), hs-CRP(-29%), PAI-1 (-26%) and systolic blood pressure (-8%). Reynolds cardiovascular risk score decreased

by 34%. Except for fasting insulin and PAI-1, the differences between diets remained significant after adjustment for body weight changes.

**Conclusions:** Four week consumption of the multifunctional diet by healthy subjects improved different MetS-associated parameters, revealing important preventive potential of this dietary approach. Supported by the Lund University Antidiabetic Food Centre.

**Key Words:** Metabolic syndrome, dietary prevention, functional foods, subclinical inflammation

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**27/741.** Nutrition in the Prevention of Non-Communicable Diseases

**Diets containing sea cucumber (*Isostichopus Badionotus*) meals are hypocholesterolemic in rats**

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**Introduction:** Sea cucumber is widely consumed as a putative functional food. It contains many biologically active substances, but only limited research on its properties in vivo has been done.

**Objectives:** In the present study, we evaluate the effect of dietary intake of thermally treated and untreated sea cucumber on growth performance and lipid profile of rats.

**Method/Design:** An analysis was done of the effects of meals containing *Isostichopus badionotus*, a sea cucumber from southeast Mexico, on growth performance and body lipid profile in rats (16 d feeding trial). Sea cucumber body wall was either lyophilized, cooked (100 °C, 1 h in water) and lyophilized or oven-dried (70 °C for 12 h), ground and incorporated into cholesterol-containing diets.

**Results:** *I. badionotus* meals generally had high protein and low lipid contents. Methionine, tryptophan and lysine were present in moderate amounts, but arginine and glycine levels were high. The meal supported growth and improved lipid profile in rats. In particular, serum cholesterol, low density lipoproteins (LDL), triglycerides concentration and atherogenic index values were all greatly reduced, as were liver lipid, triglycerides and cholesterol ( $p<0.05$ ).

**Conclusions:** Cooking or heat-treatment of the meals lowered

but did not abolish their hypolipidemic potency. Processed meals had to be incorporated in diets at much higher levels to have beneficial effects. Overall, *I. badionotus* from the Yucatan Peninsula has potential as a functional or health-promoting food.

**Key Words:** Sea cucumber, hypolipidemic effect, rats, functional food,

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**27/754.** Nutrition in the Prevention of Non-Communicable Diseases  
**Antioxidant intakes and coronary heart disease incidence in Greece**

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**Introduction:** Cardiovascular Disease (CVD) is the most common cause of death in Europe. Almost half of the CVD deaths are manifested as Coronary Heart Disease (CHD). Diet is a recognized CHD component cause. Antioxidants are compounds able to disrupt oxidation chain reactions and thus protect other constituents, including important biomolecules, from oxidation. Oxidation has been hypothesized as a mechanism to explain the processes implicated in the development of chronic diseases and ageing.

**Objectives:** Research on the influence of antioxidants on the occurrence of CHD is not yet conclusive. This study was designed to investigate prospectively the role of antioxidants on CHD incidence in the Greek population.

**Method/Design:** The EPIC cohort in Greece consists of 28.572 participants (11.954 men and 16.618 women) 20 – 86 years old recruited between 1994 and 1999 from all over Greece and followed up till the end of 2009. The diet of the study participants was assessed with a validated semi quantitative food frequency questionnaire. Specialized databases were used to estimate the dietary intakes of about 40 antioxidant compounds and indices. Cox Proportional Hazards Regression was used for the analyses using CHD incidence as the primary outcome.

**Results:** 636 participants developed CHD in the course of the study. A strong inverse association was reported between Proanthocyanidin intake and ORAC and FRAP indices on the one hand and CHD on the other, in both sexes. In women, flavones, flavanones, total flavonoids, vitamin C and total phenols appear to also convey some protection. No significant positive associations between any of the antioxidants and incident of CHD were observed.

**Conclusions:** This study shows a protective role of some antioxidants against the development of CHD in a large Greek population, and might explain in part the reported health benefits of the traditional Mediterranean diet.

**Key Words:** Antioxidants, Coronary Heart Disease, EPIC study, Mediterranean diet,

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**27/757.** Nutrition in the Prevention of Non-Communicable Diseases  
**How to reduce glycaemic response in processed foods: mechanisms of action and interest**

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**Introduction:** Decreasing the glycaemic response in general population is interesting in prevention of some metabolic diseases and has been considered as relevant by EFSA. However, process and food composition influence dramatically the carbohydrate fate and then the metabolic consequences of carbohydrate rich foods.

**Objectives:** The purpose of the work was to evaluate different ways to decrease glycaemic response in healthy subjects (carbohydrate digestibility, fibres, fat), by understanding some of their mechanism of action (gastric emptying, intestinal enzyme digestion...).

**Method/Design:** Six clinical trials including 12 to 20 subjects were reviewed to evaluate the effect of added fibres, fat and carbohydrate digestibility on glycaemic and insulinemic responses. Moreover, to understand the mechanism of action, gastric emptying and carbohydrate fate through isotope methodology were investigated. Tested products were cereal products of two types, either biscuits or extruded cereals differing in their 1/ carbohydrate digestibility, 2/ soluble fibre content or 3/ fat content.

**Results:** Two successful ways were obtained to decrease significantly the glycaemic and insulinemic responses. On one hand, there was the replacement of rapidly available glucose by slowly available glucose through process adaptation including a change of intestinal enzyme digestion. On the other hand a significant dose-dependent reduction in gastric emptying was observed with addition of soluble fibres. Fat from 1g to 12g/100g did not modify significantly the glycaemic response.

**Conclusions:** It is possible to reduce the glycaemic and insulin response of processed carbohydrate rich foods by modifying the process (to increase the slowly available glucose content) or by adding soluble fibres. In another hand, modifying fat in carbohydrate rich foods has a minor impact on glycaemic and insulin responses.

**Key Words:** carbohydrates, cereal food, glycaemia, fibres, insulin

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**27/760.** Nutrition in the Prevention of Non-Communicable Diseases  
**Antihyperglycemic activity of *Passiflora alata* of diabetes in NOD-mice (Non-Obese Diabetic)**

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**Introduction:** Passiflora spp. is a fruit native to Brazil good source of antioxidants. Its peel is a byproduct of industrial production of juice. Studies have been indicated that dietary antioxidants may protect against some chronic disease by your capacity for scavenging free radicals. Insulin deficiency on diabetes promotes increases in  $\beta$ -oxidation of fatty acids that increase the formation of free radicals, especially hydrogen peroxide. In addition this increase fat influx into the liver can be cause liver disease.

**Objectives:** Determine the potential antioxidant of Passiflora spp peel and its effect on diabetes.

**Method/Design:** Commercial Passiflora spp. peel flour (PPF) was used supplement in standard diet in ratio  $\frac{1}{4}$  for 24 weeks. Total content of phenolics extracted by water were analyzed, as well as the antioxidant activity by 2,2-diphenyl-1-picrylhydrazyl (DPPH). 34 female NOD mice aging 4 weeks of life were hosted in a SPF animal facility. The animals were divided into control group (normal diet) (N-20) and PPF treated group (n-14). Blood glucose was measured by glucometer weekly between the fourth and twenty four week. Hepatic enzymes (ALT e AST) levels were measured by Modular System (Roche) and insulin by Elisa Kit (Millipore) the final of the experimental protocol. It was analyzed histological sections of pancreas wich were colored with eosin / hematoxylin.

**Results:** Aqueous extract of PPF showed  $3.63 \pm 0.27$  mg GAE/g and it was able to scavenge  $17.98\% \pm 1.23$  of the radical after 30 minutes of reaction. Level of blood glucose was used for confirmed diabetes in the animals. PPF group showed reduction in ALT and AST levels and increase in serum insulin concentration, as well as, reduction on insulinitis observed by histological analysis.

**Conclusions:** These results suggest that daily intake of Passiflora spp. peel flour can reduce the diabetes incidence and damage on liver in NOD mice.

**Key Words:** passion fruit, antioxidant activity, diabetes, liver disease

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### 27/761. Nutrition in the Prevention of Non-Communicable Diseases **Dietary intake and gastric cancer risk in the Greek EPIC cohort study**

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**Introduction:** Despite the gradual decrease of its incidence, stomach cancer is still the second most common cause of cancer-related death worldwide. It has been proposed that the risk for gastric cancer may be associated with dietary factors. The traditional Mediterranean Diet (MD) has been shown to be inversely related to cancer incidence.

**Objectives:** To investigate the relation between the intake of several food groups, as well as the adherence to traditional Mediterranean Diet, and the incidence of gastric cancer in the Greek component of the European Prospective Investigation into Cancer and nutrition (EPIC) study.

**Method/Design:** After a median of 10.7 years, 26,426 participants (10,972 men, 15,454 women) were actively followed-up, contributing 259,000 person-years. Stomach cancer was diagnosed in 61 participants (42 men, 19 women). Dietary intakes were ascertained at enrollment through an extensive, validated, interviewer-administered food frequency questionnaire. Data were analyzed through Cox regression, controlling for potential confounders.

**Results:** Inverse associations of gastric cancer incidence with olive oil intake (hazard ratio per gr/day; 0.985, 95 % CI, 0.97 – 0.99), monounsaturated lipids intake (hazard ratio per gr/day; 0.974, 95 % CI, 0.95– 0.99), as well as adherence to Greek religious diet (hazard ratio; 0.535, 95 % CI, 0.34 – 0.85) were observed. On the other hand, consumption of salty biscuits and crackers was related to increased incidence of stomach neoplasia (hazard ratio per gr; 1.073, 95 % CI, 1.03 – 1.12). No statistically significant association was found between adherence to MD and gastric cancer occurrence, probably due to lack of power.

**Conclusions:** In a general population – based Greek cohort we have found evidence that consumption of certain foods/nutrients and adherence to the Greek religious diet are associated with stomach cancer incidence.

**Key Words:** gastric cancer; cohort; Mediterranean diet; incidence

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### 27/774. Nutrition in the Prevention of Non-Communicable Diseases **Effect of buckwheat sprouts and groats on antioxidant enzymes activity in rats**

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**Introduction:** The nutritional benefit of buckwheat (*Fagopyrum esculentum*) is well known. Several studies have shown that eating buckwheat sprouts and groats can alleviate metabolic disorders like obesity, diabetes and hypercholesterolemia. In Poland, particularly in the east part of the country, buckwheat groats are common food, but buckwheat sprouts are rather unknown.

**Objectives:** To explore the effect of adding buckwheat groats and sprouts to the fodder of rats on the activity of antioxidant enzymes in selected tissues of rats fed high fat diet.

**Method/Design:** Each group consisted of six young Wistar rats (three months old, males, ca. 250 g of body weight) that were

fed an appropriate diet for a period of five weeks. After this time the rats were anesthetized, the tissues were isolated. In selected tissues, we measured the activities of the enzymes: glutathione peroxidase (GPX1) and catalase (CAT). Additionally, the antioxidant potentials of plasma rats and extracts from buckwheat groats and sprouts were determined by FRAP method. The total content of polyphenols in fodder of rats and in extracts of groats and sprouts were estimated using Folin-Ciocalteu method.

**Results:** Antioxidant potential and total polyphenols' content of buckwheat sprouts was much higher than those of groats. Administration of buckwheat sprouts to the diet of rats caused a significant decrease in activities of both antioxidant enzymes when compared to the control group. Buckwheat groats The addition of buckwheat groats to the fodder of rats resulted in smaller changes in antioxidant activity of these enzymes.

**Conclusions:** The obtained data suggest that buckwheat groats, particularly sprouts, possess a significant antioxidant potential, which may be used in amelioration of oxidant-induced damage. The activity of antioxidant enzymes, shown in this study, may help to introduce buckwheat sprouts as a health-promoting product into the diet.

**Key Words:** buckwheat, rats, antioxidant enzymes, groats

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#### 27/781. Nutrition in the Prevention of Non-Communicable Diseases **Micronutrient status of adolescent girls in central Mozambique: Zane-study**

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**Introduction:** In developing countries, children and women suffer the most from malnutrition. Especially vulnerable are adolescent girls who are still growing but likely to become pregnant. Mozambique is among the least developed countries. About 40% of Mozambican girls give birth before the age of 18 years but little is known on their nutritional status. High prevalence of HIV-infection further complicates the situation.

**Objectives:** Our aim was to collect data on the diet and nutritional status of adolescent girls in Zambesia province, central Mozambique. The present study focuses on vitamin A, zinc, iron and iodine. Deficiencies of these micronutrients are globally serious nutritional problems.

**Method/Design:** A cross-sectional study was carried out on two occasions in 2010. Girls aged 14 to 19 years were studied in Quelimane city (urban area), as well as central areas and rural villages in two districts. Anthropometrical and biochemical measurements were used as indicators of nutritional status. Whole blood haemoglobin was measured with HemoCue®. Serum and spot urine samples were collected, frozen and delivered to Finland for analyses. HIV, malaria and fecal parasites were tested from compliant subjects.

**Results:** Biochemical data on nutritional status are available from 532 girls of whom 63 were pregnant and 29 HIV-positive (161 did not consent to test). Body mass index of the non-pregnant girls was [mean(SD)] 20,2 (2,4) kg/m<sup>2</sup>. Average blood haemoglobin was 119 (16) g/l and serum ferritin in the subjects with CRP ≤10 mg/l was 26,3 (21,4) µg/l. Average serum concentration of zinc was 9,48 (2,35) µmol/l and retinol 0,87 (0,22) µmol/l. Median iodine concentration in spot urine samples was 69,7 µg/l [mean (SD) 95,1 (83,4)].

**Conclusions:** These results indicate that micronutrient deficiencies are common among adolescent Zambesian girls. The data will be further analyzed according to HIV and pregnancy status and other relevant factors.

**Key Words:** micronutrient status, adolescent girls, HIV, pregnancy, Africa

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#### 27/783. Nutrition Research and Education

#### **Anti-proliferative and cell-cycle effects of chokeberry and pomegranate juices on colon cancer cells in vitro**

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**Introduction:** Chokeberry and pomegranate juices are good sources of polyphenols, mainly anthocyanins and ellagitannins. Some of their biological effects are shown to overcome effects of similar fruits and the possible explanation is higher content of bioactive compounds and differences in their metabolic fate. For that reason they are prioritized in usual diet as foods with beneficial effects on human health.

**Objectives:** The aim of this study was to investigate the anti-proliferative effects of raw chokeberry (*Aronia melanocarpa*) and pomegranate (*Punica granatum*) juices on LS-174 colon cancer cell line, in comparison to the effects of other berry juices (red raspberry, black raspberry, blueberry, red currant and black currant), and to evaluate their effects on cell cycle.

**Method/Design:** Juices were made from chokeberry fruit grown organically in western Serbia and from wild pomegranate harvested in south Montenegro. In vitro cytotoxic activity of investigated juices on LS-174 cell line was determined by MTT assay, while cellular DNA content and cell cycle distribution were determined by flow cytometry.

**Results:** The in vitro assay showed that both juices significantly decreased cell survival in tested cell line. The IC<sub>50</sub> values in the MTT assay were 18,56±1,26 µl/ml for chokeberry juice and 2,24±0,78 µl/ml for pomegranate juice showing the greatest anticancer potency of pomegranate juice. IC<sub>50</sub> values for other berry juices were ranged from 15.4±2.3 for black currant juice and 66.7±2.1 for black rasp-



berry juice. In vitro antitumor activities for both juices were accompanied with the important sub-G1 accumulation of all cell lines after treatment.

**Conclusions:** It was shown that pomegranate juice has the most profound anti-proliferative potential on LS-174 cells in vitro, compared to the other berry juices investigated and cell cycle arrest is one of the proposed mechanisms of their anti-cancer action. The differences in activity of these juices in vivo should be further evaluated and analyzed.

**Key Words:** Anti-Cancer, Chokeberry, Pomegranate

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**27/784.** Nutrition Research and Education

**A technologically designed dairy-fat improved the atherogenic outcome in hamster and is related to a specific metabolomic signature**

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**Introduction:** Cholesterol and saturated fatty acids in dairy fats are frequently accused to promote atherosclerosis. Dairy fats can be technologically designed to improve health outcome

**Objectives:** We evaluated the atherogenicity of various fat designs. We also hypothesized that the atherogenic potential of edible fats can be 'read' as a metabolic signature.

**Method/Design:** Hamsters were fed for 12 weeks high fat diets (60% energy as fat): standard butter (G9), standard butter with 50% plant oil mix (G10), decholesterolized G10 (G12), G9 with 50% canola (G11), decholesterolized/desaturated butter (G13), G13 with 50% plant oil mix (G14), native palm oil with 30% canola (G16). The severity of atherosclerosis was determined by the cholesteryl ester deposition in the aortic tree. Fatty acid analysis was performed in each plasma lipid classes and liver total lipids. LCMS metabolomics was performed on plasma and urines.

**Results:** The standard butter (G9) induced the greatest atherogenic outcomes ( $P < 0.05$ ), and the plant oil mix (G16) the least ( $P < 0.05$ ). The decholesterolized/desaturated butter (G13) exhibited the lowest atherogenic severity among the dairy fats ( $P < 0.05$ ; 1.9 fold less than the standard butter (G9)).

Among the 124 diagnostic fatty acids used, a subset of 46, almost all in plasma, were especially predictive of atherosclerosis (prediction value of 65%), except for hamsters receiving the G13-diet. LCMS metabolomics was comparatively better to predict the dietary influence of all diets on the atherogenic outcome, especially in urines samples.

**Conclusions:** Decholesterolization / desaturation of dairy fat bring a clear atherogenic benefit. Fatty acid profiling coupled with multivariate statistical methods permit to predict atherogenesis to some extent, whereas a metabolomic fingerprinting was of better ac-

curacy. The predicting LCMS analytes are currently being determined in a biomarker perspective.

**Key Words:** dairy fat, atherogenesis, technological design, LCMS metabolomics

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**27/792.** Nutrition in the Prevention of Non-Communicable Diseases  
**Polymorphisms in gstm1, gstt1, coffee consumption and cutaneous melanoma risk.**

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**Introduction:** Glutathione-S transferase genes GSTM1 have been reported to influence UV sensitivity and melanoma risk. There is increasing evidence identifying the role of dietary components in modulating the risk of melanoma. The aim of this study was to investigate GSTM1, GSTT1, coffee consumption and the risk of cutaneous melanoma.

**Objectives:**

**Method/Design:** Within a case-control study aimed to study environmental and occupational risk factors for melanoma conducted in the inpatient wards of IDI-San Carlo Rome (1), individual patterns at two polymorphic genes (GSTM1 and GSTT1) belonging to Glutathione S-Transferases family (GSTs) were investigated in 340 subjects (188 cases of melanoma and 152 controls). The genetic analysis were conducted by INAIL. Information on socio-demographic characteristics, diet, smoking history, sun exposure and pigmentary characteristics was collected for all subjects. The association between genetic polymorphisms, coffee consumption and cutaneous melanoma was assessed by logistic regression.

**Results:** High frequency of coffee drinking ( $\geq$  once daily), compared with low frequency consumption of coffee ( $< 7$  times weekly) was associated with a protective effect for cutaneous melanoma (OR: 0.45; 95%CI: 0.30- 0.66) after controlling for age, sex, education, number of nevi, pigmentary characteristics, tobacco smoking and sun exposure. After controlling for other food items simultaneously in the model the protective effect of coffee remained. After stratifying for GSTM1 and GSTT1 genotypes, the protective effect was more pronounced for GSTM1 null genotype (OR:0.38; 95% 0.17-0.83) and GSTT1 null genotype (OR: 0.01; 95% CI: 0.00- 0.22).

**Conclusions:** Our results show that consumption of coffee is protective for melanoma and GSTM1 and GSTT1 null individuals may benefit more of this protection than GSTM1, GSTT1 positive individuals. Fortes C, Mastroeni S, Melchi F, Pilla MA, Alotto M, Antonelli G, Camaione D, Bolli S, Luchetti E, Pasquini P.

The association between residential pesticide use and cutaneous melanoma. Eur J Cancer. 2007;43:1066-75.

**Key Words:**Coffee, Melanoma, Epidemiology, GSTM1 and GSTT1

**27/794. Nutrition in the Prevention of Non-Communicable Diseases**  
**Iran's experience on reduction of Tran's fatty acid Content in edible oils**

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**Introduction:** The current situation of Cardiovascular Disease (CVD) has encouraged health policy makers of Iran to design a national plan and agenda in order to improve the quality control of soap Oil products and set up a surveillance system to monitor the level and amount of Trans fatty acids (TFAs) in oil industry.

**Objectives:** The program's framework comprised three main aspects

**Method/Design:** 1) Campaigning on Public education with an emphasis on increase in knowledge and attitude of the public regarding adverse health effects of TFA.

2) Negotiation of Ministry of Health and Medical Education) MOHME) representatives with food processing companies and setting regulations on restricting the amount of TFAs from >20% to less than 10%.

3) Establishment of a national committee including experts of MOHME and representatives of major food industries.

**Results:** Total Production of Solid Vegetable oil decreased while total Production of Sop Vegetable oil increased significantly in consecutive years in Iran. A total of 181 samples of edible vegetable oil products from local manufacturers and the retail market were analyzed for their trans-fatty acid compositions and contents.

**Conclusions:** TFA and SFA intake can be decreases by Proper guidance and education of people, Voluntary reduction of these fats content by the oil industry and Oil Labeling TFA and SFA composition along with Legislation about TFA and SFA reduction in edible oil (legislation to ban these fats). Our study indicated sop oil production is increased at an accelerated pace while solid oil production is reduced. Furthermore, TFA and SFA content of oil are scaledown.

**Key Words:** National Policy, Edible Oil, Trans Fatty Acid; and Iran.

**27/796. Nutrition in the Prevention of Non-Communicable Diseases**  
**The effects of berberis vulgaris fruit extract on serum lipoproteins, apob, apo-a-i, homocysteine, glycemic control and total antioxidant capacity in type 2 diabetic patients**

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**Introduction:** Berberine is a major alkaloid in Berberis vulgaris fruit extract (BVFE) which have important role in regulation of serum glucose and fat metabolism in vivo and in vitro but its role in type 2 diabetes have not been extensively examined.

**Objectives:** The aim of this study was the effect of BVFE on serum lipoproteins, apoB, apoA-I, homocysteine, glycemic control and total antioxidant capacity in type 2 diabetic patients.

**Method/Design:** In a double-blind randomised clinical trial, 31 non-smoking diabetic patients were randomly assigned to 3 g/d BVFE or placebo for 3 months. Serum glucose, lipoproteins, apoB, apoA-I, insulin, homocysteine, HbA1c were measured at baseline and end of 3rd month. At the beginning, end of 1st, 2nd and 3rd month, a 24-hour dietary recall questionnaire was completed from each patients.

Data were analyzed by SPSS version 16.

**Results:** There was no significant difference in dietary intake of the participants in BRFE group during the study and also compare to placebo group. There were significant difference in serum TG(p=0.0001), TC(p=0.001), LDL-c(p=0.001), apoB (p=0.001), glucose (p=0.002), insulin (p=0.01), insulin resistance (p=0.01) and increase in serum TAC (p=0.005) between two groups at the end of study but homocysteine, HbA1c and HDL-c had no significant change between two groups at the end of study.

**Conclusions:** Intake of 3g/d BVFE for 3 month may have beneficial effects on lipoproteins, apoproteins, glycemic control and TAC in type 2 diabetic patients.

**27/804.** Nutrition in the Prevention of Non-Communicable Diseases

**Dietary fatty acid composition during lactation and the risk of asthma in the offspring**

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**Introduction:** Fatty acids (FA) modulate the immune system, and they might affect the development of IgE – mediated allergic diseases. The risk of developing allergic diseases may be greatest in early life.

**Objectives:** We explored the association of maternal dietary FA composition during lactation with the risk of asthma in the offspring.

**Method/Design:** The subjects comprised 1798 children and their mothers from the Type 1 Diabetes Prediction and Prevention (DIPP) Nutrition Study. Dietary intake was assessed by a validated 181-item food frequency questionnaire, which covered the 3rd month of lactation. The incidence of asthma was assessed by the age of 5 with a questionnaire modified from International Study of Asthma and Allergies in Childhood (ISAAC). Cox proportional hazards regression was used for statistical analysis.

**Results:** 5.3% of the children in the study had asthma. The mean (SD) duration of exclusive breastfeeding was 2.3 (1.8) months, while

that of total breastfeeding was 9.2 (4.7) months. The use of margarine was associated with an increased risk of asthma (user vs. non-user HR 1.96, 95%CI 1.01-3.82, p=0.047). Low intake of margaric acid (17:0) was associated with an increased risk of asthma in non-allergic mothers (lowest quarter vs. the mid half HR 3.66, 95% CI 1.20-11.19, p=0.043). The intakes of n-3 PUFA and fish were not associated with the risk of asthma.

**Conclusions:** In the present study, the use of margarine in the whole cohort, and a low intake of margaric acid in non-allergic mothers, were associated with an increased risk of asthma in the offspring. The intakes of n-3 PUFA and fish were not associated with the risk of asthma.

**Key Words:** diet, asthma, lactation, fatty acids

**27/808.** Nutrition in the Prevention of Non-Communicable Diseases

**The effect of resveratrol on some biochemical parameters in serum rats fed high fructose diet**

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**Introduction:** Resveratrol (3,5,4'-trihydroxy-trans-stilbene) has a wide range of activities on human body including anti-inflammatory, anti-angiogenic, anti-proliferate and anti-cancer actions.

**Objectives:** The aim of this study was an evaluation of resveratrol in rats fed high-fructose diet on selected biochemical parameters in serum.

**Method/Design:** Male Wistar rats (n=30), 5 weeks old, after the adaptation period, were randomly divided into five groups and fed experimental diets. Group I – (control) was fed AIN-93G, group II – high fructose diet (HF), group III – HF diet with addition of 0.02% of resveratrol (RSV), group IV – HF diet with 0.04% of RSV and group V – HF diet with 0.06 % of RSV. After fourth month of experiment, fasted rats were anaesthetized; blood was drawn from a heart puncture and collected in test tubes. In serum concentration of total cholesterol (TC), HDL cholesterol (HDL) triacylglycerol (TAG), alanine aminotransferase (ALT), asparagine aminotransferase (ASP) and cholinesterase activity were analyzed with commercial kits.

**Results:** Addition to HF diet of resveratrol did not alter the concentration of TC, LDL and activity of ASP. The level of HDL cholesterol was significantly increased in serum of rats fed HF diet with 0.06% of RSV in comparison to group fed AIN-93G and HF diet. The level of TAG was significantly lower in serum of rats fed diet with 0.06% RSV in comparison to animals fed diet with 0.02% RSV. ALT activity was significantly higher in rats fed HF diet with 0.06% of RSV. Cholinesterase activity was significantly lower in group fed HF diet with 0.04% of RSV in comparison to control group.

**Conclusions:** Resveratrol may be a good bioactive compound in modulation of lipid profile and prevention of non-communicable chronic diseases.

**Key Words:** resveratrol, high-fructose diet, rats, lipid profile

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27/810. Nutrition in the Prevention of Non-Communicable Diseases

**Basic chemical composition of some varieties of brown and yellow oat (whole grain, husk, endosperm and bran)**

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**Introduction:** Oats significantly differs to its chemical composition from other cereals. The preferred combination of nutrients and bioactive compounds occurring in this grain found its application in human and clinical nutrition.

**Objectives:** The aim of the study was to determine basic chemical composition in some varieties of brown and yellow oat (in whole grain, endosperm, bran and husk).

**Method/Design:** Varieties of oats were obtained from Malopolska Plant Breeding Station of Polanowice, Poland. There were three brown (Gniady, CHD 2875/01, CHD 2833/02) and three yellow (Bohun, Deresz, Cwal) cultivars. Oats were husked and grinded to obtained bran and endosperm. Dry mass, total nitrogen, total fat, ash, dietary fiber, carbohydrates were determined using AOAC methods.

**Results:** It has been shown that bran and whole grain are rich in protein, fat and fiber -both in brown and yellow oats, especially it was found in the CHD 2875/01 and Bohun cultivars. In all cultivars the endosperm has lowest concentration of fiber. The most deficient in this component were endosperms of Cwal and Gniady varieties. The husk of all types of oats contained more carbohydrates, fiber and ash than others fraction of yellow and brown grains.

**Conclusions:** These investigated cultivars of oats are good source of nutrient components, especially whole grain. The husk, which is removed from grain during different technological processes, has also beneficial chemical composition. Oats and oat products should be often present in our daily diets.

Acknowledgment: This study was supported by the Polish Ministry of Science and Higher Education; grants no N N312 208436.

**Key Words:** Functional foods, oat, chemical composition, whole grain

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27/813. Nutrition in the Prevention of Non-Communicable Diseases

**The antioxidant activity of extracts of brown and yellow oats (whole grain, husk, endosperm and bran)**

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**Introduction:** Lots of scientific and epidemiological researches show that nutritional factors are very important in prevention of changes caused by reactive oxidative species on human body. The good sources of antioxidants in daily diets are vegetables, fruits, and cereals which are still little appreciated.

**Objectives:** The aim of the study was to evaluate the antioxidant properties in some varieties of brown and yellow oat (in whole grain, endosperm, bran and husk).

**Method/Design:** Material was obtained from Malopolska Plant Breeding Station of Polanowice, Poland. There were three brown (Gniady, CHD 2875/01, CHD 2833/02) and three yellow (Bohun, Deresz, Cwal) cultivars. Oats were husked and grinded to obtained bran and endosperm. The antioxidant activity was measured by determining the ability of elimination the free radical ABTS• and DPPH• and by indicates the content of polyphenols by Poly-Swain and Hills method.

**Results:** The highest ability of free radicals scavenging (ABTS• and DPPH•) had properly whole grain of Gniady and CHD 2875/01 cultivars. The lowest capacity of free radical scavenging activity had endosperm of both yellow and brown oats. It has been shown that the brown oats cultivars are richer in polyphenols than yellow ones. Among fractions the husk was the best source of polyphenolic compounds (both in yellow and brown oats), on the other hand there was the lowest concentration of this components in the endosperm. In whole grain and bran the amount of polyphenols was similar in all cultivars.

**Conclusions:** The husk has very strong antioxidant activity, most likely connected with the polyphenol concentration. These results suggested that it should be increased amount of whole grain oats products in human nutrition.

Acknowledgment: This study was supported by the Polish Ministry of Science and Higher Education; grants no N N312 208436.

**Key Words:** antioxidant activity, polyphenols, whole grain, oats

### Maternal food consumption during pregnancy and risk of asthma and allergic outcomes in the offspring

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**Introduction:** Epidemiological and immunological studies suggest that maternal diet during pregnancy might affect the development of allergic diseases in the offspring.

**Objectives:** The authors set out to study the effect of maternal food consumption during pregnancy on the emergence of ISAAC-based allergic outcomes: asthma, allergic rhinitis, wheeze, and atopic eczema by the age of 5 years.

**Method/Design:** Data from 2441 children at 5 years of age were analyzed within the Finnish Type 1 Diabetes Prediction and Prevention (DIPP) Study, a population-based birth cohort study. Maternal diet was assessed with a validated food frequency questionnaire.

**Results:** In multiple regression models adjusted for known confounders, low maternal consumption of leafy vegetables [adjusted odds ratio (aOR): 1.55; 95% CI: 1.21, 1.98], malaceous fruits (aOR: 1.45; 95% CI: 1.15, 1.84), and chocolate (aOR: 1.36; 95% CI: 1.09, 1.70) were positively associated with the risk of wheeze in children. No material associations were observed regarding asthma, allergic rhinitis, and atopic eczema.

**Conclusions:** Development of wheeze in childhood appears to be influenced by intrauterine exposure to some factors in the maternal diet.

**Key Words:** pregnancy, children, asthma, allergy, diet

### Patterns of calcium intake and their relation to the bone status in mothers and daughters.

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**Introduction:** It was hypothesized that family similarity in the intake of dairy products and calcium by mothers and daughters affects the status of bone tissue and the risk of osteoporosis.

**Objectives:** Analysis of similarities between mothers and daughters in patterns of calcium intake from dairy products and examination of relations between patterns of calcium intake, bone tissue status and risk of osteoporosis.

**Method/Design:** The research involved 712 mother-daughter pairs aged 29-59 and 12-21, respectively. The food consumption frequency method was used to determine the customary calcium intake from dairy products and then from the daily diet (DD; mg/person/day). Bone mineral density (BMD) was measured by dual-energy x-ray absorptiometry.

**Results:** Three patterns of calcium intake were determined for mothers and daughters, respectively. In mothers, the patterns were referred to as: "milk with natural milk beverages" (19% of the sample), "average" (68%), "cheese-yoghurt" (13%) and in daughters: "milk-cheese-yoghurt" (19%), "average" (67%), "yoghurt-cheese" (14%). Family similarity in the consumption of dairy products and calcium was established for 57% of mothers and daughters from the same family. Quantitative similarity in calcium intake from DD ranged from poor to moderate ( $r=0.14-0.40$ ) and qualitative similarity (concerning sources of calcium and their share in DD) was high ( $r=0.63-0.90$ ). The correspondence analysis showed that a lower BMD of mothers was accompanied by a lower BMD of daughters, and a higher BMD of mothers was accompanied by a higher BMD of daughters and consumption by daughters of various dairy products ("milk-cheese-yoghurt" pattern) and calcium in the recommended amounts (1216 mg/day).

**Conclusions:** The occurrence of family similarities was found for mothers and daughters as regards the intake of dairy products and calcium and bone mineral density. In daughters, consumption of various dairy products and recommended amount of calcium had a favourable effect on their bone status and a lower risk of osteoporosis.

**Key Words:** Bmd, Calcium, Family, Intake And Osteoporosis.

**27/844. Nutrition in the Prevention of Non-Communicable Diseases**  
**Association between dietary fat intake and serum lipid status in healthy adolescents**

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**Introduction:** Serum lipid status is an important determinant of non-communicable diseases such as cardiovascular diseases. Lipid status is known to be influenced by dietary habits, however correlations are not always as straightforward as they seem.

**Objectives:** To assess the correlation between regular fat intake and serum lipid status in healthy adolescents.

**Method/Design:** The present study comprised 553 (289 females) healthy European adolescents aged 12.5–17.5 years. Information on dietary intake was obtained by two 24h recalls. Blood samples were obtained after an overnight fasting period. Multilevel analysis with inclusion of a random intercept for study centre was used to evaluate the relationship between dietary fat intake, expressed as energy

percent (En%), and serum lipid status. Confounders (current age, sex, BMI standard deviation score, body fat percentage, Tanner stage, physical activity and educational level of the mother) were entered as covariates

**Results:** The mean total fat intake was 33.7 En% (SFA intake: 14.0 En%, MUFA intake: 12.4 En%, PUFA intake: 4.7 En%). In the total population tested a total fat intake in En% showed a positive correlation with serum HDL (p=0.001). This positive correlation with HDL was also observed for En% SFA intake (p=0.011) and En% MUFA intake (p<0.001). In the female population a negative correlation was shown between En% of total fat intake and serum triglycerides. In males a positive correlation between En% PUFA intake and serum total cholesterol was found.

**Conclusions:** The mean total fat intake was 33.7 En% (SFA intake: 14.0 En%, MUFA intake: 12.4 En%, PUFA intake: 4.7 En%). In the total population tested a total fat intake in En% showed a positive correlation with serum HDL (p=0.001). This positive correlation with HDL was also observed for En% SFA intake (p=0.011) and En% MUFA intake (p<0.001). In the female population a negative correlation was shown between En% of total fat intake and serum triglycerides. In males a positive correlation between En% PUFA intake and serum total cholesterol was found. **DISCUSSION:** In contrast to our expectations a rise in the En% of total fat intake and En% SFA seems to be beneficial as it induces a rise in HDL-cholesterol and a decrease in triglyceride serum concentrations. These results indicate that the relationship between regular fat intake and serum lipids seem to be influenced by other factors.

**Key Words:** Dietary Habits, Serum Lipids, Adolescents

**27/846. Nutrition in the Prevention of Non-Communicable Diseases**  
**Prevalence of comorbidities in individuals living with HIV infection under medical and nutritional attention**

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**Introduction:** In Mexico, obesity and chronic degenerative diseases have become a public health problem. In individuals living with HIV infection is well established that the antiretroviral therapy (ARV) and dietary changes seem to be the cause of comorbidities such as hyperlipidemia and diabetes.

**Objectives:** This study was conducted in order to provide real data about the prevalence of chronic degenerative diseases in HIV-infected patients receiving medical and nutritional treatment at the HIV and Sexually Transmitted Diseases Ambulatory Care and Prevention Clinic (CAPASITS) in Chihuahua City, Mexico.

**Method/Design:** We conducted a pilot test, collecting information from 89 subjects with HIV attending CAPASITS nutrition outpatient service from November 2010 to April 2011, the purpose was to describe the prevalence of chronic diseases in these individuals.

**Results:** The 21.35 percent are women (19) and 78.65 percent male (70), with an average age of 40.87 +9.91, predominantly from

low socioeconomic status and with elementary and secondary education completed (67.82%), The 84.09 percent family history of chronic diseases. The most prevalent diseases were: hypertriglyceridemia, present in 29.55% of the revised cases, hypercholesterolemia was present in 21.59%, 14.61% cursed with systemic hypertension, 6.7% of the individuals had a diagnosis of diabetes, 2.25 % of the subjects presented chronic renal failure. Obesity was found in 47.19% of the study group, 36.96% presented overweight according to the BMI criteria and 11.23% were classified as obese. Most patients don't practice physical activity. Sedentarism increases 1.55 times the risk of developing hypertension (OR 1.55, IC0.47-5.09) and decreases the risk for overweight or obesity (OR 0.51, CI 0.21-1.22).

**Conclusions:** The prevalence of comorbidities shows the importance of multidisciplinary work in this group of patients, particularly the nutritional intervention as part of comprehensive treatment of patients with HIV.

**Key Words:** Chronic Degenerative Diseases, Arv, Nutritional Intervention

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**27/865.** Nutrition in the Prevention of Non-Communicable Diseases  
**Leukocyte profile differences between eating disorder patients and adolescents at risk for eating disorder**

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**Introduction:** Obesity and eating-disorders (ED) are diseases that have increased among adolescents in the last decade. Both disorders show leukocyte alterations however there are few studies in adolescents at risk.

**Objectives:** The aim of this study was to evaluate the leukocyte profile of a group of adolescents at risk for suffering an ED, a group with diagnosed anorexia nervosa (AN) and a control group.

**Method/Design:** This study comprised a sample of 121 females adolescents, aged 12.0 to 17.9 years, enrolled in the AFINOS study (69 healthy adolescents and 24 at risk for ED (EDR)) and 28 patients with AN from the ANABEL study. BMI was calculated and the adolescents were classified into two groups: overweight (including obesity) and normoweight, according to Cole's cut-off points. The leukocyte profile was determined using an automatic system. EDR was evaluated using the SCOFF questionnaire. Data were analysed using the one way ANOVA and partial correlations controlled for

EDR.

**Results:** Control, EDR and AN groups showed differences in Leukocytes (6.34±1.48; 7.47±2.20; 5.65±1.47;cells/ml;p<0.001), neutrophil (3.43±1.12 vs 4.32±1.94 vs 2.95±1.22;cells/ml;p<0.001), basophils (0.089±0.045 vs 0.10±0.058 vs 0.028±0.046;cells/ml;p<0.001) and monocytes (0.44±0.14 vs 0.49±0.15 vs 0.25±0.11;cells/ml;p<0.001). The percentage of obese adolescents in the control group was 22% while in the EDR group was 55%. Positive correlations between leukocytes (r= 0.31; p=0.001), neutrophils (r=0.25 ;p=0.005), monocytes (r=0.40;p=0.000 ), lymphocytes (r=0.20;p=0.025 ) and BMI respectively, were found.

**Conclusions:** Summarizing, adolescents with an increased risk for ED showed increased prevalence of obesity and increased leukocyte and neutrophil counts as opposed to the characteristic leucopenia and neutropenia shown in AN patients

**Key Words:** Anorexia Nervosa, Ed Risk, Obesity, Adolescents, Leukocytes

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**27/872.** Nutrition in the Prevention of Non-Communicable Diseases  
**Achieving optimum iodine nutrition in the population in Serbia**

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**Introduction:** Once established in a country, salt iodization represents long-term solution to nutritional deficiency of micronutrient such as iodine. Universal salt iodization, introduced in Serbia in 1953. (at a level of 10mg KI per kg of salt) brought during the 1960s a fourfold reduction of goiter prevalence among school-age children. From 1990s, legislation in Serbia mandates that all salt for human consumption should be iodized at the level of 12-18 mg iodine per kg salt.

**Objectives:** In 2007., Institute of Public Health of Serbia with the support of UNICEF, carried out national survey with the aim to re-evaluate iodine nutrition status in the population.

**Method/Design:** This cross-sectional study covered 30 clusters (schools) selected in proportion to enrolment size, 30 pupils randomly selected from all grades in each school, and 30 prenatal clinics for enrolling a convenience sample of ±12 pregnant women. For the purpose of iodine analysis, urine and household salt sample were obtained from each participant.

**Results:** School-age children response rate was 97%, while pregnant women 96%. All 1297 collected household salt samples were iodized (median iodine content 14mg/kg). In 994 school-age children, the median urinary iodine (UI) was 195µg/L. The median UI

in 347 pregnant women was 158µg/L. Among 34% of women reporting to use a supplement, the median UI was 195µg/L, significantly ( $p < 0.001$ ) higher than the median UI of 146µg/L among women not using a supplement. No statistical relations were found between the iodine levels in household salt and the iodine status in either school-age children or pregnant women.

**Conclusions:** Our experience suggests that salt iodization, even compulsory, is not sufficient by itself to ensure adequate iodine supply in common diet of a population. Long-term commitments by public, private and civil stakeholders in solving iodine deficiency as national priority, should form basis for secure iodine consumption.

**Key Words:** Iodine Deficiency, Serbia, Salt Iodization

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**27/881.** Nutrition in the Prevention of Non-Communicable Diseases

**Ambulatory blood pressure is related to the proportions of linoleic and arachidonic acid in erythrocyte membranes in healthy subjects**

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**Introduction:** Previous cross-sectional studies have found that circulating/tissue polyunsaturated fatty acids (PUFA) are associated with vascular function, although the literature remains inconsistent.

**Objectives:** The MARINA study (ISRCTN66664610) investigated whether increasing doses of fish oil have favourable cardiovascular effects in healthy men and women (n 367, 45-70 y). The present work addresses the hypothesis that habitual PUFA intakes, assessed by erythrocyte membrane phospholipid composition at baseline, are associated with blood pressure (BP), endothelial function and arterial stiffness.

**Method/Design:** Erythrocyte fatty acid composition was determined in 317 participants before intervention. The percentages of total erythrocyte fatty acids from linoleic acid (18:2n-6), arachidonic acid (20:4n-6), alpha-linolenic acid (18:3n-3), eicosapentaenoic acid (20:5n-3) and docosahexaenoic acid (22:6n-3) were divided into tertiles. Ambulatory 24 h diastolic, systolic and mean arterial BP (DBP, SBP and MAP), flow-mediated dilatation (FMD) and arterial stiffness (pulse wave velocity, PWV) were compared between tertiles using one-way ANOVA to test for a trend and Fisher LSD tests to adjust for multiple comparisons.

**Results:** The highest tertile of erythrocyte 18:2n-6 was associated with lower 24 h SBP, DBP and MAP ( $P < 0.05$  compared to tertiles 1 and 2), but FMD and PWV did not differ. The highest tertile of erythrocyte 20:4n-6 was also associated with higher 24 h SBP, DBP and MAP ( $P < 0.05$  compared to tertiles 1 and 2). Apart from the relationship between 18:2n-6 and DBP, the associations between fatty

acids and BP were not significant when adjusted for weight status (BMI  $\leq 25$ , 25.1-30 and  $\geq 30.1$ ). Differences were mirrored in day-time and night-time ambulatory BP. There were no differences in outcomes between tertiles of 20:5n-3, 22:6n-3, omega-3 index, or 18:3n-3.

**Conclusions:** The results of this investigation showed that habitual n-6 PUFA, but not n-3 PUFA intakes, may predict BP, although this relationship is modified by weight status.

**Key Words:** Linoleic Acid, Arachidonic Acid, Blood Pressure, Endothelial Function, Arterial Stiffness

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**27/884.** Nutrition in the Prevention of Non-Communicable Diseases

**Bioactivity of hydrolysate crustacean discarded: Antioxidante and antiproliferative (cytotoxic) activity**

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**Introduction:** Fisheries discards represent a problem because of the evident waste of natural resources and their impact on the ecosystem. The study of alternative ways of use and valorization of both discarded species and the byproducts of target captured species is nowadays an active area of research. The production of hydrolysates is one such potential useful application and some hydrolysates are known to be sources of biologically active peptides with considerable potential in pharmacology and as growth-stimulating agents in animal feeds. This work presents the results of the activities of hydrolysates from four relevant species of discarded decapod crustaceans caught off the Galician-Northern Portugal coast and the Grand Sole: one galatheid *Munida* sp., the portunid crabs *Polybius henslowii* and *Lio-carcinus* depurator and *Macropipus tuberculatus*.

**Objectives:**

**Method/Design:** 400 g of homogenized crustacean were hydrolyzed for 1-2 hours in a water-thermostated 2 L-reactor with controlled temperature and pH. The reaction was stopped by heating at 90°C for 15 min. The mixture was allowed to cool and then consecutively sieved through 500 and 20 µm meshes. The hydrolysate was finally centrifuged at 16000 x g for 20 min to remove suspended particles. An aliquot of the hydrolysate was used for the determination of protein concentration and antioxidant and cytotoxic activities.

**Results:** The antioxidant activity (ABTS, DPPH) expressed as percentage of inhibition for the different samples varied between 60% and 83%. Cytotoxicity, measured by 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl tetrazolium bromide (MTT) assay and cell viability (tested on human hepatoma HepG2 cells) indicated a high and dose-dependent cytotoxic activity, especially at low concentrations in *Munida* hydrolysates.

**Conclusions:** Further work is currently in progress to determine possible applications of these hydrolysates for human food.



**Key Words:** Hydrolysate; Discard; Crustacean; Antioxidant; Cytotoxic

**27/894.** Nutrition in the Prevention of Non-Communicable Diseases

**Effects of perinatal protein-restriction on hippocampal neurogenesis in response to a learning task.**

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**Introduction:** Perinatal malnutrition results in learning deficits and predisposition to mental-related disorders including anxiety and depression that extend into adulthood. At Learning and memory relay on the production of new neurones in the dentate gyrus (DG) of the hippocampus and hippocampal neurogenesis has been associated with the aetiology and treatment of depression but whether adult neurogenesis is affected by perinatal malnutrition during is not known.

**Objectives:** To investigate the effects of perinatal undernutrition on neurogenesis at adulthood.

**Method/Design:** Pregnant Wistar rats were fed ad libitum either a control (20% protein) or a low-protein (8% protein) diet throughout pregnancy and lactation. At weaning, pups received a standard diet and at 3 months of age their learning capacities were evaluated. In addition, hippocampal neurogenesis either under basal conditions or under exposure to the object recognition memory test (OR), was assessed by BrdU and NeuN co-labelling.

**Results:** There were no differences between the groups in time spent exploring the two identical objects during the acquisition trial. In contrast, whereas control animals showed a progressive reduction in exploration time over the familiar object in the subsequent test sessions (2h short term memory; 24 h long term memory and 7 days permanent memory), adult animals born to protein-restricted dams (LP) spent the same time exploring the novel and the familiar object in the first (2h) and third (7 days) post- trial sessions. The offspring of LP dams exhibited decreased numbers of BrdU-labeled cells in the DG in relation to controls. Nevertheless, under exposure to the OR test, the proportion of new cells exhibiting a neuronal phenotype was increased in both groups as revealed by the co-labeling of the BrdU-labeled cells with NeuN.

**Conclusions:** these data suggest that there not exists a direct relationship between the cognitive and neurogenesis deficits induced by malnutrition in early life.

**Key Words:** Nutritional programming, Neurogenesis, Learning, Memory.

**27/896.** Nutrition in the Prevention of Non-Communicable Diseases

**Analysis of the impact of perinatal under-nutrition on hypothalamic nutrient sensing involving mTOR**

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**Introduction:** In previous studies aimed to determine the molecular mechanisms that might underlie the nutritional programming of metabolic disorders, we observed that the expression of PI3K and AKT was significantly increased in the hypothalamus of adults rats born to protein-restricted dams. The PI3K/Akt pathway is at the heart of the intracellular transduction cascade of insulin and leptine and acts as an upstream activator of the protein kinase mTOR which is a critical regulator of nutrient sensing and cellular metabolism.

**Objectives:** To determine to what extend early protein restriction alters the integration within the hypothalamus of nutrient-related signals.

**Method/Design:** Wistar rats were fed isocaloric diets containing either 20% protein (control) or 8% protein (LP diet) throughout pregnancy and lactation. At weaning offspring received standard chow and at 3 months of age the effects of fasting (48 h) or fasting plus re-feeding (3h) on the phosphorylation (activity) levels of mTOR in the hypothalamus were assessed by immuno-histochemistry.

**Results:** LP pups presented significant lower body weight compared with controls but there were no differences between the groups in feeding behavior, blood metabolites and glucose tolerance. In response to fasting, the activity of mTOR within the arcuate nucleus (ARC) of the hypothalamus decreased by 30% in control as well as in LP rats. However, after a re-feeding period of 3h, the phosphorylation levels of mTOR in the ARC of control, but not of LP rats, were identical to those found in the ad libitum-fed animals. Moreover, in contrast to control animals, LP animals exhibited also a significant reduction in the activity of mTOR in the paraventricular nucleus (PVN) in response to fasting

**Conclusions:** We suggest that central adaptation of nutrient sensing to an inadequate foetal and neonatal energetic environment is one of the basic mechanisms of the nutritional programming of metabolic disorders.

**Key Words:** Nutritional programming, nutrient sensing, hypothalamus, mTOR.

27/897. Nutrition in the Prevention of Non-Communicable Diseases

### **Analysis of the consequences of perinatal undernutrition on the metabolic plasticity of skeletal muscle**

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**Introduction:** A poor nutritional environment during early life sensitises the offspring to the development of metabolic diseases via epigenetic changes that act to program feeding behaviour and energy homeostasis. Skeletal muscle is the most important organ in the body in terms of metabolic capacity and muscular cells exhibit a remarkable flexibility in the usage of fuel in response to nutrient intake and the energetic demands of the organism. Actually, during energy demand or deprivation there is a suppression of anabolic pathways and an activation of catabolic pathways in skeletal cells involving the uptake of glucose and fatty acid oxidation.

**Objectives:** The aim of this study was to determine the long-term effects of perinatal malnutrition on the metabolic flexibility of skeletal muscle

**Method/Design:** The metabolic properties of soleus muscle derived from adult rats born to dams fed a control (20% protein) or a low-protein (8% protein, LP) diet throughout pregnancy and lactation were evaluated by the measurement of the enzymatic activities of hexokinase (HK), beta-hydroxyacyl CoA dehydrogenase (beta-HAD) and citrate synthase (CS) as well as by profiling the expression of several genes implicated in the regulation of the glycolytic and oxidative pathways.

**Results:** With the exception of reduced body weight and reduced levels of plasmatic triglycerides, perinatal-malnourished rats exhibited the same metabolic profile as control animals. Similarly, a reduction in the enzymatic activity of HK with no change in beta-HAD and CS under *Ad libitum* feeding conditions was observed in LP rats but not in controls. In the fed state, LP rats showed enhanced expression levels of key regulatory genes of mitochondrial metabolism including CPT-1, PGC-1 $\alpha$ , UCP3 and PPAR $\gamma$  and impaired expression of these genes in response to fasting.

**Conclusions:** We conclude that altered mitochondrial biogenesis precedes and may contribute to development of metabolic disorders associated with perinatal malnutrition.

**Key Words:** Nutritional programming, Skeletal muscle, Metabolism, Mitochondrial biogenesis.

27/902. Nutrition in the Prevention of Non-Communicable Diseases

### **Effects of new nutritional recommendations on diet and iron status**

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**Introduction:** A previous study on infant nutrition (1995-97) showed low iron status, which associated most strongly with high consumption of cow's milk among 12-month-olds. Icelandic infant dietary recommendations were revised in 2003, iron-fortified formula was then recommended from 6 months of age instead of regular cow's milk and breastfeeding was emphasised more than before.

**Objectives:** The aim of this study 2005-07 was to investigate the effects of the recommendations on the diet and iron status by comparison to earlier results.

**Method/Design:** A randomized sample of Icelandic 4-month-old infants was selected by Statistics Iceland. Dietary history was used to evaluate food intake from 0-4 months and monthly dietary data was collected by 24h food records at 5-8 and 10-11 months and by 3 day weighed food records at 9 and 12 months (n=140). At 12 months blood samples were collected and iron status evaluated (n=140).

**Results:** In the present study iron-depletion (serum ferritin < 12 $\mu$ g/l) affected 5.8%, 1.4% were also iron-deficient (MCV < 74fl), none was anemic (Hb < 105g/l) vs. 41%, 20% and 2.7%, respectively in the previous study. The main dietary changes were in line with new recommendations, i.e., a lower consumption of unmodified cows' milk which was replaced by iron-fortified formula. Other dietary factors associating with improved iron status were consumption of meat, porridges and fruits. Both exclusive and partial breastfeeding rate has increased, as 32.6% vs. 25.7% of 5-month-olds were EBF and 20% vs. 13% of 12-month-olds were PBF in the present study compared to the previous cohort, respectively.

**Conclusions:** Improved iron status of Icelandic infants could be explained by changed diet and nutrient intake following new recommendations. Overall feeding practices and nutrient combination is more important for the iron status than single factors. The study showed a strong public health impact of recommendations on infant nutrition.

**Key Words:** Iron status, infant nutrition, formula, breastfeeding.

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**27/903. Nutrition in the Prevention of Non-Communicable Diseases**  
**The effect of protein intake on growth up to one year of age**

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**Introduction:** A study on Icelandic infants conducted in 1995-1997 showed high protein intake of 9-12-month-olds (mean=15.5±4 E %), which associated with growth from 6-12 months of age, and with 6-year-olds' BMI. Revised infant dietary recommendations published 2003 put emphasis on breast-feeding and protein reduced milk instead of usual cow's milk to their children from 6-months to 2-years old.

**Objectives:** The objective of this study was to evaluate the new recommendations, if they had effect on protein intake and growth.

**Method/Design:** This is a prospective longitudinal observational study. National statistics randomly selected healthy term Icelandic infants (n=196) born in 2005 (Jan-Dec). Dietary data were collected retrospectively by dietary-history for 0-5-month-olds and by monthly registrations for 5-12-month-olds. Anthropometric measures were regularly registered.

**Results:** Compared to the previous infant study (1995-1997) the velocity of weight growth from 6-10 months was lower (1349 g vs. 1544 g) in infants born 2005 (p=0.006). Protein intake (g/kg) among girls was lower in the present study compared to the prior study (p<0.001). Protein was 14.4 E % in the 2005-2007 study compared to 15.5 E % in 1995-1997 among 9-12 months old infants (p=0.011). Protein intake (g/kg) among 9-month-olds was negatively associated to breastfeeding duration (r=-0.471, p<0.001) and positively related to weight growth velocity from 6-12 months (r=0.212, p=0.004). Both exclusive and partial breastfeeding rate has increased, 32.6% vs. 25.7% of 5-month-olds were EBF and 20% vs. 13% of 12-month-olds were PBF in the 2005-2007 cohort and the 1995-1997 cohort, respectively.

**Conclusions:** Protein intake has decreased since the prior study, but it is still high. The reduction in velocity of weight growth might be the result of reduced protein intake and higher breastfeeding rates in the later half of the first year. Long-term influences of decreased protein intake and growth in infancy need further investigation.

**Key Words:** Growth, Protein intake, Breastfeeding, Formula.

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**27/920. Nutrition in the Prevention of Non-Communicable Diseases**  
**Adequacy of folate and Vitamin B12 status in a representative sample of Irish adults.**

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**Introduction:** In addition to the role of folate in the prevention of neural tube defects, an optimal folate and vitamin B12 status may be protective against cardiovascular disease, certain cancers, cognitive decline and osteoporosis.

**Objectives:** The aim of this study was to assess folate and vitamin B12 status in a representative sample of Irish adults.

**Method/Design:** Participants who provided a blood sample during the National Adult Nutrition Survey were included (n = 1064). Red cell folate (RCF), serum folate and serum vitamin B12 were measured by microbiological assay.

**Results:** Mean concentrations of all biomarkers were within normal ranges for all subgroups. Of the total population, 6% had a deficient or borderline RCF level (< 453nmol/l) and this was most common among women of child bearing age (10%). Only 1.1% of the population had a borderline deficiency of serum folate (< 6.8nmol/l); however, high levels (> 45.3nmol/l) were detected in 18% of the total population and in 23% of men and women aged ≥ 65yrs. Deficient or borderline serum vitamin B12 levels (< 148pmol/l), present in 6% of the total population, were highest among men and women aged 51-64 yrs (9%).

**Conclusions:** These findings indicate that the majority of the Irish adult population have an adequate folate and vitamin B12 status. However, this work has highlighted some subgroups of concern including young women and older adults.

**Key Words:** Red cell folate: serum folate: vitamin B12

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**27/923. Nutrition in the Prevention of Non-Communicable Diseases**  
**Diet and colorectal cancer**

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**Introduction:** The list of cancers the incidence of which is related to diet and factors related to diet has tended to increase. These include colorectal cancer who is the fourth most common incident cancer and cause of death from cancer throughout the world.

This paper reviews the current state of knowledge in relation to CRC development and considers evidence for potential mechanism by which diet may modify the risk. The studies have shown that diet high in refined sugars possibly increase risk of CRC. Intake of fibre from vegetables and cereals has been associated with a clear reduction in risk for colorectal adenomas. The evidence of dietary fat has failed to find clear evidence for the association of CRC. Results of most studies show that diets high in total and saturated/animal fat possibly increase the risk of CRC. A numbers of studies reported that higher intakes of b-carotene were associated with a reduced risk of colorectal cancer. The evidence on the relationship between CRC and dairy products is inconsistent. It's plausible that increased risk associated

with dairy products may be due to fat whereas any decreased risk may be a consequence of vit.D and calcium content and possibly, for some dairy products, conjugated linoleic acid. The evidence of a risk reducing effect of whole grain relating to CRC is assessed as probable whereas the evidence of an increased risk by high consumption of refined white flour products and sweets is (still) insufficient despite some evidences. Prospective cohort studies suggest that folic acid have lower risks of colorectal cancer. The evidence for a risk reducing effect of calcium, selenium, vitamin D and vitamin E on colorectal cancer is insufficient. The dietary effects may be modulated by genetic polymorphisms in biotransformation genes.

**Objectives:** The aim of our study was to review the epidemiological literature how the diet may modify the risk of colorectal cancer.

**Method/Design:** Approximately 120 studies that examined the relationship between food intake and cancer of the colon and rectum are reviewed. Studies were identified through MEDLINE, using a combined text word and the medical subject heading (MeSH) search strategy.

**Results:** The studies have shown that diet high in refined sugars may increase CRC incidence. Results of most studies show that diets high in total and saturated/animal fat may increase CRC risk. Some studies have suggested that vitamin D and increased calcium intake can lower CRC risk, although few studies have found that supplements of these nutrients could reduce CRC risk. The evidence on the relationship between CRC and dairy products is inconsistent. The evidence of a risk reducing effect of whole grain relating to colorectal cancer is assessed as probable whereas the evidence of an increased risk by high consumption of refined white flour products and sweets is still insufficient despite some evidences. Prospective cohort studies suggest that folic acid have lower risks of colorectal cancer, but not all studies have found this. A statistically significant protective effect of fruit and vegetable consumption was found in 26 of 31 dietary studies in which results were expressed in terms of relative risk. Finding for fruits consumption and colon cancer risk are less abundant than those for vegetables. Intake of fibre from vegetables and cereals has been associated with a clear reduction in risk for colorectal adenomas. A few studies have looked at a possible link between a diet high in magnesium, selenium and vitamin E and reduced colorectal cancer risk. Some, but not all, of these studies have found a link. More research is needed to determine if this link exists.

**Conclusions:** In spite of the large number of publications in this area, there are few randomized controlled trials. Furthermore, most studies concluded that decreased consumption of refined sugars, red and processed meat and the excessive consumption of vegetables and fruit are likely to have significant benefits for reducing the incidence of colorectal cancer.

**Key Words:** Food, Nutrition, Cancer, Colon, Rectum

## 27/925. Nutrition in the Prevention of Non-Communicable Diseases **Polyphenols protect against fructose's deleterious effects on insulin sensitivity and oxidative stress**

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**Introduction:** Red grape polyphenol extracts improve insulin sensitivity (IS) and oxidative stress (OS) in animal model but human studies are lacking. Fructose is known to induce deleterious effects on lipid metabolism, IS and OS

**Objectives:** The aim of this study was to evaluate if 9 weeks of polyphenol supplementation allow preventing fructose's deleterious effects on IS and OS of offspring of type 2 diabetic patients (OffT2D).

**Method/Design:** A randomized, double blind study was performed on 38 healthy subjects with android overweight. OffT2D received during 9 weeks a polyphenol supplementation (2g/d) or placebo. After 8 weeks' supplementation, they received a load of fructose during one week (3g/kgFFM/day). Insulin sensitivity was assessed with a 2-step euglycemic hyperinsulinemic clamp (0.2 and 1mUI/kg/d) with infusion of 6,6-[<sup>2</sup>H<sub>2</sub>]glucose. Oxidation substrates were assessed by indirect calorimetry. Immunoblot detection of carbonyl proteins reflecting OS was also performed in muscle biopsy. All tests were realized on day 0, 56 and 63.

**Results:** Fructose induced in both groups a significant increase in plasma triacylglycerols (+32%placebo,+36%polyphenol) and a decrease in HDL-c (1.52±0.43vs1.41±0.45mmol/L;p<0.01placebo-1.33±0.27vs1.26±0.25mmol/L;p<0.01 polyphenol). Fructose significantly increased weight of offT2D in placebo group (81.0±10.0vs 81.3±10.2kg;p=0.03); no change in polyphenol group. Fructose impaired IS in placebo group in decreasing glucose utilization (7.4±2.4vs6.6±2.3mg.kg-1.min-1;p=0.03), and fasting hepatic insulin sensitivity index (12.1±4.8vs9.6±2.6;p=0.03), in inducing lipogenesis by decreasing lipid oxidation (0.10±0.16vs-0.03±0.14mg.kg-1.min-1;p=0.03 respectively in polyphenol and placebo group). Fructose did not modify these parameters in polyphenol group. Fructose increased glucose oxidation in both groups (2.4±0.8vs3.1±0.7mg.kg-1.min-1;p=0.01placebo; 2.3±0.5vs2.6±0.6mg.kg-1.min-1;p=0.04 polyphenol), and decreased glycogen stores only in placebo group (5.0±1.5vs4.0±1.2mg.kg-1.min-1;p=0.02). Fructose induce OS in placebo group (1.31±0.57vs1.62±0.78;p=0.02) but not in polyphenol group (0.95±0.25vs0.85±0.23;NS).

**Conclusions:** 9 weeks of red grape polyphenol extract supplementation can prevent the deleterious effects of fructose on hepatic and whole-body insulin sensitivity, oxidation substrates and oxidative stress without any impact on lipid metabolism in offT2D.

**Key Words:** polyphenols, fructose, insulin sensitivity, oxidative stress

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**27/929.** Nutrition in the Prevention of Non-Communicable Diseases  
**Anthropometric data of a sample of Irish adults aged 65+ years**

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**Introduction:** Understanding body composition, how it changes with age and any associated health implications is important to maintain the health care and nutritional support of older populations.

**Objectives:** The purpose of this research was to explore measured anthropometric data for healthy adults aged 65+ years who participated in the Irish National Adult Nutrition Survey (NANS).

**Method/Design:** Anthropometric measurements, performed by trained fieldworkers on consenting adults aged 65+ years from NANS, were obtained. Height was assessed using a Leicester portable height measure (Chasmores, Ltd. UK) and waist-to-hip ratio (WHR) calculated using tape measurements. Weight and body composition were determined using a Tanita® weighing scale. BMI was determined as weight (kg) divided by height (m) squared.

**Results:** Anthropometric measurements were assessed across three age groups (65-69, 70-74 and 75+ years), although those aged 70-74y tended to have the highest mean values for all measurements. When compared with NANS participants under 65 years of age, a lower weight and higher WHR was observed in those participants over the age of 75 years ( $P < 0.05$ , one-way ANOVA). Differences ( $P < 0.05$ , one-way ANOVA) were also identified in percentage body fat; with those in the younger cohort having a lower percentage body fat than each of the age groups in this older adult cohort.

**Conclusions:** While this preliminary analysis reveals no major differences in body composition between the three age groups of older adults, there were differences in composition when compared with the younger adults. Further analysis of this dataset will allow for more complete understanding of body composition in older Irish adults.

**Key Words:** BMI; weight; body fat; older adults.

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**27/936.** Nutrition in the Prevention of Non-Communicable Diseases  
**Effect of several CLNA isomers on lipolysis in rat adipocytes**

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**Introduction:** During the last years conjugated linolenic acid (CLNA) has been proposed as an alternative to conjugated linoleic acid (CLA) in terms of a functional molecule. According to the literature CLA is not a lipolytic molecule. Nevertheless, little is known about the effect of CLNA isomers on adipose tissue, and their lipolytic activity in vitro has not been described yet.

**Objectives:** The aim of the present study was to analyze the lipolytic effect of CLNA isomers (punicic acid,  $\alpha$ -eleostearic acid,  $\beta$ -calendic acid,  $\beta$ -calendic acid and jacaric acid) on perirenal adipose tissue in rats.

**Method/Design:** Eight male Wistar rats (body weight 250g) were sacrificed after 12 hours of fasting. Perirenal adipose tissue (PR) was dissected, weighed and digested by using collagenase. Lipolysis was measured in presence of CLNA isomers (10-4M and 10-5M), isoproterenol (10-5M) or a combination of isoproterenol and CLNA. Basal lipolysis was also assessed. Glycerol release was measured by spectrophotometry. Results were expressed as the percentage of basal lipolysis.

**Results:** CLNA isomers did not stimulate lipolysis in adipocytes at 10-5M, nor at 10-4M. They did not increase lipolysis induced by isoproterenol.

**Conclusions:** These results show that CLNA isomers are not lipolytic agents and they cannot be proposed as useful tools for increasing fat loss in rat adipocytes.

**Key Words:** CLNA, lipolysis, glycerol, rat, adipocytes.

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**27/938.** Nutrition in the Prevention of Non-Communicable Diseases  
**Effect of puniceic acid on hepatic fatty acid oxidation**

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**Introduction:** Conjugated linolenic acid isomers (CLNA) have been described as new functional ingredients. It seems that liver is a target organ for these CLNAs on health outcome, specially for puniceic

acid (PUA; cis-9,trans-11,cis-13 CLNA).

**Objectives:** The aim of the present study was to analyze the effect of puniolic acid (PUA; cis-9,trans-11,cis-13 CLNA) on hepatic fatty acid oxidation in rats.

**Method/Design:** Twenty four male Wistar rats were divided into two groups and fed on obesogenic diet containing or not 0.5% of PUA (control group, PUA group) for 6 weeks. Liver triacylglycerol content was measured. The activity of carnitine-palmitoyl transferase Ia (CPT-Ia), a marker of mitochondrial fatty acid oxidation, and acyl CoA oxidase (ACO), a marker of peroxisomal fatty acid oxidation were assessed by spectrophotometry. mRNA levels of these enzymes (CPT-Ia, ACO) as well as its regulatory transcriptional factor PPAR $\alpha$  (peroxisome proliferator-activated regulatory factor- $\alpha$ ) were measured by real time RT-PCR.

**Results:** Liver triacylglycerol content was not modified. PUA, at a dose of 0.5%, increased liver ACO activity (+207%;  $P < 0.05$ ) but did not modify hepatic CPT-Ia activity. Although a significant increase in PPAR $\alpha$  expression was found, no changes were observed in mRNA levels of the analyzed enzymes.

**Conclusions:** These results show that PUA at 0.5% in the diet raises fatty acid oxidation in liver, just in peroxisomes. Although PUA seems to be PPAR $\alpha$  agonist, according to the obtained results, peroxisomal fatty acid oxidation takes place at post-transcriptional effect. Therefore, hepatic fatty acid oxidation induced by PUA is not complete.

**Key Words:** Puniolic acid, PPAR $\alpha$ , CLNA CPT-Ia and ACO.

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#### 27/941. Nutrition in the Prevention of Non-Communicable Diseases **Dairy calcium intake and tooth loss among Danish adults**

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**Introduction:** An inverse association between calcium intake and oral health has been reported. Oral health status may be influenced by gender. However, it remains unclear whether this gender variation reflects differences in sources of calcium intake or differences in exposure to risk factors for oral disease between men and women.

**Objectives:** To investigate whether gender differences in tooth loss is influenced by caries-risk and sources of dietary calcium intake.

**Method/Design:** This is a prospective study, which included 432

Danish adults (30-60 y) with information on dietary calcium intake in 1982/83 and tooth loss from 1987/88 to 1993/94. Total calcium intake, estimated by 7-d food records or diet history interviews, was divided into dairy and non-dairy source. Calcium intake was natural-log transformed to improve normality.

**Results:** Among men, a unit increase in dairy calcium intake was significantly associated with a reduced risk of tooth loss (Incidence-rate ratio (IRR) = 0.61; 95%CI= 0.44 – 0.88) even after adjustment for tooth count in 1987/88, age, education, civil status (model 1), smoking, alcohol, sucrose and vitamin and/or mineral supplement intake (model 2), time since last dental visit, presence of oral dryness (model 3) and high Lactobacillus count (model 4). Among women, dairy calcium was not statistically associated with tooth loss in the crude and adjusted models (from model 1 to model 3). However, the association became highly significant once Lactobacillus count was included in model 4 (IRR= 0.55; 95%CI= 0.34 – 0.87). Non-dairy calcium was not associated with tooth loss among men and women in the fully adjusted models.

**Conclusions:** Dietary calcium intake, particularly calcium from dairy products, seems to protect against loss of teeth among adult men and women. The previous gender difference found in the relation between calcium intake and tooth loss may be the result of differences in caries-risk between genders.

**Key Words:** Dairy Products: Dietary Calcium: Gender: Oral Health: Tooth Loss.

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#### 27/947. Nutrition in the Prevention of Non-Communicable Diseases

#### **Determination the quantity of zinc in serum and maternal milk of Moroccan babies exclusively breastfeeding**

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**Introduction:** Zinc deficiency increases the risk and severity of a variety of infections, restricts physical growth. The amount of zinc provided by human milk in exclusively breastfed babies is not well known mainly because of technical difficulties to assess exclusive breastfeeding and technical analyses of this trace element.

**Objectives:** To provide longitudinal data on zinc in serum and mother's milk of life in Moroccan babies with a recall of morbidity. Study fits within the framework of the activities of "alliance internationale Zinc"

**Method/Design:** 53 paired mothers aged 27,85  $\pm$  6,85 years and newborn terms babies at birth were recruited. 80% of these women were not formally educated and 77% were unemployed, Deuterium dilution technique was used to estimate maternal milk intake in babies. The concentration of zinc in milk and serum was determined using Selectable-Mode Inductively Coupled Plasma (ICP-MS), at 1, 3 and 6 months after child birth. And determinate hemoglobin and C-reactive protein (CRP).

**Results:** The average quantity of zinc in mother's milk was  $2,362 \pm 1,442$  mg/ml,  $2,217 \pm 1,736$  mg/ml and  $1,493 \pm 0,975$  mg/ml respectively at 1, 3 and 6 months after child birth; in the same period zinc in serum was  $0,636 \pm 0,295$  mg/l,  $0,701 \pm 0,525$  mg/l and  $0,450 \pm 0,136$  mg/l. The mother's Hemoglobin was  $12 \pm 1,02$ ,  $12,75 \pm 1,5$  and  $12,43 \pm 0,79$  respectively at 1,3 and 6 months after childbirth. The inflammation, bacterial or viral infection, at mothers was 10%, in 1 and 6 month and 6,67% in 3month. 20% of babies had diarrhea at 1 and 3 months and 7% in 6 month. 50% of the babies also had respiratory problem which decreased by 40% at 3 and 6 month.

**Conclusions:** Zinc deficiency was high among the studied group, 42% in mother's milk and 68% in serum. And a large scale study would be needed to confirm this.

**Key Words:** Babies exclusively breastfeeding, zinc in mother's milk, zinc in serum, Hg, CRP

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**27/951.** Nutrition in the Prevention of Non-Communicable Diseases  
**Quantity and variety of the fruit intake influence cross-sectionally in inflammation status of young adults**

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**Introduction:** Fruits are rich sources of vitamins and antioxidants, whose consumption has been associated with lower pro-inflammatory status. To increase the intake of some types of fruits producing healthy benefits is a current challenge.

**Objectives:** We evaluated the relationship of the consumption of different fruits with circulating C-reactive protein (CRP) and complement C3 (C3) concentrations in young adults.

**Method/Design:** Two-hundred and eighty-five healthy subjects (173F/ 112M; age:  $22 \pm 3$ y; BMI:  $22.1 \pm 2.8$ kg/m<sup>2</sup>) were enrolled. Dietary intake, anthropometry as well as plasma CRP and C3 were determined by validated procedures. We selected for the analyses 3 fruit-groups commonly consumed: 1) citrus fruits (CF), including orange, tangerine and lemon, 2) apples and pears (AP), 3) banana.

**Results:** Subjects included in the highest tertile of CF intake presented lower CRP concentrations ( $1.0 \pm 0.8$  vs.  $1.5 \pm 1.60$  mg/l, adjusted-P-trend: 0.041), compared to the lowest tertile ( $\geq 4$  vs. 0 servings/wk), while those included in the highest consumption of AP had lower C3 concentrations ( $1.05 \pm 0.21$  vs.  $1.14 \pm 0.21$  g/l, adjusted-P for trend: 0.018), compared to the lowest tertile ( $\geq 3$  vs. 0 servings/wk), after adjusting for age, gender, energy intake, BMI, smoking and physical activity. Banana intake ( $\geq 3$  vs. 0 servings/wk) was not statistically associated with the investigated markers, although it followed

the same trend.

**Conclusions:** In this cross-sectional study, a greater consumption of different fruits was significantly associated with lower plasma CRP and C3 values, suggesting that both quantity and variety of fruits are implicated in the anti-inflammatory effects of this food-group.

**Key Words:** fruit, C-reactive protein, complement C3, inflammation.

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**27/953.** Nutrition in the Prevention of Non-Communicable Diseases  
**Effects of lipoic acid on JNK and ERK1/2 phosphorylation in 3T3-L1 adipocytes**

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**Introduction:** Activation of MAPK subfamilies, JNK and ERK 1/2 has been involved in the regulation of the lipolytic process. Moreover, JNK1 and JNK2 deficiency accelerates basal lipolysis in 3T3-L1 adipocytes, while ERK 1/2 activation increases lipolysis through HSL phosphorylation on Ser600. Previous studies from our group found that Lipoic acid (LA), an antioxidant molecule with beneficial effects in obesity, has lipolytic properties.

**Objectives:** The aim of the present study was to investigate the ability of LA to regulate both JNK and ERK 1/2 MAPK.

**Method/Design:** Fully differentiated 3T3-L1 adipocytes were treated during 1 and 24 hours with LA (250  $\mu$ M). ERK 1/2 and JNK phosphorylation and protein levels were assessed by western blot.

**Results:** LA (250  $\mu$ M) increased significantly ERK 1/2 phosphorylation at Thr202/Tyr204 after 1 hour of treatment, while no effects were observed on JNK phosphorylation at Thr183/Tyr185. In contrast, after 24 hours of LA treatment JNK phosphorylation was significantly inhibited and ERK 1/2 phosphorylation was down-regulated to basal levels in 3T3-L1 adipocytes.

**Conclusions:** These data suggest that LA-induced lipolysis might be mediated by ERK 1/2 activation in the early steps and maintained by JNK inhibition in longer periods of treatment in 3T3-L1 adipocytes. Further studies are needed to better elucidate this possibility.

**Key Words:** Lipoic Acid, lipolysis, JNK, ERK1/2, obesity

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**27/954.** Nutrition in the Prevention of Non-Communicable Diseases  
**Effects of lipoic acid on ampk in adipose tissue of lean and high-fat fed rats**

*P. Prieto-Hontoria.*

**Introduction:**  $\alpha$ -Lipoic acid (LA) is a natural antioxidant compound with beneficial effects on obesity and insulin sensitivity. AMPK is a key player in regulating energy metabolism and AMPK

activators have been proposed as novel therapeutical agent for type 2 diabetes. The role of AMPK in mediating the metabolic actions of LA is complex and seems to be tissue-dependent. Activation of AMPK in adipose tissue has been suggested to be beneficial in insulin-resistant states, particularly as AMPK activation also reduces cytokine secretion in adipocytes. However, there is not information regarding the ability of LA to modulate AMPK in adipose tissue

**Objectives:** The aim of this study was to determine the effects of dietary supplementation with LA on total AMPK and AMPK phosphorylation in epididymal fat of lean and high-fat fed rats.

**Method/Design:** Control and high fat-fed male Wistar rats were assigned into two subgroups; in one of them the diet was supplemented with  $\alpha$ -LA (0.25 wt/100 wt of diet) during 8 weeks. Two Pair-Fed (PF) groups were also included in order to evaluate if LA actions are only secondary to its inhibitory effects on food intake. The amount of total and phosphorylated (Thr172) AMPK in epididymal fat depot was determined by Western Blotting.

**Results:** LA supplementation was able to counteract the hyperinsulinemia ( $P<0.001$ ) and the increase in the HOMA index ( $P<0.001$ ) induced by consuming the high-fat diet. The HOMA index and serum insulin levels were significantly lower in LA-supplemented groups than in their corresponding PF groups. Together with the increase in insulin-sensitivity, LA significantly increased ( $P<0.05$ ) AMPK phosphorylation at Thr172 in adipose tissue from both lean and obese rats as compared to the PF groups.

**Conclusions:** These data suggest the ability of LA to activate AMPK in adipose tissue, which could contribute to the insulin-sensitizing actions of this molecule.

**Key Words:** Lipoic acid, AMPK, insulin sensitivity, obesity

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### 27/965. Nutrition in the Prevention of Non-Communicable Diseases Microsatellite instability markers in mammary cancer

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**Introduction:** Analysis of genetic instability of the abundant, highly polymorphic, short nucleotide repeat sequences known as microsatellites, is emerging as an important tool in the study of cancer.

**Objectives:** The aim of the present study was to determine the frequency of microsatellite instability (MSI) in a used model of mammary carcinogenesis induced in the rat by treatment with 7,12-dimethylbenz[a]anthracene. The degree of genetic stability of seven different microsatellite loci was evaluated. In this study we examined the possible role of MSI as a marker for detection dietary interventions (polyphenolic compounds, trace elements, oils) on the development of mammary cancer.

**Method/Design:** DNA was extracted from rat mammary tumors and normal tissues (livers from DMBA-untreated rats), amplified by PCR, using different polymorphic DNA markers and the reaction

products were analyzed for microsatellite instability.

**Results:** The result of this experiment indicated that 86% of rat mammary tumors showed loss of heterozygosity at D3Mit3 locus. In this study no microsatellite instability was observed in the tumors in 6 tested loci (D8Mgh11, D7Mit11, D7Mgh1, D3Mgh5, D5Mgh5, D1Mgh2). None of examined attempts showed microsatellite instability at more than 1 locus.

**Conclusions:** Identification of the underlying mechanisms by which dietary factors affect genomic stability might prove useful in the treatment of mammary cancer as well as in the incorporation of dietary factors into mammary cancer prevention strategies.

**Key Words:** Dietary Factors, Microsatellite Instability, Cancer, 7,12-Dimethylbenz[A]Anthracene.

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### 27/967. Nutrition in the Prevention of Non-Communicable Diseases Investigation of risk factors associated with objective parameters of the nutritional status in hospitalized patients

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**Introduction:** The investigation of risk factors associated with nutritional status could contribute for better knowledge of the malnutrition.

**Objectives:** To investigate the incidence of malnutrition and its possible association with many parameters that assess nutritional status and to identify the associated risk factors.

**Method/Design:** The nutritional status was assessed in 235 hospitalized patients. The malnutrition was defined as present when the patient presented at least 2 anthropometric criteria below the normal range and habitual energy intake below 75% of the energy requirement ( $HEI/ER<75\%$ ). Gender, age, type of disease, recent weight change and dental problems were investigated as possible associated risk factors. The chi-square and Mann-Whitney tests were used to compare the data and univariate and multiple logistic regressions were used to identify the factors associated with malnutrition. The odds ratio (OR) and confidence interval (CI) of 95% were calculated with the significance level set at 5% ( $p<0.05$ ).

**Results:** One fifth (20%) of the patients were malnourished on admission to the hospital and 27.5% reported recent weight loss. The malnutrition ( $p<0.0001$ ) which was greater in patients with malignant diseases. The only variables significantly associated with malnutrition according to univariate logistic regression were recent weight loss ( $p=0.0058$ ;  $OR=2.909$ ;  $IC95\%=1.362$ ;  $6.212$ ) and malignant disease ( $p=0.0001$ ;  $OR=3.847$ ;  $IC95\%=1.948$ ;  $7.597$ ). When multiple regression was used in the model which included type of disease, malignant disease was shown to increase the chance of malnutrition fourfold ( $p=0.0002$ ;  $OR=3.855$ ;  $IC95\%=1.914$ ;  $7.766$ ). When disease was excluded, recent weight loss also increased malnutrition fourfold ( $p=0.0012$ ;  $OR=3.716$ ;  $IC95\%=1.677$ ;  $8.236$ ).



**Conclusions:** Patients with a history of recent weight loss and those with malignant diseases are more susceptible to malnutrition.

**Key Words:** nutritional status, malnutrition, hospitalized patients, risk factors.

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**27/968.** Nutrition in the Prevention of Non-Communicable Diseases

**Agreement between nutritional risk assessment parameters and the MNA in hospitalized elderly**

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**Introduction:** The malnutrition or problems related to malnutrition in the elderly are still rarely recognized and treated in the hospital setting. Either way, it is essential for all elderly patients to undergo nutritional assessment at hospital admission.

**Objectives:** To assess the agreement between nutritional risk assessment parameters and the mini nutritional assessment (MNA) and then assess the accuracy of these parameters in relation to the MNA.

**Method/Design:** The nutritional status of 132 hospitalized elderly was assessed with the MNA, body mass index (BMI), calf circumference (CC) and arm circumference (AC). Their habitual energy intake (HEI) was also determined. The chi-square and the Mann-Whitney tests were used. The agreement between the nutritional risk criteria and the MNA was determined by the Kappa coefficient. The ROC curve was used to determine the accuracy of the parameters in relation to the MNA and to determine the cut-off values. The significance level was set at 5% ( $p < 0.05$ ).

**Results:** A little more than half the sample (54.5%) was well nourished, 34.9% were at risk of malnutrition and 10.6% were malnourished. There was good agreement only for BMI < 22 (Kappa=0.44), with an accuracy (AUC) of 0.78. No agreement was found for the other parameters, their sensitivities were shown to be low. However, CC and AC were very specific for determining the well nourished patients: the CC specificity was 86.1% and AC specificity was 94.4%. The cut-off values determined by the ROC curve were  $\leq 23.2$  for BMI,  $\leq 26.2$  for AC and  $\leq 32.2$  for CC.

**Conclusions:** The best parameters to determine nutritional risk in relation to the MNA were AC, BMI and CC. However, these nutritional assessment parameters should be used to replace the MNA for the assessment of hospitalized elderly patients with their current cut-off points.

**Key Words:** MNA, elderly, nutritional status.

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**27/972.** Nutrition in the Prevention of Non-Communicable Diseases

**Birth weight and weight for age during the first year of life and glycemia in young adults**

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**Introduction:** Due to the increased prevalence of chronic diseases, it is important to study their risk factors, including those that appear early in a person's life.

**Objectives:** To determine the relationship between birth weight (BW) and weight according to age (W/A) at 6 and 12 months of age and glycemia in young adults.

**Method/Design:** This was a concurrent cohort study (n=996) among subjects from the 5th Region of Chile who were 22 to 28 years at the time of the study. A fasting blood sample was taken to determine the glycemia. Weight at birth and at 6, 9 and 12 months of age were obtained from clinical records and expressed as z-scores (WHO reference).

**Results:** Normal glycemia values were found in the adults, with significantly higher levels in males than females (87.5 versus 83.7 mg/dL,  $p=0.01$ ); z-scores of W/A at 0, 6 and 12 months also were normal (-0.23, -0.21 and 0.07, respectively). The increase in weight from 0 to 6 months and from 6 to 12 months showed z-scores of 0.03 and 0.29 respectively. An increase in glycemia ( $\beta = 0.83$  mg/dL,  $p=0.004$ ) was observed associated with a BW decrease and the same inverse relationship was observed at 6 months ( $\beta = 0.57$  mg/dL,  $p=0.04$ ) and at 12 months. However, at 12 months the significance disappeared after controlling for confounders (BMI, educational level, gestational age, BW and breastfeeding) ( $\beta = 0.59$ ,  $p=0.73$ ).

**Conclusions:** A lower weight at birth and at 6 months was associated with higher values of glycemia in adults. These results underscore the importance of adequate nutrition in pregnancy and during the first six months of life to reduce the effect these risk factors can have on increasing glycemia in adults.

**Key Words:** Weight during first year, glycemia, young adults

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**27/989.** Nutrition in the Prevention of Non-Communicable Diseases

**Food supplements use in relation to perimenopausal and menopausal women's health improvement**

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**Introduction:** The proportion of the middle aged in Korean population is increasing rapidly. The middle age is a turning point in life cycle; especially woman's body experiences a big change contrasting

to the previous period, deterioration of body function, menopause due to change of hormone. In addition to physiological change, women also go through the change of social role in family and work caused by the changed social environment. These changes pose a health threat for the middle aged women.

**Objectives:** In order to improve health and nutrition status of pre-, peri-, and post-menopausal women, we investigated the health characteristics, the use of dietary supplements and the relationships between dietary supplements use and women's lifestyle associated determinants

**Method/Design:** This survey of 91 menopausal women was undertaken by questionnaire. The exclusive man-to-man interview by well-trained interviewers guaranteed a scientific data collection. This survey data analysed using the SPSS program.

**Results:** The higher correlations were indicated between women's belief on the effectiveness of dietary supplements for relieving menopausal symptoms, number of dietary supplements consumed, personal interest on dietary supplement information, belief on the effectiveness of dietary supplements for general health improvement, annual expenditure on dietary supplements. Variables of mental health were strongly inter-correlated. So were social health associated parameters. Whether or not women used at least one dietary supplement use was explained by how much women were interested in dietary supplement information, how strongly believed dietary supplements ameliorate general health condition, self-rated health level, number of efforts for relieving menopausal symptoms, severity of menopausal symptoms, and number of organizational activities women participated.

**Conclusions:** The multiple regression results failed to reveal the higher relationships between dietary supplements consumption, dietary habits, and dietary quality that were observed through the analyses of variance for different groups based on the degree of dietary supplements consumption.

**Key Words:** Menopausal Women's Health and Food Supplement

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**27/994.** Nutrition in the Prevention of Non-Communicable Diseases  
**Point of care measurements of Vitamin A in blood and breast milk for low resource settings**

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**Introduction:**

**Objectives:** About 254 million children are affected by vitamin A (VA) deficiency worldwide. Blood and breast milk levels of VA can be used as indicator for VA status. However, current methods such as HPLC are not field-friendly but need well trained personal in a sophisticated laboratory environment. Therefore, we compare the results of a portable test kit based on the fluorometric detection of VA after extraction from blood with traditional HPLC.

**Method/Design:** A total of 56 human plasma and 25 breast milk

samples were extracted either by an established standard procedure (A) or with the ready-to-use extraction and measuring vial (B). Both organic extracts were analysed by HPLC. Additionally, the disposable vial was also measured in the portable fluorophotometer, the iCheck (C).

**Results:** No differences between the standard (A) and new (B) extraction method (iEx) analyzed by HPLC and the results using the portable fluorophotometer (A vs B): 1.72±1.14 µmol/L vs. 1.77±1.28 µmol/L; (C): 1.72 ±1.16 µmol/L) were found. Both extraction systems (A vs. B) and quantification methods (A vs. C) showed a very good agreement based on correlation coefficients of  $r^2 > 0.95$ ;  $P < 0.001$ . Quantification limit of the new method was set to 0.4 µmol/L and coefficient of variation ranged from 2.5 to 6.4 % and was inversely related to concentration. Similar characteristics were obtained for breast milk samples.

**Conclusions:** The novel test kit can easily assess plasma and breast milk levels of VA within minutes at point-of-care achieving a similar quality as with highly sophisticated HPLC method. This greatly enhances the ease of application and diagnostic power in low-resource settings.

**Key Words:** Blood, Milk, Point of Care Assay and Vitamin A.

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**27/995.** Nutrition in the Prevention of Non-Communicable Diseases  
**Effect of a single blueberry portion on oxidative stress and endothelial function: a pilot study.**

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**Introduction:** Blueberries (*Vaccinium corymbosum*) are important sources of dietary bioactive compounds such as anthocyanins (ACNs) that could protect the integrity of DNA from reactive species, reduce the inflammatory state and improve endothelial function.

**Objectives:** The objective of the study was to investigate the effect of one portion (300g) of blueberry (providing about 300mg ACNs) on markers of oxidative stress (endogenous and oxidatively induced lymphocyte DNA damage) and endothelial function/action (nitric oxide and endothelium-mediated changes in peripheral arterial tone).

**Method/Design:** Ten healthy male subjects were randomized in a cross-over design and received one portion of fresh blueberries ground by blender or placebo (purple jelly). The products were consumed early in the morning and blood was collected before consumption and at different times (1h, 2h and 24h). The resistance to H<sub>2</sub>O<sub>2</sub>-induced oxidative damage and endogenous DNA damage (formamidopyrimidine DNA glycosylase (FPG) sensitive sites) were

evaluated in peripheral blood mononuclear cells by means of the comet assay. Peripheral arterial function was assessed using a new non-invasive plethysmographic method (Endo-PAT 2000), while plasma nitric oxide analysis was performed by commercial kits. All variables were examined by a two-way ANOVA for repeated measures design.

**Results:** The consumption of one portion of blueberry significantly reduced ( $p < 0.01$ ) the levels of H<sub>2</sub>O<sub>2</sub>-induced DNA damage (-18%) after 1h of intake with respect to that obtained following the placebo. No significant differences were observed for endogenous DNA damage, nitric oxide and peripheral arterial function following blueberry intake.

**Conclusions:** This pilot study showed that one portion of blueberry may improve the resistance against H<sub>2</sub>O<sub>2</sub>-induced DNA damage. Further analysis, on a larger group of subjects, could be useful to clarify the effect of blueberry consumption on the modulation of endothelial function/action.

**Key Words:** Blueberry, Single Portion, Oxidative Stress, Endothelial Function and Healthy Subjects.

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**27/996.** Nutrition in the Prevention of Non-Communicable Diseases  
**Multivitamin/multimineral preparation containing folic acid and L-5-methyltetrahydrofolate rapidly increases and sustains RBC folate levels**

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**Introduction:** Neural tube defects (NTDs) are the second most common type of congenital malformations with an average incidence of 1/1000 -12/1000 pregnancies worldwide, associated with significant mortality and morbidity. The efficacy of periconceptional folic acid supplementation is well established in reducing the risk of NTDs. However, for a significant proportion of the population, especially for individuals who have low methylenetetrahydrofolate reductase (MTHFR) enzyme activity (e.g. homozygous for MTHFR677C>T polymorphism) folic acid supplementation might be insufficient. In such cases, providing L-5-methyltetrahydrofolate in addition might help ameliorate their risk of having a child with an NTD.

**Objectives:** To demonstrate superiority of a new multivitamin/multimineral preparation (MMP) containing 400µg folic acid and an equimolar amount of 451µg L-5-methyltetrahydrofolate-Ca in women of child-bearing age, compared to placebo in increasing and sustaining red blood cell folate (RBC-folate) concentration above the target level for NTD prevention of 906nmol/L.

**Method/Design:** Randomized, placebo-controlled, single center, double-blind, parallel group clinical trial. Forty eligible healthy female subjects of child-bearing age received supplementation for 16 weeks. RBC-folate was determined using a GLP-certified microbiological assay and was compared using Fisher's exact test.

**Results:** After 4 weeks of supplementation, 70% of the subjects assigned to MMP achieved RBC-folate concentrations above the protective level of 906 nmol/L compared to only 5.3% in the placebo

group ( $p < 0.0001$ ). In addition, all subjects who received MMP achieved sustained protective levels of RBC-folate concentrations until the end of the 16 week supplementation period compared to only 5.3% in the placebo group ( $p < 0.0001$ ).

**Conclusions:** These results indicate that MMP containing folic acid and L-5-methyltetrahydrofolate is able to increase and sustain RBC-folate concentrations above the protective level of 906nmol/L. This product will help women with low MTHFR enzyme activity as well as women with normal MTHFR enzyme activity reduce their risk of having a child affected with NTD.

**Key Words:** Neural tube defects, folic acid, multivitamin/multimineral supplementation, clinical trial, MTHFR polymorphism.

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**27/1002.** Nutrition in the Prevention of Non-Communicable Diseases  
**Nutritional profiles and lycopene health claims on ketchup.**

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**Introduction:** Lycopene, a carotenoid which has an effective antioxidant power that can play an important role in reducing the risk of several diseases, is a bioactive compound present in tomato products, especially in ketchup. According to Regulation CE 1924/2006, when a lycopene health claim appears on labelling, a significant amount should be provided by a quantity of the food that can reasonably be expected to be consumed. The nutrient profiles for food shall be established taking into account the quantities of certain nutrients and other substances contained in the food, such as fat, sugars and salt/sodium, which excessive intakes in the overall diet are not recommended and can play an important role in diseases as diabetes, obesity and different cardiovascular diseases. The application of nutrient profiles as a criterion in this Regulation should be intended for the purpose of governing the circumstances in which claims may be made.

**Objectives:** In this study, five commercial ketchups have been analyzed to test their content in lycopene as bioactive compound and to check if they fit the requirements requested by European Union pursuant to Regulation CE 1924/2006 in order to have lycopene health claims on ketchup labelling.

**Method/Design:** Lycopene content and individual soluble sugars (fructose, glucose and sucrose) were quantified by HPLC (Micron Analitica, Madrid, Spain). Fat content was determined gravimetrically after a continuous extraction process with ether at 100°C for 3 h using a Soxtec System HT 1043 (Tecator). Sodium content was analysed in atomic absorption spectroscopy in the Analyst 200 Perkin Elmer.

**Results:** Preliminary results show fat content in the range of 0,114-0,173 g/100g of product; total sugar levels between 7,402 and 14,876 g/100g.

**Conclusions:** So far, in this study ketchup products fit the nutritional profiles requirements within the category they belong: fruits and vegetables in terms of total fat and sugars according to Regulation

**Key Words:** nutritional profiles, tomato, ketchup, lycopene.

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**27/1004.** Nutrition in the Prevention of Non-Communicable Diseases  
**Dietary alkylresorcinols and lignans in the Spanish diet: the development of the alignia database**

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**Introduction:** The intake of alkylresorcinols and lignans in Spain is unknown due to the lack of information on the content of these compounds in particular foods.

**Objectives:** The intake of alkylresorcinols and lignans in Spain is unknown due to the lack of information on the content of these compounds in particular foods.

**Method/Design:** The values of alkylresorcinols and lignans in foods were collected from the scientific literature, and other foods particularly consumed in Spain for which values were not available were analyzed by standardised protocols, and added into the database. Data quality control system included assessment of the analytical method, in relation to the use of appropriate extraction techniques, reporting of method validation parameters and limits of detection, as well as the number of samples and their origin and the impact factor of the journal where data was published.

**Results:** The Alignia database includes the content of alkylresorcinols in 88 food items and the lignan content of 593 foods and beverages, resulting from a comprehensive review and compilation from scientific articles and new food analyses. The database includes information on data quality to allow for comparison between repeated entries, and it has been made available at [www.alignia.org](http://www.alignia.org), aiming to support the evaluation of the intake of these compounds for future clinical and epidemiological studies.

**Conclusions:** This database will be as useful tool on epidemiological studies assessing alkylresorcinol and lignan exposure to markers of chronic disease.

**Key Words:** Alkylresorcinols, Lignans, Phytoestrogens, Database, Intake

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**27/1011.** Nutrition in the Prevention of Non-Communicable Diseases  
**Egg consumption and risk of diabetes mellitus in a cohort of Spanish graduates: SUN project**

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**Introduction:** The prevalence of diabetes is increasing at an alarming rate in nearly all countries. Some studies from non-Mediterranean populations suggest that higher egg consumption is associated with an increased risk of diabetes.

**Objectives:** The aim of our study was to prospectively examine the association between egg consumption and the incidence of type 2 diabetes in a large cohort of Spanish university graduates.

**Method/Design:** In this prospective study of 15 214 women and men free of diabetes mellitus at baseline, egg consumption was assessed at baseline through a semi-quantitative food-frequency questionnaire repeatedly validated in Spain. Incident diabetes mellitus diagnosed by a doctor was assessed through biennial follow-up questionnaires, confirmed posteriorly by medical report or record, according to the American Diabetes Association criteria. Analyses were performed through multivariate logistic and Cox regression models.

**Results:** After adjustment for confounders, egg consumption was not associated with the development of diabetes mellitus, comparing highest to lowest quartile of egg consumption (>4 eggs/week vs <1 egg/week): OR=0.7;95%CI 0.3-1.8 HR= 0.6;95%CI 0.3-1.7.

**Conclusions:** Egg consumption is not associated with the development of diabetes mellitus in this Mediterranean cohort.

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**27/1013.** Nutrition in the Prevention of Non-Communicable Diseases  
**The activity of antioxidant enzymes in rats fed diet supplemented yellow and brown oats**

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**Introduction:** There is an obvious relationship between oxidative stress and the development of many diseases, especially chronic and degenerative ones. Activation of antioxidant enzymes is the first line of defense human body against them.

**Objectives:** The aim of the study was to determine the effects of diet supplemented yellow and brown oats on selected antioxidant

enzymes in rat's serum or blood.

**Method/Design:** Wistar rats were divided into 6 groups (n=7) and fed with experimental diet (I) AIN-93G, (II) AIN-93G with yellow oat, (III) AIN-93G with brown oat. In the case of induced oxidative stress at the beginning of the experiment animals from IV- VI groups were injected with Streptozotocin and fed AIN-93G diet (IV), AIN-93G with yellow oat (V), and AIN-93G with brown oat (VI). After 4 months rats were anaesthetized and blood was collected. Activity of three antioxidant enzymes were analyzed: glutathione reductase (GR), superoxide dismutase (SOD), heme oxygenase-1 (HO-1) with using commercial kits. Additionally level of malondialdehyde (MDA) and lipid hydroperoxide (LPO) (as parameters of increased oxidative stress) were measured.

**Results:** SOD and GR activity were increased both in rats fed supplemented diet and stress induced. Whereas HO-1 activity was increased in group IV (streptozotocin injected rats), and decreased in groups of animals V and VI (the streptozotocin injected rats fed diets with yellow and brown oats respectively). It was shown that level of MDA increased in stress induced rats, and decreased in rats fed oats supplemented diets.

**Conclusions:** These results may indicate that the presence of oats in the diets increases the efficiency of the body's defense mechanisms and provide better protection of cells and tissues from the toxic effects of ROS.

**Key Words:**

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**27/1018.** Nutrition in the Prevention of Non-Communicable Diseases  
**Triacylglycerols containing a high proportion of palmitic acid in the SN-2 position attenuate postprandial lipemia**

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**Introduction:** Plant and animal sources of palmitic acid have different triacylglycerol (TAG) structures, with palmitic acid mainly in the sn-1 and sn-3 positions of plant TAG and the sn-2 position of animal TAG. The industrial process of interesterification of plant fats increases the proportion of palmitic acid in the sn-2 position. These differences in TAG structure may influence the effects of plant, animal and interesterified fats on postprandial lipemia.

**Objectives:** To conduct a randomized controlled trial to test the hypothesis that palmitic acid in the sn-2 position of TAG influences the level of postprandial lipemia.

**Method/Design:** Postprandial changes in plasma TAG were measured over 8 hours following 4 test meals containing 50g test fat provided as high oleic sunflower oil (HOS; control), palm olein (PO; 8% palmitic acid in sn-2), randomly chemically interesterified palm olein (IPO; 32% palmitic acid in sn-2) and lard (85% palmitic acid in

sn-2), using a double-blind randomized crossover design in healthy men (n=25) and women (n=25).

**Results:** There were significant differences in postprandial plasma TAG concentrations following the 4 test meals (meal x time interaction P=0.002), with a more rapid increase following the HOS and PO compared with IPO and lard. There were significant meal x time interactions for IPO vs. both PO (P=0.001) and HOS (P=0.002), and lard vs. both PO (P=0.005) and HOS (P=0.005), but no significant differences between PO vs. HOS and lard vs. IPO. The incremental area under the curve following the test meals was; HOS 10.8 (95% CI 9.6, 12.2); lard 9.4 (95% CI 8.4, 10.5); IPO 10.0 (95% CI 8.9, 11.2); and PO 10.5 (95% CI 9.4, 11.7).

**Conclusions:** Fats with a high proportion of palmitic acid in the sn-2 position attenuate postprandial lipemia in healthy men and women.

**Key Words:** Tag Structure, Palmitic Acid, Postprandial Lipemia

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**27/1020.** Nutrition in the Prevention of Non-Communicable Diseases  
**Palmitic acid in the SN-2 position of triacylglycerols does not adversely affect postprandial glucose homeostasis**

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**Introduction:** Plant and animal sources of palmitic acid differ in their triacylglycerol (TAG) structure. Palmitic acid is found predominantly in the sn-2 position in animal fats, and in the sn-1 and sn-3 positions in plant fats. The industrial process of interesterification of plant fats increases the proportion of palmitic acid in the sn-2 position. It has been suggested that saturated fatty acids (SFA) in the sn-2 position of TAG may have adverse effects on insulin and glucose metabolism.

**Objectives:** To conduct a randomized controlled trial to test the hypothesis that palmitic acid in the sn-2 position of TAG influences postprandial glucose concentrations and insulin secretion.

**Method/Design:** Postprandial changes in plasma glucose, insulin and C-peptide were measured following 4 test meals containing 50 g test fat provided as high oleic sunflower oil (as control), palm olein (8% palmitic acid in sn-2), randomly chemically interesterified palm olein (32% palmitic acid in sn-2) and lard (85% palmitic acid in sn-2), using a double-blind randomized crossover design in healthy men (n=25) and women (n=25).

**Results:** There were no significant differences in the postprandial changes in plasma glucose, insulin and C-peptide concentrations between the test meals. There were significant gender x time interactions in the changes from fasting for plasma glucose (P<0.0001), insulin (P=0.005) and C-peptide (P=0.001). Women displayed lower early phase increments in plasma glucose, and greater early phase insulin

and C-peptide increments compared to men.

**Conclusions:** In healthy men and women, palmitic acid in the sn-2 position of TAG does not acutely influence plasma glucose concentrations or insulin release. In addition, meals high in palmitic acid do not influence postprandial glucose homeostasis differently to meals high in monounsaturated fatty acids.

**Key Words:** Palmitic Acid, Tag Structure, Glucose, Insulin

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**27/1023.** Nutrition in the Prevention of Non-Communicable Diseases

**Physical activity of free-living elderly women and energy balance between their energy intake and expenditure**

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**Introduction:** Physical activity is important for elderly people to maintain good health and prevent obesity. The energy intake should balance the energy expenditure.

**Objectives:** The aim of the study was the assessment of physical activity of free living elderly women and the balance between their energy intake and expenditure.

**Method/Design:** Material: 62 free living women participated in the study. The average age was 67,9±7,4 years, and average BMI was 27,7±4,4.

Daily energy expenditure (DEE), physical activity duration and number of steps, were collected using SenseWear Pro3 Armband. The physical activity was defined as a sedentary life style for MET (Metabolic Equivalent) below 3,0; as the moderate physical activity for MET between 3,0 and 6,0. The Armband was worn for the minimum period of 24 hours. The energy intake (EI) was assessed using three-day dietary recall.

**Results:** Based on three-day dietary recalls the average EI was 22,7±6,2 kcal. Based on Armband measurements the average DEE was 32,6±7,0 kcal/kg body mass/day. The median of time of moderate physical activity was 83 min. 87,1% of women had time of moderate physical activity longer than 30 min. The average number of steps was 9530±4404 steps/day. 46,8% women made daily more than 10000 steps. There was no correlation between age and BMI. There were negative correlations between BMI and EI, DEE, time of moderate physical activity. There were also negative correlation between age and DEE, number of stapes, time of moderate physical activity.

**Conclusions:** Majority of women had lower energy intake than energy expenditure. Women with higher BMI reported lower food intake (energy intake) and had lower physical activity. Older women had lower physical activity.

**Key Words:** Elderly Women, Energy Intake, Physical Activity.

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**27/1024.** Nutrition in the Prevention of Non-Communicable Diseases

**Association of dietary calcium intake with genetic polymorphisms on the metabolic syndrome risk.**

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**Introduction:** Gene-nutrient interactions may be important in modulating the susceptibility to the development of metabolic disorders.

**Objectives:** The objective of this study was to investigate the interaction effect between dietary calcium intake and candidate gene polymorphisms identified in genome-wide association study.

**Method/Design:** Subjects were participants in the Korea Association Resource (KARE) project which was initiated in 2007 to undertake a large-scale genome-wide association analysis. Among a total of 8,842 individuals after performing genotype calling and quality control processes, 8,031 (3,846 men and 4,185 women) were analyzed. The dietary data were collected by a validated semi-quantitative food frequency questionnaire. The association was assessed by multivariable adjusted logistic regression analyses.

**Results:** The prevalence of metabolic syndrome and its phenotypes were significantly and inversely associated with higher intakes of calcium after controlling for other covariates. In the KARE genome-wide association analyses for metabolic syndrome, 17 SNPs with nominal P value < 0.0001 for association with the risk of metabolic syndrome in multivariable models were identified. We found interaction effects between calcium intakes and one gene polymorphism (rs6445834 in ARHGEF3, P for interaction = 0.03 in men) identified from genome-wide association analysis and two gene polymorphisms (rs180349 in BUD13, P for interaction = 0.05 in men; rs10850335 in TBX, P for interaction = 0.04 in women) from 10 candidate genes previously identified in other studies. The group with major allele homozygotes and high calcium intake generally had the lowest risk of metabolic syndrome, as compared with those with minor allele homozygotes and low calcium intake.

**Conclusions:** Dietary calcium intake may modulate the susceptibility to the risk of metabolic syndrome in subjects who are minor allele carriers of rs6445834 in ARHGEF3, rs180349 in BUD13, rs10850335 in TBX.

**Key Words:** Calcium, Metabolic Syndrome and Gene-Nutrient Interaction.

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**27/1025. Nutrition in the Prevention of Non-Communicable Diseases**  
**Assessment of diet of predialysis female patients with chronic kidney disease**

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**Introduction:** The main goals in the management of chronic kidney disease (CKD) in predialysis patients are the reduction of unfavourable symptoms of uraemia, delaying nephro-replacement therapy and improvement of patients' quality of life. This may be achieved through the consumption of appropriate diet in conjunction with other elements of therapy.

**Objectives:** aim of the research was to assess the diet (energy and macronutrients) of CKD female predialysis patients with no previous dietary intervention in comparison with recommendations.

**Method/Design:** 31 female predialysis patients aged 29-79 years with CKD of different aetiology participated in the study.

The basis of analysis were self-reported data from three-day dietary recalls. The nutrient contents and energy value of diet was compared with guidelines for CKD patients.

**Results:** The average energy intake was  $21.8 \pm 5.6$  kcal/kg ideal body weight. The average total protein intake was  $0.85 \pm 0.25$  g/kg ideal body weight (animal protein –  $0.54 \pm 0.22$  g/kg, plant protein –  $0.31 \pm 0.13$  g/kg). Fat provided  $33.0 \pm 6.7\%$  of energy in the diet. SFA constituted  $10.7 \pm 3.0\%$  of energy, MUFA –  $14.4 \pm 3.8\%$ , PUFA –  $5.4 \pm 1.7\%$ . Carbohydrates provided  $55.7 \pm 6.6\%$  of energy, while sucrose consumption constituted  $9.3 \pm 5.1\%$ . The consumption of energy by almost all patients was lower than the recommended level. Protein consumption was lower than  $0.6$  g/kg ideal body weight in  $6.6\%$  of patients and higher than  $0.8$  g/kg ideal body weight in  $35.5\%$ . No influence of BMI on energy and macronutrient intakes was observed.

**Conclusions:** The study highlights that diet of CKD predialysis patients with no previous dietary intervention is not properly balanced.

**Key Words:** Chronic Kidney Disease, Diet, Energy Intake, Protein Intake

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**27/1041. Nutrition in the Prevention of Non-Communicable Diseases**  
**Excessive and adequate gestational weight gain are risk factors to six postpartum weight retention**

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**Introduction:** Pregnancy has been pointed out as a critical period, because women can gain more weight than recommended and retain it during post partum period as well, becoming both of them

main risk factors for obesity in women during reproductive period and later obesity.

**Objectives:** To investigate whether weight gain is a risk factor related to net weight gain at six months postpartum.

**Method/Design:** This is a prevalence study of another retrospective cohort study of women who gave birth between January and September 2004 and joined the 6th month postpartum. Study group women (106) who retained BMI  $\geq 1$  point to 6th month postpartum and control group (137) who retained BMI  $< 1$ . A survey socio-demographic, health history, food and physical activity. Prevalence ratio was calculated, the Poisson regression models estimating prevalence ratios and confidence intervals of 95%.

**Results:** The median weight gain during pregnancy was performed as recommended baseline nutritional status with the exception of overweight and obese women who gain more than recommended. The case group increased more than is recommended in all nutritional states compared with the control group, this difference was statistically significant. The study group held more than one point BMI earned on average  $11.2$  kg during pregnancy and retained  $+ / - 5.9$  kg at six months postpartum adequate weight gain had a prevalence ratio of  $2.13$  ( $p < 0.009$ ) and greater weight gain as recommended by the baseline nutritional status was  $3.64$  ( $p < 0.0001$ ).

**Conclusions:** Not only gain more weight than recommended during pregnancy, but even the proper weight gain is a risk factor for postpartum weight retention. It also emphasized that the nutritional status of overweight and obesity in early pregnancy is a protective factor with a prevalence ratio of  $0.55$  ( $p < 0.0001$ ) As should implement a strategic plan for nutrition intervention and physical activity in postpartum

**Key Words:** Pregnancy, Gain Weight, Weight Retention, Postpartum

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**27/1044. Nutrition in the Prevention of Non-Communicable Diseases**  
**Do United Kingdom based celebrity chefs contribute to the current obesity epidemic and associated co-morbidities?**

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**Introduction:** The United Kingdom (UK) is currently experiencing an obesity epidemic, of which obesity associated co-morbidities are predominant public health issues. Celebrity Chefs (CC) popularity in the UK may be contributing to obesogenic dietary habits. Anecdotal evidence suggests CC may influence food preparation and subsequently eating habits, however this has not been scientifically substantiated.

**Objectives:** Investigate whether CC influence food preparation and eating habits of a sub-population, and assess the nutritional composition of CC recipes.

**Method/Design:** After local ethical approval, non-probability

convenience sampling was used to recruit a diverse university staff population (n=43). Participants completed a research-generated questionnaire concerning food preparation habits and the use of CC resources. Simultaneously, 903 recipes from book and web sources (random sampling: 25% of total recipes from source) from 26 top ranked CC were analysed using Dietplan6 dietary analysis software programme. Data was analysed using one way ANOVA and independent sample t-tests. Significance was accepted at  $P < 0.05$ .

**Results:** 79% of participants watched CC television programmes, 74% owned CC recipe books, and 44% visited CC websites. 60% used CC recipes in preparing food, with 12% doing so weekly. Recipes from 22 CC were classified as high (>21g) in fat; 24 CC were high (>6g) in saturated fat; 7 CC were high (>2.4g) in salt (per portion, Food Standards Agency, UK). Male CC recipes had more energy (+31%), fat (+42%), saturated fat (+67%), salt (+44%) and fibre (+30%) per portion compared with female CC recipes ( $P < 0.001$ ). British CC recipes contained more energy (+80%), fat (+33%), saturated fat (+56%), and fibre (+18%) per portion than international CC recipe ( $P < 0.05$ ).

**Conclusions:** The nutritional value of CC recipes in adjunct with the influence of CC on food preparation habits may suggest CC are a hidden contributing factor to the UK's obesity epidemic and associated co-morbidity public health issues.

**Key Words:** Nutrition, Food, Recipes, Energy, Fats, Salt.

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## 27/1048. Nutrition in the Prevention of Non-Communicable Diseases **Impact of overweight and related adiposity on blood pressure in teenagers from Madrid**

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**Introduction:** Obesity in children and adolescents may trigger an increase in blood pressure that eventually lead to hypertension in adult.

**Objectives:** To assess the influence of body composition on blood pressure levels in a sample of teenagers living in Madrid

**Method/Design:** Are studied 263 men and 299 women between 12 and 16 years in two Secondary Schools in Madrid. Signed the informed consent of parents or guardians. The anthropometric methods used followed the rules of the International Biological Programme (Weiner and Lourie 1981) validated instruments, estimating the body mass index (BMI), body density (D) and relative adiposity (% G) according to the expressions Womersley and Durnin (1974) and Siri (1961), systolic blood pressure (SBP) and diastolic (DBP), with a mercury column sphygmomanometer.

**Results:** Individuals were classified according to two criteria: based on BMI (Cole et al 2000) and fat percentage (% G) (Marrodán et al. 2006). With SPSS V.17.0 examined the association between nutritional status and TA using ANOVA and Student-Newman-

Keuls. TAS was found higher in adolescents classified as obese by BMI (men: SBP =  $11.82 \pm 0.89$ , women: SBP =  $11.60 \pm 1.03$ ) in overweight (men: SBP =  $11.70 \pm 1.07$ , women:  $11.13 \pm 0.76$ ) or normal weight (males =  $10.96 \pm 0.88$  TAS, women:  $10.30 \pm 1.10$ ). In both sexes, were significantly higher averages in the individuals classified as obese by % G (male =  $11.60 \pm 0.98$  TAS, TAS women =  $11.36 \pm 1.31$ ).

**Conclusions:** Is proved the impact of weight gain and adiposity high above the elevation of SBP in children and young people discussed.

In adolescence, obesity can increase blood pressure leading to adult hypertension.

Assess the influence of body composition on blood pressure in 263 men and 299 women between 12 and 16 years in two Secondary Schools in Madrid. Signed the informed consent of parents or guardians. Anthropometry followed the rules of the International Biological Programme (Weiner and Lourie 1981) validated instruments, estimating the body mass index (BMI), body density (D) and relative adiposity (% G) according to the expressions of Durnin and Womersley (1974) and Siri (1961), systolic blood pressure (SBP) and diastolic (DBP), with a mercury column sphygmomanometer.

TAS was found higher in adolescents classified as obese by BMI (men: SBP =  $11.82 \pm 0.89$ , women: SBP =  $11.60 \pm 1.03$ ) in overweight (men: SBP =  $11.70 \pm 1.07$ , women:  $11.13 \pm 0.76$ ) or normal weight (males =  $10.96 \pm 0.88$  TAS, women:  $10.30 \pm 1.10$ ). In both sexes, were significantly higher averages in the individuals classified as obese by % G (male =  $11.60 \pm 0.98$  TAS, TAS women =  $11.36 \pm 1.31$ ). It is proven that the weight gain and adiposity increases the TAS in the young analyzed.

Individuals were classified according to two criteria: based on BMI (Cole et al 2000) and fat percentage (% G) (Marrodán et al. 2006). With SPSS V.17.0 examined the association between nutritional status and TA using ANOVA and Student-Newman-Keuls.

**Key Words:** Overweight, Related Adiposity, Blood Pressure, Adolescents

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## 27/1050. Nutrition in the Prevention of Non-Communicable Diseases **Anti-obesity effect of taraxacum officinale (Dandelion) extracts in 3T3-L1 adipocytes.**

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**Introduction:** Natural products have potential for inducing apoptosis, inhibiting adipogenesis and stimulating lipolysis in adipocytes. Dietary phytochemicals from *Taraxacum officinale* (Dandelion) affect adipocytes during specific stages of development, resulting in either inhibition of adipogenesis or induction of apoptosis.

**Objectives:** In this study, we investigated the effect of Dandelion extracts of 3T3-L1 mature adipocytes and during differentiation of pre-adipocytes into adipocytes by measuring lipid accumulation.

**Method/Design:** We have been used cell cultures for the propagation, maintenance and differentiation of 3T3-L1 cells to determine



the effect on adipogenic pathway in the presence or absence of extracts. Subsequently, we analyzed the lipid content of cells by staining cells with Oil-Red O for the quantification of total fat content and the content analysis of total triglycerides and cholesterol by HPLC. The influence of the extract on gene expression has been carried out with RT-PCR.

**Results:** Treatment with Dandelion extracts reduced the triglyceride content in Oil-Red O staining and cholesterol during differentiation. Moreover, treatment of 3T3-L1 cells with Dandelion extracts influence on expression genes involved in adipogenesis and lipid metabolism in adipocytes.

**Conclusions:** Dandelion and its formulations might potentially contribute to partially prevent or ameliorate the outcome of obesity and its associated metabolic complication including hypercholesterolemia and dyslipemia.

**Key Words:** Adipogenesis; Adipocyte; Dandelion

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**27/1051.** Nutrition in the Prevention of Non-Communicable Diseases  
**Breastfeeding and iron-supplemented infant formula: effect on anthropometric, hematological and neurobehavioural development of children.**

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**Introduction:** The prevalence of iron deficiency in children under 3 years is high and its effect on infants is not studied.

**Objectives:** To show the effect of iron-supplemented infant formula on the anthropometric, biochemical and cognitive development of infants.

**Method/Design:** Longitudinal intervention study on 81 infants followed from birth until the year. At 6 months, two groups were assigned according to the doses of the iron-fortified milk (0.44 and 1.16 mg/100 ml milk). At birth serum ferritin (SF) and anthropometry were determined, at 6 and 12 months iron biochemical parameters and anthropometry were measured and at 12 months cognitive development was measured (Bayley Scales).

**Results:** At 6 months, girls had higher values of mean corpuscular volume (MCV) and mean corpuscular hemoglobin. Babies fed with infant formula (IF) had a higher hematocrit, MCV and hemoglobin than breastfed (BF) and mixed feeding.

Children fed with higher iron-supplemented IF had a lower incidence of depleted iron stores (17.8% vs. 32.1%) and anemia (0% vs 14.3%). BF babies had better cognitive development at 12 months compared to IF (99 vs +8.7. 85.4 +12.3 p = 0.009).

**Conclusions:** The BF until 6 months improves mental and psychomotor development at 12 months. IF fortified at high doses of

iron at 6 to 12 months provides a lower percentage of anaemia and improves iron stores, but it does not affect cognitive development at 12 months.

**Key Words:** Breastfed, iron, infant formula, cognitive development, infant.

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**27/1052.** Nutrition in the Prevention of Non-Communicable Diseases  
**Factors during pregnancy that influence birth weight**

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**Introduction:** The infant birth weight (IBW) is affected by environmental, genetic and obstetrical factors.

**Objectives:** To quantify the effect of these factors on the IBW.

**Method/Design:** Longitudinal and prospective study on 213 Caucasian healthy pregnant women followed from the first visit to the obstetrician (between weeks 10 -15 of gestation) until childbirth, with infants born at term. Anthropometrical data, clinical history, life style and adherence to iron supplementation were collected. Blood samples were collected at each visit (weeks 15, 25, 34 and partum). Iron status was determined by Serum Ferritin, Total Iron Binding Capacity and Transferrin Saturation and HFE gen mutation (C282Y, H63D y S65D).

The effect on IBW was quantified by a multiple linear regression adjusted by BMI, smoking, parity, HFE mutations, iron status, iron supplementation, gestational age and by the gender of the Newborn.

**Results:** The variables that increased the IBW were: BMI at the beginning of pregnancy ( $25.3 \pm 7.9$ g), previous deliveries ( $178.4 \pm 50.6$ g), milligrams of iron supplementation ( $2.2 \pm 1.2$ g), weeks of gestation ( $19.8 \pm 127.6$  g) and gender of the baby (boy) ( $105.1 \pm 49.8$ g). The variables that decreased the IBW were iron deficiency before week 15 ( $-110.3 \pm 52.9$ g) and smoking during pregnancy ( $-141.2 \pm 55.2$ g).

**Conclusions:** Our data reaffirm the strong importance of influencing the modifiable factors such as promoting a healthy life style (nutritional status and smoking) in order to improve the nutritional status of the newborn estimated by its weight.

**Key Words:** Birth weight, pregnancy, iron status

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**27/1055. Nutrition in the Prevention of Non-Communicable Diseases**  
**Prevention of overweight and obesity: nutrition clinics in Bahrain**

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**Introduction:** Prevalence of adult obesity in Bahrain is increasing at an alarming rate, with associated morbidity and mortality. Overall, among adults aged 19 years and above, 32.5% and 28.7% are overweight and obese, respectively.

**Objectives:** To reduce the increasing prevalence of obesity among the Bahraini adults population.

**Method/Design:** Nutrition clinics for treatment of obesity in adults 19 years and above were introduced in 3 main health centres since 2009 to combine the use of mainly dietary and physical activity in a mid- to long-term intervention programme. The programme was implemented by a team of nutritionists, nurses and family physicians.

**Results:** At the end of the first year, 29.3% of males and 28% of females had lost an average of 14 kg over a period of 12 months of the programme. Around 2% of males and females did not benefit from the programme and reported weight gain. Dropout of the programme was around 20%. The most significant observations during treatment were reductions in mean BMI, waist circumference, plasma lipid levels, fast blood sugar and blood pressure.

**Conclusions:** The positive response toward Nutrition clinics indicates the potential of the intervention programme. There is a need for obesity treatment programmes that facilitate healthy eating and activity patterns for all age groups. Coordinated action at all levels is required to substantially impact the increasing prevalence of obesity in Bahrain.

**Key Words:** Obesity, overweight, nutrition clinics, diet and intervention.

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**27/1058. Nutrition in the Prevention of Non-Communicable Diseases**  
**Dietary sources of mercury (Hg) in the diet of an elderly population in Malaga**

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**Introduction:** The consumption of foods containing environmental contaminants is a potentially significant source of human

exposure of Mercury (Hg).

**Objectives:** To assess the major dietary sources of Hg in an elderly Spanish population.

**Method/Design:** We examined dietary data from PREDIMED study participants from Malaga and included 542 subjects (324 women, mean age 67y), with valid food-frequency questionnaires (FFQ). Dietary intakes were assessed with a 136-item FFQ in face-to-face interviews by trained dieticians. Data on Hg content of foods included in the FFQ were derived from a Total Diet Study from Catalonia (2004), considered as the most appropriate database for completeness and similarity as compared to the foods included in other Total Diet Studies (Pais Vasco, USA, UK and Chile were compared).

**Results:** Mean total Hg intake was 38.7µg/day. The main Hg sources (presented as % of total Hg intake) were: Fish/Seafood (75%) followed by foods with plant origin (18%) and food with animal origin, (excluding fish/seafood) (6.6%). Among the food groups with plant origin the major source were fruits (8.6%) followed by vegetables (4.2%) and cereals (2.1%). No difference between sexes was observed in the ranking of sources. Comparing total intakes of Hg by body weight (µg/kg/day) in overweight versus normal weight subjects, the latter had higher intakes.

**Conclusions:** We observed a high dietary exposure of Hg in our population, in comparison with published data from other populations. Malaga's elder people have, by tradition, high intakes of fish, fruits and vegetables, which could explain these differences, as well as the dietary assessment methods used. The consumption of healthy diets such as the Mediterranean Diet, rich in fish and plant derived foods implies higher intakes of Hg and interactions with between nutrients needs to be explored to better understand the benefits of this diet.

**Key Words:** Mercury exposure, Food Sources, Food-frequency questionnaire and Mediterranean Diet.

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**27/1064. Nutrition in the Prevention of Non-Communicable Diseases**  
**Fish consumption, omega-3 fatty acids, and environmental contaminants in relation to low-grade inflammation and early atherosclerosis**

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**Introduction:** Fish consumption and the intake of fish-derived omega-3 polyunsaturated fatty acids (PUFAs) are shown to protect from cardiovascular diseases (CVD). In contrast, most fish contain environmental contaminants such as dioxins, PCBs, and methyl mercury that have endocrine-disrupting potency and may have adverse effects on cardiovascular health.

**Objectives:** Our aim was to elucidate associations of habitual fish consumption and serum concentrations of fish-derived omega-3 PUFAs with chronic low-grade systemic inflammation and early signs of atherosclerosis as well as traditional CVD risk factors taking into account the overall effect of beneficial and hazardous compounds in fish.

**Method/Design:** The Health 2000 sub-study participants (n=1173) represented a general Finnish population sub-sample and the Fishermen sub-study participants (n=255) represented a population with high fish consumption. Model-adjusted geometric means and tests for linear trend were calculated for CVD risk factors by tertiles of fish consumption and serum omega-3 PUFAs, and additionally in the Fishermen sub-study, by tertiles of serum polychlorinated dibenzop-dioxins, dibenzofurans and polychlorinated biphenyls, and blood methylmercury.

**Results:** Serum triglyceride concentration decreased across serum omega-3 PUFA tertiles in both sexes and sub-studies. Insulin resistance and serum concentrations of C-reactive protein, tumor necrosis factor  $\alpha$ , and interleukin 6 decreased across serum omega-3 PUFA tertiles among the Health 2000 sub-study participants. Among the Fishermen sub-study men, insulin resistance and carotid artery stiffness measured by  $\beta$ -stiffness index tended to increase and RR estimate for carotid artery plaque tended to decrease across tertiles of serum environmental contaminants.

**Conclusions:** The anti-inflammatory effect of omega-3 PUFAs seems to have a key role in the cardiovascular benefits of fish consumption. Environmental contaminants may alter insulin metabolism and possibly decrease arterial elasticity in high concentrations but the overall effect of fish consumption on atherosclerosis progression appears not to be harmful.

**Key Words:** fish, omega-3 polyunsaturated fatty acids, contaminants, inflammation, atherosclerosis

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**27/1065.** Nutrition in the Prevention of Non-Communicable Diseases

### **Nut consumption and incidence of the metabolic syndrome after 6 year follow-up: the Sun Cohort**

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**Introduction:** The Predimed randomized trial showed that a Mediterranean diet enriched with nuts reduced the risk of developing the metabolic syndrome (MS). However, these results were observed after a follow-up period of only one year and only included elderly high risk subjects.

**Objectives:** Our objective was to assess the long-term relationship between nut consumption and the risk of the MS in the SUN Project, a Spanish cohort of young adults, after 6-year follow-up.

**Method/Design:** The SUN Project is an ongoing, dynamic, prospective cohort of university graduates. For the present analysis we considered 11682 participants recruited up to March 2004 to warrant a minimum follow-up of 6 years. Of these, 9924 were retained in the cohort for at least 6 years. After excluding participants with extreme caloric intake or with prevalent MS, 8643 participants were available for the analyses.

Nut consumption was collected at baseline using a 136-item food frequency questionnaire previously validated. The MS was defined according to the International Diabetes Federation criteria.

The association between nut consumption and MS was assessed with non-conditional logistic regression models adjusting for potential confounders, and stratifying by sex. According to their frequency of nut consumption participants were classified in 4 categories, from "never or almost never consumed nuts to "twice or more per week". We compared the incidence of MS between extreme categories.

**Results:** We observed 286 cases of MS among men and 97 cases among women at 6 year-follow-up. Women who consumed nuts  $\geq 2$ /week presented a 73% lower risk of developing the MS than did those who never or almost never consumed nuts (adjusted odds ratio (OR): 0.27, 95% confidence interval (CI): 0.11-0.70; p for trend<0.01). Among men, nut consumption was not associated with lower risk of developing the MS (adjusted OR: 0.98, 95% CI: 0.64-1.51; p for trend: 0.72) (p for interaction: 0.11).

**Conclusions:** Nut consumption was significantly associated with lower risk of developing the MS after 6-year follow-up among women of the SUN project but not among men.

**Key Words:** Nuts, metabolic syndrome, cohort.

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**27/22.** Nutrition Research and Education in Europe

### **Propolis and temozolomide interaction in glioma cells**

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**Introduction:** Propolis is a substance produced by bees from the resin collected from trees and shrubs, which combines beeswax and secretions from bee's salivary glands rich in many enzymes. Recent studies suggest antiproliferative activity of propolis in cultured human

tumor cells. Temozolomide (TMZ) is anticancer drug widely used in the treatment of brain tumors.

**Objectives:** The viability of glioma cells (HTB-14) were studied after exposition to different concentrations of ethanol extract of propolis (10, 20, 30, 50, 100 µg/ml) and TMZ (10, 20, 50, 100 µM) during 24, 48 and 72 hours.

**Method/Design:** We used cytotoxicity test (MTT test).

**Results:** Propolis or TMZ decreased the viability of glioma cells with the increase of doses and time of incubation (viability after 72 hours –for propolis 49-5% and for TMZ 47-10%). TMZ in dose 20 µM and propolis, in the studied concentrations, used together had higher effects than given separately to 48 hours of incubation, but after 72 hours, the influence of propolis was stronger.

**Conclusions:** Propolis administered with TMZ seems to be a promising combination which might be useful in glioma therapy. Propolis as a natural bee product, can represent an alternative way to destroy cancer cells.

This study was supported by the Polish Ministry of Science and Higher Education Grant N N405 625438.

**Key Words:** Propolis, Temozolomide, Glioma Cells

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## 27/24. Nutrition Research and Education in Europe Chrysin influenced survival of human astroglia cell line SGVp12

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**Introduction:** Key Words: Chrysin, Astrocytes, Survival

Chrysin (5,7-dihydroxyflavone) is a component of propolis that shows significant biological and pharmacological properties. This natural flavonoid has antioxidant and anti-inflammatory effects and anti-cancer properties. It induces apoptotic pathways and inhibits of cell proliferation in many types of tumor cell lines. The proliferation and the growth of C6 glioma cells exposed to 10 - 50 µM of chrysin for 72 h decreased by about 30% - 90%, but its influence on normal astrocytes is still unknown.

**Objectives:** The viability of human astroglia cell line (SVGp12) was studied after exposition to five different concentration of chrysin during 24, 48 and 72 hours.

**Method/Design:** We used cytotoxicity test (MTT test).

**Results:** Strong and significant (about 50 % of control) reduction of survival was observed for chrysin concentration 20 µM, 30 µM and 50 µM during all the time of observation. Chrysin used at concentration 5 µM and 10 µM slightly influenced on survivability of astrocytes after 24 hours but 5 µM of chrysin increased the viability of SVGp12 cells in 48 and 72 hours of observation. The viability of astrocytes exposed to 10 µM of chrysin for 72 h decreased to about 60 %.

**Conclusions:** According to the results of our study, astrocytes exposed to chrysin at concentration higher than 5 µM reduced the survival to about 40-60%. This disadvantage may close the perspectives of utilization of such flavonoid in the treatment of brain cancers.

This study was supported by the Polish Ministry of Science and Higher Education Grant N N405 625438.

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## 27/112. Nutrition Research and Education in Europe Awareness of the Swiss quality standards for health-promoting communal catering

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**Introduction:** Swiss quality standards (QS) for health-promoting communal catering (CC) were published in December 2009, accompanied by an information campaign (e.g. Internet, mass mailings). The key element is the Swiss Society for Nutrition's Food Pyramid (FP). The QS support CC establishments in providing health-promoting ways of eating/drinking, thus helping consumers to make more healthful food/beverage choices.

**Objectives:** Assess the QS awareness level of consumers and the Swiss CC sector one year after publication. Develop and launch a target group-specific public relations (PR) concept/campaign for health-promoting CC.

**Method/Design:** Computer-assisted telephone interviews (January-April 2011) of a: (1) nationally representative sample of Swiss residents (n=721) stratified by sex (337 men, 384 women) and age (16-69 yrs); (2) systematic sample from a CC address database (n=334). Topics covered are: awareness/importance of QS implementation, preferred communication channels, and (for consumers) the importance of a balanced diet and awareness of the FP. Descriptive statistical analyses are ongoing.

**Results:** Around 10% of consumers and 34% of the CC sector were aware of the QS; 75% of the latter were highly interested in the issue. The CC sector was best reached through internal trade media (30%) and associations (20-40%), as opposed to (e.g.) Internet or mail (15%). Over half of consumers considered a balanced diet in CC very important, while other related factors (e.g., pleasant ambiance) were rated less important. Consumers said to be best reached through (multiple possible answers) TV/radio spots (66%), billboards (54%) and newspaper advertisements (53%). Updated summary statistics will be presented.

**Conclusions:** A target group-specific PR concept/campaign for health-promoting CC by the Education/Business/Care subsectors is needed. Food service providers must be targeted through their customers as well as from inside the sector using sector-specific disseminators. Continuous QS implementation will continue to be monitored to ensure its successful contribution to Swiss public health.

**Key Words:** Communication, Communal Catering, Consumer Awareness, Health Promotion, Quality Standards

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**27/122. Nutrition Research and Education in Europe**  
**Urinary tract infections: nutrition economics impact of improved water intake**

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**Introduction:** The health expenditures related to urinary tract infections (UTI) represents a considerable economic burden for the Health Care System in many countries. An optimal fluid intake may decrease the risk of UTI and consequently, the development of comorbidities such as pyelonephritis and renal failure. There is no estimation of the cost impact related to an optimal hydration.

**Objectives:** The aim of the study was to estimate the health-economic impact of a sufficient (2L/day) vs low water intake (1L/day) for primary and secondary prevention of UTI from the perspective of the French payers in 2010.

**Method/Design:** A Markov model was applied to the general French healthy population. The cost of the management of the UTI episodes was estimated based on official French prices and national statistics. This was completed with the outcomes of a modified Delphi panel in order to reflect the treatment patterns of current daily medical practice for UTI in France. Probabilities to develop UTI were obtained from the scientific literature: The annual incidence of UTI is estimated to 7%, the annual recurrence to 30%, the annual risk of renal failure due to UTI to 0.2%, the reduction of UTI by increased water intake to 40% and its recurrence to 30%.

**Results:** The cost of a case of UTI in France is estimated to €805. Prevention of the recurrence of UTI through an increased water intake may result in an annual cost saving of €460 million. Similarly, primary prevention may lead to an annual cost saving of €1119 million. Sensitivity analyses of the assumptions confirmed the robustness of the approach.

**Conclusions:** Our results show that increased water intake may lead to cost savings in public funds in France. Therefore, strategies that aim to improving water intake in the general population may have a considerable clinical and economic impact.

**Key Words:** nutrition economics, water intake, urinary tract infections, prevention

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**27/148. Nutrition Research and Education in Europe**  
**Estimation of nitrites intake as food additives in Polish population**

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**Introduction:** Nitrites have a long history of use as preservatives in meat products, which inhibit *Clostridium botulinum*. Nitrites became controversial when it was recognized that it could be transformed into carcinogenic and mutagenic N-nitroso compounds such as nitrosamines. Acceptable daily intake for nitrites amounts to 0.1 mg/kg body weight/day.

**Objectives:** Estimation of nitrites intake as food additives by Polish population and the assessment of risk for human health resulting from their intake expressed as percent of Acceptable Daily Intake (ADI).

**Method/Design:** Data on food consumption was collected in 2000 under the FAO project „Household Food Consumption and Anthropometric Survey”. The source materials included 24-hour recalls of 4134 individuals (aged 1-96 years). People who consume products containing E 249/E250 were chosen - 2948 “consumers only”. Maximum permitted levels of usage of potassium/sodium nitrites (E 249/E 250) were taken into consideration according to the Polish regulation. Nitrites may be added to meat products at maximum amount - 150 mg/kg and to sterilised meat products - 100 mg/kg.

**Results:** The average intake of nitrites in the surveyed population amounted to 13.1 mg/person/day (218% ADI). The high consumption of meat products by Polish population causes that nitrites intake can significantly exceed the ADI (over 400% ADI), depending on age group. The higher exposure to that substance was found especially in the youngest children aged 1-3 and the lowest in the group of female over 75 years old but also at that group ADI was exceeded (111%).

**Conclusions:** There is essential carrying out of studies on estimation of nitrites intake based on obtaining actual data on levels of nitrites usage by food producers.

It is necessary to educate population on the selection of foodstuffs in the daily diet. Varied and diversified diet will support lower intake of food additives from food.

**Key Words:** nitrites, food additives, consumers only

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**27/150. Nutrition Research and Education in Europe**  
**Optimized e-diary to increase accuracy and acceptability of dietary surveys**

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**Introduction:** Despite various existing methodologies, it remains difficult to evaluate food intake with accuracy. Evaluating

fluid intake is even more challenging because of numerous acts of consumption within a day. In order to improve recording, we used an optimized online tool (MXS-Epidemio, MXS, Paris, France), with specific controls to track fluid intakes.

**Objectives:** To compare (i) dietary and nutritional intakes obtained with a 7-d paper food diary versus a 7-d web-based food diary and (ii) user's acceptability towards both methods.

**Method/Design:** A cross-over study design was used and completed by 246 French subjects aged 18 to 60. Each subject self-reported their food and fluid intake using both methods (7-d each) with a one week washout period. At the end of the study subjects completed a questionnaire designed to assess their acceptability of the two methods.

**Results:** Results showed (1) no difference between methods in terms of Energy intake:  $1824 \pm 39$  vs  $1836 \pm 41$  kcal/day ( $p=0.745$ ) for online and paper methods, respectively, (2) that reporting of total water intake from fluids was significantly higher with the optimized online method compared with the paper-method ( $1348 \pm 36$  vs  $1219 \pm 34$  mL,  $p<0.0001$ ), respectively, (3) that reporting of plain water is also higher with the online method:  $609 \pm 29$  vs  $532 \pm 25$  mL ( $p=0.004$ ), respectively and (4) 77% of subjects preferred the online method.

**Conclusions:** The quality of reporting using this online method was comparable for food and better for fluid in comparison with the paper-version. In addition, the online method facilitates data management and induces cost and time savings. It can be a relevant alternative to the paper method, especially to record fluid intake in population surveys.

Key Words: Dietary Records, Online Questionnaire, Fluids, Foods

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### 27/161. Nutrition Research and Education in Europe **Promotion integration between of disciplines in the basic cycle with research**

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**Introduction:** The Integrated Teaching and in same time, integrator of content allows students to learn to learn and prepare to solve problems related to their future profession.

**Objectives:** Promoting integration between of disciplines in the basic cycle using a complementary strategy, which harnesses the research and knowledge building.

**Method/Design:** The study subjects were students of the first two years of the Nutrition and Metabolism Course. was designed to study the of motherhood like transverse axis during the first 4 semesters. Working groups were created, with students as members of different steps. Each group chose a topic for seminar presentation and to conduct research in the medical records of pregnant women in the University Hospital, related to the study 'Influence of maternal weight gain and weight of the newborn'. We used two semi-structured for evaluation.

**Results:** There was formation of six groups totaling 29 students.

The students recognized that participation in the project promoted the contact with database (to 63.6%) and use of standards for writing theses and monographs (45%), and poster presentation.

For 95% of the students, the project helped to improve the integration of content covered in the Basic Course (horizontal integration) and also allowed the vertical integration through

of contact with content of the professional cycle. Among participants, 90.9% reported that the seminar contributed to the understanding of physiological, social and psychological factors that involve pregnancy.

It was identified difficulties in using the rules for writing theses and monographs (45.45%), as well as to define the methodology (40.9%).

**Conclusions:** The study of 'Influence of maternal weight gain and weight of the newborn' has been revealed as a strategy for teaching and learning with positive aspects for the interrelationship of the students, the integration of content and a possibility of learning grounded in scientific methodology.

**Key Words:** learning methodology, nutrition course, nutrition formation

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### 27/162. Nutrition Research and Education in Europe **Systematic report of research on iodine intake/status and its relationship to developmental outcome in children**

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**Introduction:** Iodine deficiency (ID) is the leading cause of preventable mental retardation worldwide. Mild-to-moderate ID in pregnancy, still present in many countries in Europe, may affect the cognitive and motor function of children.

**Objectives:** We provided a research overview of randomized controlled trials (RCTs) and observational studies (Obs) in children that investigated the relationship between iodine intake/or status and cognitive functions, one of health outcomes related to iodine intake according to EURRECA Network of Excellence. Outcomes were characterised as belonging primarily to one of the following cognitive domains: intelligence, mental and psychomotor performance. Iodine status measurements were included only if studies used the sensitive status biomarkers: urinary iodine, serum/plasma thyroidstimulating hormone and thyreoglobulin

**Method/Design:** Search included MEDLINE, EMBASE (Ovid), Cochrane Library and bibliographies. Studies were assessed for inclusion and validity, with independent duplication. This search was originally planned as a meta-analysis, but published data often provided z-scores and non-comparable cognitive test.

**Results:** Thirteen studies (5 RCTs, 8 Obs) were included from 23 that appeared potentially relevant. Obs in severely-ID indicated a strong relation between iodine intake/or status and mental impair-

ment. The results of RCTs were inconsistent, probably due to high/or moderate risk of bias. Studies from moderate-ID were methodologically weak.

**Conclusions:** There was some evidence that iodine supplementation improved general cognitive function in ID-children, but this requires confirmation with well-powered, blinded, independently funded RCTs in different age groups of children, measuring relevant long-term developmental outcomes across all levels of baseline iodine status. The studies reported herein are carried out by the EURRECA Network of Excellence, financially supported by the Commission of the European Communities, specific Research, Technology and Development Programme Quality of Life and Management of Living Resources, within the Sixth Framework Programme, contract no.036196. This report does not necessarily reflect the Commission's views or its future policy in this area.

**Key Words:** Iodine, biomarker, cognitive functions, EURRECA

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### 27/178. Nutrition Research and Education in Europe **Energy and nutrients intake in overweight and obese adolescent girls in Poland**

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**Introduction:** Faulty nutrition is one of the most important factors that can lead to overweight and obesity.

**Objectives:** The objective of the study was to assess the diet of overweight and obese girls and to compare it with the diet of their peers with normal weight.

**Method/Design:** The study included 395 girls aged 14-15 years from the whole country. Overweight and obesity were diagnosed on the basis of anthropometric measurements. Dietary data were collected using 24-h dietary recall.

**Results:** The energy value of daily diet was 5.84 MJ in girls with overweight or obesity. It was significantly lower than energy intake in girls with normal weight - 7.13 MJ. The content of protein, fat and carbohydrates was lower in diet of overweight or obese girls in comparison with those of normal weight. However the percentage of energy from protein in diet of both groups did not differ significantly - 11.6% and 12.1% respectively, similarly the percentage of energy from fat - 31.6% and 32.1%.

The intake of minerals (potassium, calcium, magnesium, iron, zinc, copper, manganese) and some vitamins (thiamin, riboflavin, niacin, vitamin B6) among overweight or obese girls also was lower than in their peers with normal weight. However the content of other analysed vitamins (vitamin A, vitamin E and ascorbic acid) in diet of both groups was similar.

In comparison with Polish DRI the energy intake among overweight or obese girls was low, similarly as the most analysed nutrients, mainly: calcium, magnesium, iron, zinc, thiamin and niacin.

**Conclusions:** Adolescent overweight or obese girls in Poland decrease their dietary intake in comparison with girls of normal weight. It could be due to the wish to reduce excessive body weight or due to

underreporting of their real intake.

The nutrient content in their diet is related to the risk of some mineral and vitamin deficiency.

**Key Words:** Diet, Overweight And Obesity, Adolescence

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### 27/182. Nutrition Research and Education in Europe **Diet, tobacco smoking and breast cancer in Poland between 1970 and 2008**

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**Introduction:** Breast cancer morbidity in Polish females is very high. Its standardised incidence rate in 2008 amounted to 47.1/100 thousand resulting from growing trend during the period of 1970-2008.

Diet and tobacco smoking were probably among the factors that played a significant role in breast cancer pathogenesis.

**Objectives:** The objective of the study was to investigate the relation between selected dietary factors and tobacco smoking and breast cancer morbidity in Poland in 1970-2008.

**Method/Design:** Standardised breast 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. Dietary variables included the consumption of total edible fats, animal fats and alcohol. Information on tobacco smoking was derived from national statistical yearbooks. The Spearman rank correlation coefficient ( $r_s$ ) was used as a measure of the relationship between examined variables.

**Results:** High positive correlation was found for breast cancer incidence rates in 1970-2008 and edible fats consumption, with  $r_s=0.87$ . Edible fats consumption significantly increased during that period from 20.8 to 30.8 kg/person/year. Positive correlation, however not very strong ( $r_s=0.37$ ) was noted also with respect to alcohol consumption which was 5.9 in 1970 and 10.1 l/person/year in 2008.

During the first part of that period (up to 1989) breast cancer morbidity was also positively related to animal fats consumption ( $r_s=0.64$ ) and tobacco smoking ( $r_s=0.51$ ).

**Conclusions:** Improper dietary habits and frequent tobacco smoking has probably contributed to the increase of breast cancer morbidity rates between 1970 and 2008. Other factors such as low physical activity, high overweight and obesity prevalence frequently accompanied by abdominal fatness in postmenopausal women could also adversely affect these rates.

**Key Words:** Diet, Tobacco Smoking, Breast Cancer

27/183. Nutrition Research and Education in Europe

### **Genetic variants in the fads gene cluster determine umbilical cord plasma polyunsaturated fatty acid amounts**

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**Introduction:** Fetal supply with long-chain polyunsaturated fatty acids (LC-PUFA) during pregnancy, which is considered important for brain growth and optimal visual and cognitive development, is provided by materno-fetal placental transfer. In addition to dietary influences, maternal fatty acid desaturase (FADS) genotypes modulate the amounts of LC-PUFAs in maternal blood. The effect of FADS genotypes on cord fatty acids has not been investigated until now.

**Objectives:** The aim of the present study was to investigate the influence of maternal and child FADS genotypes on the amounts of LC-PUFA in umbilical cord plasma phospholipids as indicator of fetal fatty acid supply during pregnancy.

**Method/Design:** In 2034 mother-child pairs of white ethnic origin from ALSPAC (Avon Longitudinal Study of Parents and Children), we measured eleven n-6 and n-3 fatty acids in umbilical cord plasma and genotyped 17 FADS gene cluster single nucleotide polymorphisms (SNPs) in maternal and child DNA samples. Linear regression analysis was used to investigate the associations of SNPs with LC-PUFA levels applying an additive genetic model. The maternal genotype effect was adjusted for the child genotype and vice versa to estimate the dominant genetic influence on cord blood fatty acid composition.

**Results:** Minor alleles of most analyzed maternal SNPs were significantly associated with higher cord plasma levels of the precursor n-6 PUFA linoleic acid, eicosadienoic acid, and dihomo-gamma-linolenic acid, whereas the child minor alleles were mainly associated with lower levels of the n-6 LC-PUFA arachidonic acid, adrenic acid, and docosapentaenoic acid. Minor alleles of both, mothers and children, were associated with decreased levels of docosahexaenoic acid.

**Conclusions:** This first association study on FADS genotypes and cord plasma fatty acids highlights the importance of FADS genotypes for fetal LC-PUFA status. In contrast to common belief, fetal fatty acid conversion seems to contribute significantly to their LC-PUFA status.

**Key Words:** FADS, desaturase, cord blood, single nucleotide polymorphism, long-chain polyunsaturated fatty acids

27/185. Nutrition Research and Education in Europe

### **Beneficial effect of long-term consumption of low-fat yoghurt on the parameters of obesity**

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**Introduction:** Introduction: The beneficial effect of dairy product in the treatment and prevention of obesity has been previously discussed.

**Objectives:** Objective: The aim of our study was to investigate the effect of yoghurt enriched with *Bifidus essensis* (0.5% fat) in the treatment of obese patients.

**Method/Design:** Materials and methods: A total of 64 subjects with central obesity (28 men and 36 women) were enrolled in the study. Baseline mean subject characteristics were: age-45.2 year old, body mass index (BMI)-32.4, fat mass- 38%, visceral fat-14.1, waist circumference-109 cm, hip circumference-120.2, sagittal diameter-27 cm. All obese patients underwent a dietary regimen, included 290 g yoghurt fermented with *Bifidus essensis* for dinner for a 6-month period. The product consisted of proteins-4.3 g, carbohydrates (lactose)-3.9 g, fat-0.5 g, and 37 kilocalories per 100 g product. At the beginning and at the end of the study several anthropometric parameters have been measured by bioimpedance device (Tanita 420).

**Results:** Results: The study demonstrated a decrease in BMI with 9.8%, in fat mass with 9.6%, in visceral fat with 14% as well as a decrease in waist circumference-11.9%, hip circumference-5.8%, sagittal diameter-10.3%.

**Conclusions:** The long-term consumption of yoghurt fermented with *Bifidus essensis* (0.5% fat) in the diet of obese patients leads to improvement of the studied anthropometric parameters as well as to significant decrease in the cardio-vascular risk.

**Key Words:** low-fat yoghurt, diet, visceral fat, obesity

27/192. Nutrition Research and Education in Europe

### **Total polyphenols and antioxidative activity of water extracts of spent coffee**

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**Introduction:** Espresso coffee is a popular beverage commonly consumed in restaurants. Spent coffee that is generated is generally disposed as household waste. Many studies have focused on utilization of waste containing a substantial amount of biologically valuable



ingredients such as antioxidants.

**Objectives:** This preliminary investigation was conducted to determine the antioxidant potential of aqueous extracts of spent coffee and to optimize the possible method for the production of valuable food supplements.

**Method/Design:** The spent coffee was received from the production of espresso coffee (Cream caffè, Italy) in the commercial espresso machine (Astoria). Extraction was carried out in distilled water (mass ratio 1:6) with adjusted pH values of 3, 7 and 10 at ambient temperature for a period of 2h. After centrifugation (4500 rpm, 10 min) reextraction was performed under the same conditions. The extracts were evaporated in vacuum evaporator to the volume of 200 ml and then dried in a spray dryer (inlet temperature 170°C, outlet 80°C).

Folin-Ciocalteu method was used to examine the content of total polyphenols in extracts. Polyphenols content was measured by UV/VIS spectrophotometer at 750 nm. Antioxidant activity was investigated by the DPPH radical scavenging activity. Changes in the absorbance of the samples were measured at 517 nm.

**Results:** The preliminary results show the following total polyphenol content in spent coffee extracts (as mg of gallic acid per g of extract): 100.83, 239.67 and 188.43 for pH 7, 10 and 3, respectively. The corresponding DPPH radical scavenging activities (expressed as IC50 µg/ml) were 25.01, 11.27 and 16.43 for pH 7, 10 and 3, respectively.

**Conclusions:** From these results, we could conclude that spent coffee aqueous extracts has a substantial amount of polyphenols with the appropriate antioxidant activity that is comparable with commercial antioxidants.

**Key Words:** Spent Coffee, Polyphenols, Antioxidative Activity, Dietary Supplement.

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### 27/215. Nutrition Research and Education in Europe **Estimation of usual vitamin and mineral intake from food and supplements in the French population**

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**Introduction:** In the context of increasing consumption of fortified foods and dietary supplements (DS), it is essential to estimate as precisely as possible the total nutrient intake by taking into account all sources of intake. Furthermore, in order to perform nutritional risk and benefit assessments, it is recommended to estimate usual intake (UI) instead of observed intake (OI).

**Objectives:** This study first compared OI with UI according to common food only and secondly compared UI successively estimated on i) common food ii) common and fortified food and iii) common

and fortified food and dietary supplements.

**Method/Design:** Data from the second French national food consumption study (INCA2) conducted in 2006-07 on a representative sample of 1863 adults and 1382 children were used. Diet was assessed using a 7-day food record. DS consumption was evaluated using a frequency questionnaire over the past 12 months. Nutrient intakes were assessed using the French nutritional composition database for common food and specific composition databases for fortified foods and DS. The Multiple Source Method and software developed by the German Institute of Human Nutrition was used to remove the day-to-day intake variability and to estimate the total UI.

**Results:** For all nutrients, the UI distribution is less scattered (SD and high percentiles lower) than the OI distribution on 7 days. Total UI after taking into account all sources (fortified food and DS) are significantly higher than UI based only on common food for all minerals and for vitamins C, D, E, B3, B6, retinol in adults and for fewer minerals (Ca, Cu, Fe, Mg, Na) and all vitamins except vitamin D, retinol and total vitamin A in children.

**Conclusions:** Taking into account all sources of intake allows a better estimation of nutrient intake in the French population.

**Key Words:** usual intakes, fortified foods, dietary supplements

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### 27/217. Nutrition Research and Education in Europe **Prevalence of inadequate nutrient intake and risk of exceeding upper levels in the French population**

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**Introduction:** The field of nutritional risk assessment includes at the left end of the distribution the risk of inadequate intake comparing to the needs and at the right end the risk of exceeding upper levels. By taking into account all sources of intake (ie common food, fortified food and dietary supplements (DS)), both of these risks can be assessed.

**Objectives:** This study investigated successively the prevalence of inadequate nutrient intake (ie intakes below requirements) and the proportion of subjects who exceed Tolerable Upper Intake Levels (ULs) with all intake sources in the French population.

**Method/Design:** Diet was assessed from the second French national food consumption study (INCA2) conducted in 2006-07 (on a representative sample of 1863 adults and 1382 children) using a 7-day food record and a frequency questionnaire over the past 12 months for DS. Nutrient intakes were assessed by linking food and DS consumption with nutritional composition databases. The Multiple Source Method and software developed by the German Institute of Human Nutrition was used to remove the day-to-day intake variability

and to estimate the total usual intake (UI). The sum of UI from foods (common or fortified) and from DS was compared to the estimated average requirements (EAR) and to ULs.

**Results:** A risk of inadequate intake in Ca, Mg, Se and vitamins C, E, B6 is observed for the adults over 75 years old and in Mg for other adults groups. For children, inadequate intakes were reported in vitamins C, E and minerals Ca, Cu, I, Mg, Zn for different groups of age and sex. Very few subjects (<2%) exceeded ULs even with consideration of all sources of nutrient intake.

**Conclusions:** According to the EAR cut point method, some age-gender groups may be considered as particularly at risk. For now, the risks of exceeding ULs are limited.

**Key Words:** inadequate intakes, tolerable upper intake level

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### 27/219. Nutrition Research and Education in Europe **Feasibility, validity and potential of new dietary assessment technologies for large-scale epidemiological studies**

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**Introduction:** Innovative use of technology (e.g. personal digital assistant/PDA, internet) is deemed to enhance dietary assessment including various epidemiological research settings. However, little is known about their relative merits for large-scale epidemiological studies, where valid and comparable food and nutrient intake estimates across study populations are fundamental, within reasonable timeframes, costs and respondent burden.

**Objectives:** To evaluate the feasibility, validity and potential of new dietary assessment technologies for measuring diet in large-scale epidemiological studies.

**Method/Design:** Findings from an upcoming new type of literature review paper in the International Journal of Epidemiology (IJE) will be presented. Searches with defined inclusion and exclusion criteria were performed in Pub Med and Web of Science. Eligible technologies applied in study populations of all age groups in low- and middle-income and industrialized countries and published in English-language journals between 1995 and 2011 were evaluated according to predefined indicators targeted to needs of large-scale studies (e.g. work flow, cost, users' acceptance, data quality). Application components and innovative features were also described.

**Results:** PDA-, mobile-phone-, interactive computer-, web-, digital-images- and hybrid-based technologies were identified. PDA-variants, for example, instruct the participant to record all foods and beverages at the time of consumption by selecting appropriate items from an integral finite drop-down menu ranging from 400 to more than 4000 foods. Time-efficient and facilitated data processing was

reported, but the accuracy of individual dietary estimates was low to moderate. By contrast, mobile-phone-based technologies are based on digital photos (self- or automatically taken) or voice records, which are readily adopted and promising for frequent imaging to collect total diet, but have limited power and storage capacity.

**Conclusions:** A variety of new dietary assessment technologies have been developed. Comparisons across the different types will increase the understanding of their performance to complement, improve or substitute conventional epidemiological dietary assessment instruments in large-scale epidemiological studies.

**Key Words:** dietary assessment, technology, feasibility, validity, large-scale epidemiological studies

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### 27/243. Nutrition Research and Education in Europe **Predictors of weight loss maintenance during a 6 months dietary intervention period. Results from the DiOGenes study**

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**Introduction:** Introduction: There is a need to develop tools to predict individual weight loss maintenance during a weight loss program.

**Objectives:** Objective: We aimed to identify predictors of weight loss maintenance outcome in subjects from eight European countries in the DiOGenes project.

**Method/Design:** Materials and methods: A total of 932 overweight/ obese subjects [body mass index (BMI): 27 - 42 kg/m<sup>2</sup>] were enrolled in an 8-week low-calorie diet (LCD). The 776 subjects (83%) who achieved at least 8% reduction in their initial body weight were randomized into five dietary arms varying in protein content and glycemic index for a 6-month weight maintenance period. Baseline characteristics, weight loss at weeks 1, 3 and 8 of LCD were assessed as predictors of weight loss maintenance using multivariate regression and correlation models.

**Results:** Results: The multivariate model showed that the 6-month weight loss maintenance was predicted by: -7.889-0.343\*weight loss

(kg) at week 3 +1.505\*weight loss (kg) at week 8+2.422\*gender, (R2 = 51%, P = 0.0001). Furthermore, women showed better weight maintenance than men.

**Conclusions:** Conclusion: A greater weight loss during 8-week of LCD and female gender predict better 6-month weight maintenance of weight loss, whereas the baseline characteristics did not predict outcome.

**Key Words:** predictors, weight maintenance, obesity, gender

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## 227/309. Nutrition Research and Education in Europe Evaluation of food purchasing behavior of consumers

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**Introduction:** The first step of meeting nutritional needs is purchasing food. As food safety is controlled within a legal framework for the whole food chain, it is the consumer's responsibility to choose the foods carefully and keep them safe until they are consumed.

**Objectives:** This study was conducted in Ankara Province in Turkey to determine food purchasing behavior of adult consumers.

**Method/Design:** A total of 700 consumers who were working in ministries, 365 males and 335 females were included in this study, and was conducted to find out the criteria which consumers took into account while purchasing food. The data has been collected by conducting face to face interviews and fill in a questionnaire constructed for this purpose. These food purchasing behavior points have been analyzed in terms of gender, age and educational level of the adults involved.

**Results:** The mean age of consumers was 36.37±7.68 years. A significant relationship was determined between the scores the consumers received from nutrition (p<0.05), the safety (p=0.000) and all of the shopping criteria (p<0.01) and their gender, between the scores received from safety and the age groups (p<0.01) and between the scores received from the safety (p<0.01) and the total scores from all of the shopping criteria, and their level of education received (p<0.05). It was also determined that female had higher scores of all the sections than male.

**Conclusions:** There are various reasons influencing the consumers' preferences. These factors vary from individual to individual while education is a significant factor in terms of making appropriate preferences. In order to raise consumers who have awareness into buying appropriate food, nutrition education should start at early ages.

**Key Words:** Purchasing, Food, Consumer, Behaviour, Nutrition

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## 27/321. Nutrition Research and Education in Europe Lifestyle counselling in promoting obese commercial drivers? Health ? Design and feasibility of a rct (nct00893646)

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**Introduction:** Irregular and long working hours are common among long-distance drivers and they are related to obesity and its comorbidities.

**Objectives:** To study if modifications in diet and promotion of walking and sleep hygiene lead to weight loss and improved cardio-metabolic health and alertness among obese long-distance drivers. In addition feasibility of the intervention (realization of counselling, participant responsiveness, applicability and patient safety) was studied.

**Method/Design:** Hundred thirteen truck and bus male drivers (aged 30-62, waist circumference >100 cm, without self-reported sleep apnoea or diabetes) were randomised into an intervention (INT, n=56) and control (CON, n=57) group. The 12-month intervention is individual lifestyle counselling comprising of monthly face-to-face and telephone contacts with a dietician. Counselling is structured and based on a counselling manual. The 2nd year is a follow-up phase for INT while CON participants receive 3-month telephone counselling (4 times). Assessments at 0, 12, 24 months include, among others, food diary (3 days), 2-km Walk Test for physical fitness, and 2-week sleep monitoring (Actiwatch) with sleep diary. The primary outcome is weight loss of 10 %; among secondary outcomes are alertness, health-related fitness and occurrence of metabolic syndrome.

**Results:** The intervention phase will be completed by June 2011. At present, 79 men have finished the 12-month assessments and 5 men have discontinued. Mean baseline BMI was 32.9 kg/m<sup>2</sup>. After 12 months, the mean weight change (unadjusted) was -3.6 (SD 6.6) kg in INT and +1.1 (3.8) kg in CON. At baseline the walk test time was rather slow, 17.5 minutes. At 12 months the changes were minor in both groups.

**Conclusions:** Based on preliminary results, we expect to develop

a lifestyle counselling procedure for occupational health care to promote health and alertness in long-distance drivers.

**Key Words:** Lifestyle counselling, irregular working hours, weight reduction, alertness, sleep

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## 27/328. Nutrition Research and Education

### The European food consumption validation (EFCOVAL) project- results

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**Introduction:** For effective formulation and evaluation of European health and food safety policy, standardized data are required on the food consumption of the European population. Many member states collect such data at the national level using different methodologies limiting the development, evaluation and follow-up of European food policies.

**Objectives:** To outline the main results and conclusions of the European Food CONsumption VALidation project (EFCOVAL).

**Method/Design:** The pre-existing EPIC-Soft application for standardized 24-h recalls was reprogrammed into a Windows environment and new functions were added. Six country specific versions of EPIC-Soft were updated and one new version was prepared. Further activities included a validation study of repeated 24-h recalls using EPIC-Soft among 600 adults in 5 countries; feasibility studies in children and the assessment of flavourings and development of new statistical software to estimate the usual intake from repeated 24-h recalls.

**Results:** The validation study showed that repeated EPIC-Soft 24-h recalls are suitable to describe the usual intake distributions of protein and potassium of European adult populations. In combination with a food propensity questionnaire (FPQ) the recalls are appropriate to rank individuals according to their fish and fruit & vegetable intake in a comparable way. Dietary intake of children can be assessed by the combination of EPIC-Soft 24-h recalls and food records. The EPIC-Soft standardized way of describing foods improved the estimation of dietary exposure to flavourings.

**Conclusions:** The findings provide sufficient evidence that the repeated 24-h dietary recall using EPIC-Soft for data standardization in combination with a FPQ and new statistical tools to model usual intake is a suitable method for pan-European surveillance of nutritional adequacy and food safety among healthy adults and is feasible in children of 7 years and older.

**Acknowledgements:** The Community funding under the Sixth Framework Program for the EFCOVAL project is acknowledged (FOOD-CT-2006-022895).

**Key Words:** EFCOVAL, Europe, food consumption survey, 24-h dietary recall, EPIC-Soft

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## 27/343. Nutrition Research and Education

### Identification of population groups at-risk-of-poverty and malnutrition in Europe

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**Introduction:** Poverty is one of the main reasons for unhealthy dietary habits in Europe. The FP7 CHANCE project intends to adopt a new multidisciplinary approach, leading to nutritional strategies for the prevention of malnutrition in population group's at-risk-of-poverty.

**Objectives:** The primary objective was to identify population groups at highest risk of poverty and provide insight into main determinants influencing the poverty and malnutrition. Identification was performed for five European countries: Italy, Lithuania, Finland, United Kingdom and Serbia.

**Method/Design:** For the identification of the population group's at-risk-of-poverty and malnutrition valuable sources was identified, data extracted and analyzed. In order to identify the population in the highest risk-of-poverty relationship between poverty status and different characteristics affecting the poverty age, gender, education, employment, family structure and food expenditure are selected and analyzed.

**Results:** Our data indicated that Lithuania is in the highest risk-of-poverty rate with 20.6% of population with cut-off point 60% of median equivalised income, than Italy (18.4%), Serbia (17.7%), UK (17.3%) and Finland (13.8%). Females, younger than 24 years are at

a higher risk of poverty than males. Single person, one adult older than 65 years, single parent with dependent children and single female are the types of household with the highest risk of poverty. Population over 60 years spends the highest percent of income on food and non-alcoholic beverages. Younger of 24 years spend the highest % of income on alcohol, cigarettes and narcotics indicating that this population could be at additional risk of unhealthy dietary habits and malnutrition.

**Conclusions:** The population with the highest risk of poverty and malnutrition is low educated, unemployed or inactive single females younger than 24 and older female than 65 years of age for 5 analyzed European countries.

Acknowledgement: Funding under FP7 CHANCE project and Ministry of Science Serbia project number 41030

**Key Words:** Population, Poverty Risk, Socio-Economic Status, Demography, Malnutrition

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#### 27/344. Nutrition Research and Education

### **Dietary guidelines and state legislation to improve child nutrition in Bulgaria**

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**Introduction:** National studies on nutrition and nutritional status of Bulgarian population show a number of negative characteristics and trends in nutrition of children. As a risk population group children represent high priority in the national nutrition policy.

**Objectives:** To develop and implement scientifically based national dietary guidelines and state legislation for improvement of child nutrition, reducing the risk of nutrient deficiencies, obesity and other chronic diseases.

**Method/Design:** Under consideration are the results obtained in the national studies of nutrition and nutritional status of children; dietary reference intakes of the population; scientific evidence for relationship of nutrition with child health and development. Leading specialists in the field of child nutrition and health in our country take part in the project.

**Results:** Food Based Dietary Guidelines for children 3-6 years of age and of schoolchildren 7-19 years of age are developed and published (2008), and promoted countrywide. The recommendations include positive and restrictive messages referring to improvement of nutrition, increasing of physical activity, maintaining of healthy weight. Food pyramids are elaborated for each age population group. Recommendations for exclusive breastfeeding and adequate complementary feeding of infants are presented in Dietary guidelines for infant nutrition (2008). Ordinance of the Ministry of Health for healthy nutrition of schoolchildren, prescribing and regulating the foods and beverages allowed to be offered on the school territory, including

canteens, buffets and vending machines was nationally introduced in 2009. In 2011 an Ordinance regulating the requirements for healthy nutrition of children 3-7 years of age in kindergartens and other child establishments has been developed as well.

**Conclusions:** National dietary guidelines for children and state legislation are basis on effective nutrition policy in Bulgaria.

**Key Words:** dietary guidelines, children, nutrition

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#### 27/350. Nutrition Research and Education

### **Health professionals? Beverage consumption and knowledge of liquid intake**

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**Introduction:** Liquid consumption is essential for a healthy life as is a balanced and adequate diet. Fluid intake, notably water, is essential for good health. Water plays a role in almost all body functions and is a major component of every cell, tissue and organ. While some quantity of water comes from solid food, most of it comes from beverages, either as plain water or as part of other beverages such as coffee, tea and soft drinks.

**Objectives:** This study aims to identify health professionals' beverage consumption and knowledge of liquid consumption.

**Method/Design:** The sample comprises 102 health professionals working in HASVAK State Hospital in Ankara, Gölbaşı town. Data were collected via a questionnaire. Beverage consumption was measured by means of questions related to consumption frequency and quantity. The items were adapted from Valisa et.al (2010). As for identifying knowledge, 14 expressions signifying "true", "false" and "no ideal" were presented.

**Results:** Among the participants, 84.3% were female while 15.7% were male; 22.5% were doctors, 43.1% were midwife-nurse, 34.3% were other health personnel. The mean age was 33.84±7.89 years, BMI was 24.19±4.35 kg/m<sup>2</sup>, daily consumed water was 7.17±3.58 glasses of water. Liquid consumption increased in the summer (93.1%) and decreased in the winter (38.2%). The mean knowledge score related to liquid intake was 10.27 ± 1.83. It was found out that while the difference among knowledge mean scores was not statistically significant (p>0.05), it was significant in terms of profession groups (p<0.01).

**Conclusions:** Some drinks are consumed on account of satisfying thirst while some were consumed on account of their nutritional value or stimulating effects. Knowledge of liquid intake is significant in order to be a healthy individual. In order for this study to be applied to different social groups and wider audiences and raise awareness, training should be provided.

**Key Words:** Adult, Health Professionals, Beverages, Consumption, Knowledge

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**27/358. Nutrition Research and Education in Europe  
Nutritional sciences in Austria**

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**Introduction:** In Vienna in the 1980ies students were allowed to register for individual irregular studies as combination of nutrition with one of the established studies, mainly in natural sciences. In 1994 a 5 year curriculum in nutritional sciences (Magister degree) has been established which was changed according to the Bologna process to a bachelor and master curriculum in 2006.

**Objectives:** Study programs design & goals

During a 6 semester training bachelor students take courses in natural science basics. In the master studies (4 semester) students can focus on molecular nutrition, food quality and safety, and public health nutrition.

**Method/Design:** The main goal of the bachelor curriculum is to give students additional information on natural sciences, as well as to introduce them to basics on human nutrition and food sciences. The master curriculum on scientific advancement and enlarges the skills acquired through the bachelor study. Mobility is supported during all phases of the bachelor and master studies.

**Results:** Qualification and career prospects

Bachelor graduates are competent to handle problems concerning the interrelationship between food and human beings. They are able to deal with nutritional issues in nonprofit organizations, the food industry, as well as in public relations.

Master alumni are able to develop models for resolution of nutritional and health problems. They are qualified for scientific research. Depending on the specialization students are experienced in molecular biological tools, modern food science or public health concerns.

Currently 1.770 are registered for the bachelor program, 123 for master study, 181 are involved in the teachers training, and 50 do their PhD.

**Conclusions:** Due to the multidisciplinary curriculum the study of nutritional sciences in Vienna is very popular; about 800 students are registered for bachelor and 80 for master program of nutritional sciences each year. About 18% of students are of foreign countries, mainly from Germany.

**Key Words:** nutritional sciences, curriculum, bachelor, master

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**27/434. Nutrition Research and Education in Europe  
A systematic review of school-based interventions for obesity reduction in children and adolescents**

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**Introduction:** It is a systematic review of school-based interventions for obesity reduction.

**Objectives:** To describe the current literature evidence on school-based interventions to prevent or reduce overweight/obesity in children and adolescents.

**Method/Design:** PubMed electronic database was searched up to August 2010. Inclusion criteria: school-based nutrition interventions aiming to reduce overweight/obesity, promote healthy nutrition consumption and/or nutrition knowledge, with  $\geq 4$  weeks of intervention and  $\geq 6$  months of follow-up for outcome assessment; studies published in English, Portuguese or Spanish and focusing on individuals aged 0-19 years. Exclusion criteria: studies including specific groups; interventions not involving children directly.

**Results:** Search strategy using selected keywords founded 4637 studies, and after evaluation for two independent reviewers only 109 studies remained for data extraction, which included 295 different analyses. 44% of the studies were published in the last 10 years; 40% of the interventions were educational, 11% environmental, 46% combined both and only 4% were regulatory. More than a half (57%) of the interventions lasted 6-24 months, and most of them were conducted in North America (55%) or Europe (30%). Only 45% of 118 analyses for overweight/obesity reduction (or evaluating other similar outcomes: BMI, abdominal obesity, skinfolds thickness, body fatness) showed an improvement in the intervention group, and in 4% the results were worse than in the controls. For healthy nutrition attitudes (increase of fruit, vegetable and/or water intake, and reduction of snacks, soft drinks, candies and/or fat intake), 56% of the 151 analyses showed a significant positive effect in the intervention group and only in 3% the results were worst than in controls. Knowledge about healthy nutrition showed better results, and 89% of the 26 analyses showed a positive effect in the intervention group (11% without effect).

**Conclusions:** Interventions showed modest effectiveness to reduce obesity/overweight or modifying nutrition behavior, although improvement in nutrition knowledge was found.

**Key Words:** school, interventions, childhood, obesity

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**27/447. Nutrition Research and Education in Europe  
Comparison of health perception of migrants in Austria, Germany and Sweden**

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**Introduction:** Migrants are one of the disadvantaged groups

in Europe, this results among other problems in higher prevalence of non-communicable diseases. For a better understanding of health related information, special needs of migrants compared to native residents have to be considered. The results are part of the EU-project CHANCE (www.community-health.eu).

**Objectives:** Generally, Austria and Germany have high percentages of Turkish migrants, in contrast the major migrant group in Sweden is Finnish. This survey explored differences/similarities of migrants concerning their health perception in an Austrian, a German and a Swedish disadvantaged district.

**Method/Design:** In 2008, 652 questionnaires were collected for basic analyses (Austria: 254; Germany: 186; Sweden: 212). In Austria, 28.9% of all interviewees noted to have a migration background, in Germany 23.5%, in Sweden 14.2%. In Sweden, the majority were aged 61 years plus, whereas in Austria and Germany younger people participated. Swedish migrants were the highest and the German migrants the lowest educated group.

**Results:** For the majority of all migrants their health was very important (71.7%), they estimated their health status as good (51.0%) and thought that it will remain the same within the next three years (55.2%). German migrants estimated their actual health worse than Austrian. Swedish migrants had a more negative view of their future health prospects than Austrian, but this outcome was age-dependent. The major sources for health information were mass-media (100%), doctors (73.8%), and social environment (76.6%). While German migrants got more information from their doctor, Swedish migrants used this source infrequently. 40.7% of participating migrants get their information always within the district, 73.8% always understood their doctors' advice and 66.9% were confused by health information.

**Conclusions:** We suppose that German migrants had a more negative view of their actual health because of their lower education. Due to higher age, Swedish migrants worry about their future health.

**Key Words:** health perception, community health management, migrants, education level

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#### 27/450. Nutrition Research and Education in Europe

### **Influence of fat emulsification on postprandial lipemia and lipid oxidation in lean and obese subjects**

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**Introduction:** Obese people present a chronic imbalance of fat distribution. In this context, the kinetics of postprandial lipemia and resulting exogenous lipid oxidation appear to be some of the major elements of obesity pathophysiology. However, the impact on post-

prandial lipid metabolism of different fat structures in food is poorly described.

**Objectives:** Our objective was to show that non-emulsified fat and emulsified fat result in different kinetics of lipid absorption and ultimately of lipid oxidation.

**Method/Design:** To verify this hypothesis, 10 normal weight subjects and 10 obese subjects digested, during a test breakfast, 40 g of dairy fat varying by its emulsified state (fat-containing drink + bread) or not (fat spread on bread + drink without lipids). Plasma samples were collected during 8h of digestion to analyse triacylglycerols of chylomicrons after ultracentrifugation. The milk fat also contained a mixture of triacylglycerols labelled with carbon 13 (stable isotope, <sup>13</sup>C) to characterize the kinetics of exogenous lipids oxidation thanks to <sup>13</sup>CO<sub>2</sub> breath test coupled with indirect calorimetry.

**Results:** Our results show that non-emulsified spread fat resulted in a later peak of chylomicron triacylglycerols during digestion compared with emulsified fat, both in lean and obese subjects. This effect was most pronounced in obese subjects, with a much later peak of chylomicrons and of lower intensity during the first 5 hours of digestion of non-emulsified spread fat. Moreover, this was associated with an earlier and higher appearance of carbon 13 in breath with the emulsified fat in lean and obese subjects. In obese subjects, this resulted in an increase of cumulated exogenous lipid oxidation.

**Conclusions:** These differences between digestion of emulsified and non-emulsified fat point up a new concept of "slow" and "fast" lipids. Dietary fat structure in food could thus be specifically adapted to control postprandial lipemia and lipid oxidation in obese subjects.

**Key Words:** fat, structure, lipemia, oxidation, obesity.

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#### 27/463. Nutrition Research and Education in Europe

### **Systematic review: socioeconomic and cultural determinants of low micronutrient intake and status within EURRECA Network**

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**Objectives:** To systematically review data on the relationship between socioeconomic and cultural factors and the level and distribution of usual micronutrient intake and status of EURRECA's prioritized micronutrients (folate, vitamin B12, iron, zinc, iodine for intake and status; vitamin C, vitamin D, calcium, selenium, copper for intake) among Europeans.

**Method/Design:** Medline and Embase databases were searched up to July 2010. Search terms included: 1) determinants (education, occupation, income, employment, urbanization, marital status, race/ethnicity/immigration, religion, food preferences/availability), 2) micronutrients, 3) population groups, 4) dietary intake and/or adequacy and 5) status biomarkers. Original studies were included if: i) performed in Europe after 1990, ii) involved >100 subjects, iii) dietary intake was recorded for minimum 3 days or assessed by validated food frequency questionnaire, iv) biomarkers reflected micronutrient status (following EURRECA methodology)

**Results:** The search resulted in 7922 papers. Thirty-nine studies reported micronutrient intake and/or status levels for different levels of one or more determinants. Studies were mainly excluded because they did not include an internal comparison between different groups (e.g. immigrants vs. residents). Most data were available on the relationship between vitamin C or calcium intake and education, and between iodine status and urbanization or race/ethnicity/immigration. For these associations meta-analyses will be performed.

**Conclusions:** In Europe, data on micronutrient intake and/or status related to socio-economic-cultural determinants are scarce. Further analyses of available data will estimate the relationship social factors -inadequate intake/status, thus identifying vulnerable groups and helping policy makers to create specific nutritional programs for the most disadvantaged.

**Acknowledgement:** The study reported herein has been carried out within the EURRECA Network of Excellence (www.eurreca.org), financially supported by the Commission of the European Communities, specific Research, Technology and Development (RTD) Programme Quality of Life and Management of Living Resources, within the Sixth Framework Programme, contract no.036196.

**Key Words:** Socio-Economic-Cultural Determinants, Micronutrients Intake/Status

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### 27/510. Nutrition Research and Education in Europe **Evaluation and comparison of the basic nutritional knowledge level among greek adolescents and young adults**

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**Introduction:** Substantial evidence shows a correlation between nutrition and the etiology and/or treatment of various diseases while the positive effect of balanced nutrition linked to health protection is consecutively confirmed. Thus adherence to healthy eating patterns interests a major part of community, which among other parameters, also impacts the basic nutritional knowledge level.

**Objectives:** To assess the level of basic nutritional knowledge through responses on common relevant questions which are probably associated with the grounds someone relies on when making decisions about food choices.

**Method/Design:** A new validated research tool (i.e. test in the form of a questionnaire) was devised and used for the purpose of this study. 125 adults of 25-35 years old were recruited, while 246 High school students aged 14 (n=126) and 17 (n=120) also participated. SPSS v.11 was used for the statistical analysis of the data collected.

**Results:** The average score for students (14 and 17 years old) was 24.5 and 25.7 respectively out of 50, which were significantly different from that of adults displayed 34.5. Questions regarding nutrient value were the most unknown in all 3 groups. 70.4 % of adults believe that salt provides calories while 80 % seems not to have comprehended the meaning of the food grouping in categories. Ample confusion related with energy yielding of micronutrients was also observed.

**Conclusions:** Poor knowledge on food groups, nutrients' sources and needs, as well as energy and nutrient content may well interfere to the overall nutrition behavior. It is recommended that nutrition education interventions programs at schools or other frames can be quite effective in improving nutrition knowledge scores, whilst guiding to the right decisions about healthy food choices.

**Key Words:** Nutrition, Knowledge, Behavior, Questionnaire, Education

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### 27/527. Nutrition Research and Education in Europe **Development of regional Food Composition Data Base (FCDB) for West Balkan countries (WBC)**

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**Introduction:** Development of a regional Food Composition Database (FCDB) requires involvement of many compilers from different countries and is a long and continuous process. UNU/SCN Network for Capacity Development in Nutrition in Central and Eastern Europe (NCDNCEE) (<http://www.agrowebcee.net/ncdn>) took this challenge and in collaboration with FP6 EuroFIR and FP7 EuroFIR-NEXUS projects developed the first regional FCDB



**Objectives:** Our goal was to develop a regional electronic and online food composition database specific for some countries of Central and Eastern Europe and West Balkan

**Method/Design:** FP6 EuroFIR project ([www.eurofir.net](http://www.eurofir.net)) was central in this endeavour and provided all necessary technical recommendations under which a Serbian FCDB was created three years ago. Web based application (Food Comp Data Management, FCDM) was developed and network members were trained in FCDB creation on many NCDNCEE meetings in last three years

**Results:** This tool was proved to be a useful for the initiation of new FCDB and enabled the creation of a Regional Food Composition data base. The FP7 EuroFIR-Nexus project and NCDNCEE initiated Balkan platform and regional food composition data base further development. Regional FCDB has now food composition data for 46 nutrients, and more then 1300 foods specific for WB countries and is growing.

The development of the Regional Food Composition data base is a concrete result of collaboration between EU funded project EuroFIR, EuroFIR-Nexus and UNU NCDNCEE network.

**Conclusions:** In conclusion one could say that the approach resulting in a regional FCDB was seen as important for CEE and WB countries. The web based application that allowed the creation of a new FCDB on national level plus one in the English language seems to be one of a few capacity development activities with such a result. It may also be important in communication, data exchange between different countries and for integration of any new food data.

**Key Words:** FCDB, web application, EuroFIR-NEXUS, UNU NCDNCEE network

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## 27/529. Nutrition Research and Education in Europe The perceptions of educators of Child Education Centers regarding the healthy food habits implementation

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**Introduction:** Educators of Child Education Centers (ERC) must know the proposal of Health Ministry about the "Ten Steps to Healthy Eating: Food Guide for Children Under 2 years.

**Objectives:** Identify the perceptions of educators Child Education Centers (ERC) regarding the healthy food habits implementation.

**Method/Design:** Was scheduled educational strategy to encourage exclusive breastfeeding until six months of life and guidance on the introduction of complementary feeding with growth of consistency and variety of foods. The program was made in one day with a schedule of eight hours to avoid interrupting service to the community.

Educational strategies included: exposure through dialogue, role play, group discussions, demonstrations and video. The theoretical content was divided into five sessions, encouraging the exchange between theory and practice and that during the discussion were recorded key challenges and strategies used by the group of educators.

**Results:** During the development of work with 17 groups, the principal evidence were:

- Lack of promoting breastfeeding in some ERCs;
- Lack of physical infrastructure to accommodate the mothers;
- no specific place for proper storage of expressed breastmilk;
- Negative beliefs about the existence of breastfed children;
- Insufficient number of staff to implement care;
- Difficulties of educators during the mealtime to offer foods and to stimulate the formation of proper habits
- Lack of guidance for families to carry out appropriate practices in residence

To cope with the difficulties above, the educators have proposed some strategies such as increased contact between parents and educators to stimulate breastfeeding and milking in the Child Day Care, by guidance by a multidisciplinary team and reproduction of this program with parents of the students, improving relationship between educators and students.

Were shown situations of stress when the teacher identifies the ideal work conditions, but can not find the necessary structure to put it into practice.

However, they concluded that despite the difficulties, there are conditions to promote healthy eating.

**Conclusions:** Through critical analysis and reflective were identified possibilities to implement the proposals made.

**Key Words:** Health promotion strategies, nutrition in children, breastfeeding

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## 27/530. Nutrition Research and Education in Europe Differences in photographic atlas used to estimate food portion size across PILOT-PANEU consortium countries

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**Introduction:** The Pilot study in the view of a Pan-European dietary survey – adolescents, adults and elderly (PILOT-PANEU) aims to contribute to the development of uniform methodologies for the estimation of dietary risks and identification of dietary habits.

The use of photographs, electronic or printed, to assist subjects

with estimation of food portion sizes during intake assessment studies is widespread including in PILOT-PANEU consortium countries.

**Objectives:** In this work we aim to investigate the differences in photographic atlas used to estimate food portion size across PILOT-PANEU consortium countries.

**Method/Design:** To achieve this goal we developed a technical questionnaire covering several items of the construction and validation of a photographic food atlas, namely: the amplitude of the picture book, including number of photographs series, number of portions in each series and portion weight; technical details of the photography, including perspective, illumination and photograph size; and psychological constructs (perception, conceptualization and memory) addressed during validation studies of the different photographic food atlas.

**Results:** This technical questionnaire was used to perform a systematic study of the photographic food atlas available. Several differences were highlighted, not only due to different food habits, but mainly because the absence of common approaches to the construction and validation of a photographic food atlas.

**Conclusions:** This study will contribute to the development of a harmonized and validated photographic food atlas to be used during the Pan-European dietary survey – adolescents, adults and elderly, as recommended by EFSA.

**Key Words:** photographic food atlas, portion size, PILOT-PANEU

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## 27/571. Nutrition Research and Education in Europe Nutrition patterns and anthropometric and biochemical parameters of women

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**Introduction:** Normal prophylactic and therapeutic procedures aim not only at compensating for hormonal deficiencies, but also at leading a healthy lifestyle. The latter is understood as the provision of adequate nutrition balanced for energy and nutrients. Following a healthy lifestyle during the perimenopausal period prevents body overweight and changes in blood lipid concentration, as well as other risk factors of the diet-related diseases.

**Objectives:** The aim of the thesis was to analyse nutrient intake and nutritional patterns of women, describing their interrelations with reference to anthropometric and biochemical parameters.

**Method/Design:** The intake of nutrients by 443 women experimental women at the age of 36-60 was determined for a 24-hour period over 7 sessions. The research was conducted in two stages. The first stage (I) consisted of population research concerning the assessment of dietary patterns and selected anthropometric parameters, while the second stage (II) involved analyses of biochemical parameters (the concentration of total cholesterol, HDL, LDL, glucose and triglycerides).

– markers of the nutritional status.

**Results:** Two nutritional patterns were distinguished – “varied” and “fatty”, which were prevalent in the sample of women under examination. Along with the growth in consumption of nutrients, the “fatty” nutrition pattern, as compared to the “varied” one, was characterized by more unfavourable features due to a significant increase in the percentage of women with an inadequate level of intake of such nutrients as fat and cholesterol. However, a larger increase in the percentage of persons at risk of excessive intake of saturated fatty acids was found for the “varied” nutrition pattern as compared to the “fatty” pattern. Together with the increase in the intake of nutrients, the “varied” nutrition pattern, as compared to the “fatty” pattern, was characterized by unfavourable changes in a larger number of features describing body measurements and composition. A large percentage of women with improper levels of total cholesterol, LDL cholesterol and HDL cholesterol concentration was found in both nutritional patterns. Along with an increase in nutrient intake in the “fatty” nutritional pattern, a significantly higher increase was observed in the percentage of persons with reduced HDL cholesterol concentration, in comparison with the “varied” pattern.

**Conclusions:** The results showed that the group of women under analysis was largely at risk of loss of health due to unfavourable values of their anthropometric and biochemical parameters resulting from an improperly balanced diet. Both nutritional patterns, which should be regarded as prevalent in the examined population, significantly diverge from all recommendations concerning the prevention of diet-related diseases, the aim of which is to improve health and to reduce the mortality rates of women.

**Key Words:** nutrition patterns, anthropometric parameters, biochemical parameters, diet-related diseases, women

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## 27/649. Nutrition Research and Education in Europe FADS1 genetic variability interacts with $\alpha$ -linolenic acid intake to affect serum non-HDL cholesterol concentrations in adolescents

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**Introduction:** delta 5- and delta 6-desaturases, two rate-limiting enzymes in PUFA biosynthesis, are respectively encoded by the FADS1 and FADS2 genes. Genetic variants in the FADS1-FADS2 gene cluster are associated with changes in plasma concentrations of PUFA, HDL- and LDL-cholesterol and triglycerides. However, little is known about whether dietary PUFA intake modulates these associations - especially in adolescents.

**Objectives:** To assess whether dietary linoleic acid (LA) or  $\alpha$ -linolenic acid (ALA) modulates the association between the FADS1 rs174546 polymorphism and concentrations of PUFA, other lipids and lipoproteins in European adolescents.

**Method/Design:** Dietary intakes of LA and ALA, FADS1 rs174546 genotypes, PUFA levels in serum phospholipids, and serum concentrations of triglycerides, cholesterol, and lipoproteins were determined in 573 European adolescents from the HELENA study. The sample was stratified according to the median dietary LA ( $\leq 9.4$  and  $>9.4$ g/d) and ALA ( $\leq 1.4$  and  $>1.4$ g/d) intakes. Dietary intake was measured via two non-consecutive 24-h recall interviews.

**Results:** The associations between FADS1 rs174546 and concentrations of PUFA, triglycerides, cholesterol, and lipoproteins were not affected by dietary LA intake (all P-interaction $>0.05$ ). Similarly, the association between the FADS1 rs174546 polymorphism and serum phospholipid concentrations of ALA or eicosapentaenoic acid was not modified by dietary ALA intake (all P-interaction $>0.05$ ). In contrast, the rs174546 minor allele was associated with lower total cholesterol concentrations (P=0.01 under the dominant model) and non-HDL cholesterol concentrations (P=0.02 under the dominant model) in the high-ALA-intake group, but not in the low-ALA-intake group (P-interaction=0.01).

**Conclusions:** These results confirmed the gene-nutrient interaction between n-3 PUFA intake and the FADS1 rs174546 polymorphism on non-HDL cholesterol concentrations recently shown in adults and extended these findings to European adolescents. This interaction may help explaining the interindividual differences in plasma cholesterol concentrations observed in response to n-3 PUFA intakes, though appropriate interventional studies are required.

**Key Words:** genetic, linoleic, cholesterol, adolescent, epidemiology, fads

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#### 27/651. Nutrition Research and Education in Europe

##### **Dutch consumers overestimate the risks of environmental pollutants in their diet**

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**Introduction:** Until now, no research has been carried out in the Netherlands how consumers perceive different food risks.

**Objectives:** To estimate the differences of food risk perception between scientists and Dutch consumers.

**Method/Design:** A sample of the average Dutch population (CentERdata Databank n=2006) and senior (nutrition and toxicology) scientists belonging to the Netherlands Nutrition Centre's scientific network (n=62) were asked to estimate the effects 8 potential dietary risk factors on their health on a scale from 0-5 (1= no risk and 5= maximal risk to my health). These factors were (a) unhealthy/unbalanced diet, (b) pathogenic microorganisms in food, (c) process contaminants like acrylamide and PAKs, (d) environmental pollutants,

(e) pesticides, (f) food additives, (g) genetically modifies organisms (GMO) and (h) nanotechnology in food.

**Results:** Scientists scored the food risks in the following order (starting with big risk to my health): 1. Unhealthy/unbalanced diet 2. Pathogenic microorganisms in food 3. Process contaminants 4. Nanotechnology in food 5. Environmental pollutants 6. Pesticides 7. Additives 8. GMO. Consumers worried the most over 1. Environmental pollutants in their diet followed by 2. Unhealthy/unbalanced diet 3. Pesticides 4. process contaminants 5. Microorganisms 6. Additives 7. GMO and 8. Nanotechnology in food. 24% of consumers used the option 'I do not know/no opinion' at the nanotechnology option (all other options  $<10\%$ ).

**Conclusions:** After statistical analysis of the results it can be concluded that consumers, when compared to scientists underestimate the negative effects of an unhealthy/unbalanced diet to their health and overestimate the risks of environmental pollutants, pesticides, food additives and GMO in their diet. Hence, consumers overestimate the risk of chemical pollutants in their food. This could lead to more unhealthy diet changes due to e.g. not consuming fruit and vegetables in fear of pesticides of fish in fear of environmental pollutants.

**Key Words:** Food risk perception, Food Safety

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#### 27/652. Nutrition Research and Education in Europe

##### **Consumers overestimate the risks of environmental pollutants, pesticides, additives and GMO in their diet**

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<sup>1</sup>Food Safety. the Netherlands Nutrition Centre. Den Haag. the Netherlands; <sup>2</sup>Nutrition and Health. the Netherlands Nutrition Centre. Den Haag. the Netherlands.

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**Results:** Scientists scored the food risks in the following order (starting with big risk to my health): 1. Unhealthy/unbalanced diet 2. Pathogenic microorganisms in food 3. Process contaminants 4. Nanotechnology in food 5. Environmental pollutants 6. Pesticides 7. Additives 8. GMO. Consumers worried the most over 1. Environmental pollutants in their diet followed by 2. Unhealthy/unbalanced diet 3. Pesticides 4. process contaminants 5. Microorganisms 6. Additives

7. GMO and 8. Nanotechnology in food. 24% of consumers used the option 'I do not know/no opinion' at the nanotechnology option (all other options <10%).

**Conclusions:** After statistical analysis of the results it can be concluded that consumers, when compared to scientists, underestimate the negative effects of an unhealthy/unbalanced diet to their health and overestimate the risks of environmental pollutants, pesticides, food additives and GMO in their diet. Hence, consumers overestimate the risk of chemical pollutants in their food. This could lead to more unhealthy diet changes due to e.g. not consuming fruit and vegetables in fear of pesticides or fish in fear of environmental pollutants.

**Key Words:** Food risks, food safety, perception, consumers, diet, additives

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27/718. Nutrition Research and Education in Europe

### **New tool to tackle parental misperception of weight status overweight child**

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**Introduction:** Many parents misperceive the weight status of their overweight child. This may be a barrier in achieving a healthy life style and body weight of the child.

**Objectives:** To test a tool for healthcare professionals working at infant welfare centres, which may help increase the awareness of parents regarding the weight status of their overweight child.

**Method/Design:** The tool was a growth curve picture card showing on one side pictures of normal weight and overweight boys of different ages, identical to a growth curve, and on the other side pictures of common situations concerning eating, drinking and physical exercise. The tool was presented to healthcare professionals working at infant welfare centres and parents of overweight children aged <4 years. Both groups were asked to evaluate usefulness of the card. Two weeks after evaluating the card, the parents were asked whether they had undertaken any action regarding their child's overweight.

**Results:** The growth curve and situation pictures were judged as very useful by respectively 61% and 46% of the parents (n=43). Parental exposure to the tool resulted in increased concerns regarding the child's weight in 27% of the parents (n=25). Up to 47% of the parents reported to have undertaken activities regarding their child's overweight. The growth curve and situation pictures were judged as very useful by 53% of the healthcare professionals. The tool was judged as very helpful for increasing awareness in parents of their child's overweight by 75% of the healthcare professionals, and 65% indicated they would use the tool on a daily basis.

**Conclusions:** The growth curve picture card is a useful tool for healthcare professionals for increasing awareness in parents of their child's overweight. Future studies should investigate the effect of the tool on life style and body weight of overweight children.

**Key Words:** Parental perception, obesity, healthcare professionals, overweight, growth curve children

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27/719. Nutrition Research and Education in Europe

### **The Impact of Healthy Food and Lifestyle Primes on People's Choices of Food and Activities**

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**Introduction:** In order to control the obesity epidemic, it is important to motivate people to more often consume healthy foods or be physically active. Priming may be a new way to promote a healthy lifestyle.

**Objectives:** The present study addressed the question whether priming people with the concepts of healthy eating or healthy physical activity can increase their preference for healthy foods or healthy physical activities.

**Method/Design:** Participants were assigned randomly to the control, healthy food or the healthy physical activity prime condition. In each condition prime words were presented subliminally or supraliminally to the participants. Afterwards, we assessed participants' wanting to eat healthy foods over unhealthy alternatives as well as their wanting to do healthy physical activities over unhealthy physical activities using a forced choice methodology.

**Results:** Participants who liked the food were willing to work much harder to obtain healthy food following the subliminally healthy food primes as compared to those in the control prime condition. In contrast to the subliminally healthy food primes, the subliminally healthy physical activity primes did not make participants work harder to obtain healthy food as compared to those in the control condition. Priming participants supraliminally with healthy food primes or healthy physical activity primes both increased wanting for healthy foods depending on how much they like the food items.

**Conclusions:** Priming may be an effective way to influence healthy eating behavior, but this depending on how much foods are liked.

**Key Words:** priming, obesity, healthy lifestyle, eating behavior, physical activity

### **Prevalence of Malnutrition-inflammation complex syndrome in hemodialysis patients: characterization of reliable nutritional indicators and inflammatory markers**

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**Introduction:** Malnutrition-inflammation complex syndrome (MICS) is common and concurrent in hemodialysis patients(HD). Prevalence of malnutrition has been reported around 18-75% and inflammation state in 30-50%. Both conditions are related to poor clinical outcome.

**Objectives:** To investigate the prevalence of MICS on HD patients. Secondly, it was studying from an overall and multifactor perspective the possible interaction with nutritional-inflammatory markers and body composition parameters.

**Method/Design:** We studied 69 patients on HD (Men:62;age:67±14,4 years; time on HD:45,5±40,3 months). Primary diagnosis was diabetes mellitus (23,2%). According, recent criteria proposed by International Society of Renal Nutrition and Metabolism (ISRNM) we analyzed the prevalence of MICS by combining BMI, serum albumin and CRP in two groups: MICS (+) group as BMI< 23 kg/m<sup>2</sup>, serum albumin <3,8 g/dL and CRP >1 mg/dL (non hs). The rest of HD patients were defined as MICS (-) group. We also studied additional nutritional and inflammatory markers and were compared the interaction between them. Body composition analysis by vectorial bioimpedance (Akern;RJL101). Statistical analysis by SPSS.

**Results:** In this study the prevalence of MICS was 66,6% defined as MICS (+) group. Mean age was similar in both groups (>65 years;p>0,05). By comparing groups had significant differences with midarm muscle circumference (MAMC), body cellular mass, malnutrition-inflammation score (MIS), serum albumin, CRP and ferritin (all, p<0,001). MICS (+) group and phase angle <4° was a risk factor of nutritional status (OR:3,5; IC95%:1,1-10,5;p<0,01). Multivariate analysis model was associated significantly with percentage of: ideal body weight, MAMC, body cellular mass, extracellular body water (p<0,01;\*p< 0,05) and phase angle, exchange Na/K, MIS and serum ferritin as inflammatory biomarkers (all, p<0,01).

**Conclusions:** MICS is a high prevalence condition characterized by alteration of several nutritional indicators, being remarkable, muscle wasting, volume overload, and hypoalbuminemia associated with inflammatory state and poor clinical prognosis in HD patients.

**Key Words:** malnutrition-inflammation complex syndrome, hemodialysis

### **Teachers knowledge of the influence of nutrition on childrens mental performance in four European countries**

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**Introduction:** Nutrition plays an important role in the development of children affecting them physically and mentally. Teachers are in a unique position to observe what factors influence a child's cognitive development and performance hence it's important to understand if they perceive diet to have an effect on mental performance.

**Objectives:** Examine teachers' understanding of the effect of diet on children's mental performance, using semi-structured interviews.

**Method/Design:** The study was conducted in England, Germany, Hungary and Spain. Participants were teachers of children aged 4-10 years old recruited in state elementary schools. Semi-structured interviews were used to ask what they thought about the effects of diet on mental performance. Responses were recorded, coded and group analysed using the Nudist-Vivo 8.0 program. Reports on the national data from each country were analysed to make cross-country comparisons.

**Results:** Preliminary analysis reveals that teachers highlight having a healthy diet affects mental aspects of children's lives. The principal aspects of mental performance mentioned by them were attention and concentration. Most of the teachers expressed the opinion that hunger acts as a barrier to concentrating in class. Many teachers recognized an association between low levels of attention and students not having breakfast: it was highlighted as an important habit to avoid lethargy or becoming tired quickly throughout the school day. Teachers also noted unhealthy foods (sweets and junk foods) provide a quick burst of energy in a short period of time but also Irritability, nervousness or hyperactivity resulting in an inability to concentrate.

**Conclusions:** Teachers perceive diet has a direct influence on the ability of children to concentrate, as well as on their mood and behavior. Their opinion of what a child eats affecting their health and development is closely linked to some specific foods which teachers label as "unhealthy".

Study Supported by 7th Framework Programme (NUTRIMENTHE Grant-agreement: 212652)

**Key Words:** Teachers, Knowledge, Nutrition, Children, Mental Performance

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**27/764.** Nutrition in the Prevention of Non-Communicable Diseases  
**Production of muscle interleukins 6 and 15 regulated by metabolic signals: Adrenaline and AMPK activation**

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**Introduction:** Interleukins 6 and 15 (IL6, IL15) have been described as myokines (cytokines produced by muscle) with anti-inflammatory effects and/or roles in controlling muscle metabolism and fat-muscle crosstalk, thus possibly mediating part of the beneficial effects of activated muscle against chronic diseases associated with low-grade inflammation such as diabetes and obesity. Therefore, it is of interest knowing their regulation by key metabolic signals that usually act under physiological conditions that activate metabolism in muscle (especially fatty acid oxidation) such as exercise and fasting, as the increase in adrenaline levels and the activation of the fuel gauge adenosine monophosphate-activated protein kinase (AMPK).

**Objectives:** To study in C2C12 myocytes the time-course effects of adrenaline and AICAR (AMP analog which activates AMPK) on IL6 and IL15 expression and secretion.

**Method/Design:** Differentiated C2C12 myotubes were treated for different periods (0, 1, 3, 6, 8, 12 and 24h) with 1µM adrenaline and 0.5mM AICAR, alone or in combination. mRNA expression was analyzed by Q-PCR, and protein levels were measured in the culture medium by ELISA.

**Results:** IL-6 mRNA levels were rapidly and highly increased both by adrenaline and AICAR, peaking after 3 and 12 hours by 38-fold and 17-fold respectively, and adrenaline potentiated the effects of AICAR with 24h-treatment. There was also increased secretion of IL-6, by 4.5-fold (both with adrenaline and AICAR, but without additive effects between them). On the contrary, the treatments tended to reduce IL-15 mRNA expression, with undetectable secretion levels.

**Conclusions:** Adrenaline and activation of AMPK regulate IL-6 and IL-15 expression in muscle cells and especially seem to be important regulators of IL-6, which is highly induced. The positive effects of the induction and secretion of IL-6 observed by other authors by exercise can be explained, at least in part, by the action of both adrenaline and AMPK.

**Key Words:** interleukins, myokines, muscle, adrenaline and AMPK

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**27/767.** Nutrition in the Prevention of Non-Communicable Diseases  
**Test-retest reliability study of a self-administered questionnaire about food supplements consumption**

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**Introduction:** Questionnaires are an important tool to obtain food intake information in nutritional studies. They should be easy to be completed and its reliability must be previously studied.

**Objectives:** The main objective of this study was to evaluate the test-retest reliability of an original questionnaire about food supplements consumption.

**Method/Design:** A self-administered questionnaire (5 sections of 27 questions) was designed and provided to 47 volunteers who represent 28.7% of the population (505 undergraduate students from a public higher school) under study. To assure study reliability, the volunteers completed two series of questionnaires with the time amplitude of one week. The test-retest method was used in the reliability study of the questionnaire. Pearson correlation and Cohen's kappa test were performed using SPSS software v. 17.0.

**Results:** Pearson's correlation between answers of the two periods were statistically significant for all the variables and the majority of r-values were above 0.600 (p<0.01 and p<0.001). A great fraction of these correlations ranged from 0.670 to 1.000, thus showing that questions were appropriate. Moreover, when Cohen's kappa test was calculated it also demonstrated an high concordance level between the answers of the volunteers.

**Conclusions:** The original questionnaire developed in the study complies with the requirements of reproducibility. In fact, the internal consistency of answers evaluated during the test-retest study proved to be good. Moreover, inter-answer reliability determined through Cohen's kappa test was above 0.700 the majority of times.

**Key Words:** Questionnaire, food supplements, reliability, test-retest method

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**27/768.** Nutrition in the Prevention of Non-Communicable Diseases  
**Free fatty acids regulate the production of the anti-inflammatory interleukin-6 in c2c12 myocytes**

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**Introduction:** The incidence of obesity has raised in the last years, with associated serious health chronic problems such as cardiovascular disease and insulin resistance. Obesity may increase the

rate of lipolysis in adipocytes, elevating plasma free fatty acids (FFA). Chronically elevated FFA can induce inflammatory responses and disrupt insulin signalling in skeletal muscle, among other effects, but they can also function as physiological signals, as with their acute elevation during fasting. Interleukins 6 and 15 (IL-6 and IL-15) are multifunctional cytokines, but also myokines; myokines are muscle produced cytokines that have been suggested to contribute to exercise-induced protection against several chronic diseases.

**Objectives:** To investigate in C2C12 myotubes the time-course effects of elevated FFA (at physiological concentration similar to that of fasting) on IL-6 and IL-15 expression and secretion.

**Method/Design:** Murine C2C12 differentiated muscle cells were treated with 700  $\mu$ M oleic/linoleic FFA equimolar mixture. Samples were collected at different times of incubation: 0, 1, 3, 6, 8, 12 and 24 h. IL-6 and IL-15 mRNA levels were analyzed by quantitative RT-PCR. The levels of IL-6 and IL-15 proteins in culture medium were analyzed by ELISA.

**Results:** The mRNA expression of both IL-6 and IL-15 was increased by the FFA treatment, peaking after 3 h of treatment. IL-6 secretion (showed by culture medium levels of protein) was also significantly increased, becoming significantly higher with respect to control after 8, 12 and 24 h of treatment, while IL-15 medium levels were undetectable.

**Conclusions:** FFA are signals able to rapidly induce the expression of IL-6 and IL-15 in muscle cells, especially that of IL-6, since secretion is also stimulated. The results suggest that physiologically elevated FFA are able to induce the production of signalling molecules (myokines) in muscle cells possibly involved in the fat-muscle crosstalk.

**Key Words:** Myokines, Free Fatty Acids, Muscle, Anti-inflammatory Cytokines

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### 27/795. Nutrition Research and Education in Europe Nutritional status of school children in rural Morocco

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**Introduction:** Morocco undergoes nutrition transition. Even though some studies have revealed nutritional status in urban areas the rural ones still lack nutrition assessment studies.

**Objectives:** This study aims to assess nutritional status, food intake of schoolchildren in a rural setting.

**Method/Design:** A sample of 300 schoolchildren was observed in a rural school in the Province of Sidi Kacem. Anthropometric measurements were performed and food intake was estimated by the 24 recall by trained doctorate students.

**Results:** Average age was 15.45 years  $\pm$  1.64. Sex ration was not even with 66% boys and only 34% girls. Stunting, underweight and wasting are respectively was 9.7%, 12.3% and 10%. Stunting was

revealed more among boys than girls in this rural area. There is a correlation between the food frequency profile and nutritional status (height for age and weight for age) of pupils. High fruits and vegetables intake is correlated to physical growth.

**Conclusions:** Rates of malnutrition are lower than the Moroccan average in this relatively intensive agricultural area. A focused analysis is needed to determine the part of socioeconomic factors in the importance of these outcomes.

**Key Words:** Nutritional, Growth, Schoolchildren and Morocco.

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### 27/798. Nutrition Research and Education in Europe Comparison of bias in protein and potassium intake estimated with 24-h recalls across European populations

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**Introduction:** Forthcoming pan-European food consumption surveys will use the duplicate 24-h recall (EPIC-Soft) to collect harmonised data across European countries. In EFCOVAL, we investigated whether this method provides valid and comparable estimates of dietary intake across Europe.

**Objectives:** To evaluate the validity of the 24-h recall method, including its design aspects, on estimating protein and potassium intakes among adults in five European centers.

**Method/Design:** Data was collected in Belgium, the Czech Republic, France, the Netherlands, and Norway. A total of 600 adults, between 45 and 65 y and representing all educational levels were recruited. Two 24-h recalls (EPIC-Soft) with at least one month in-between were used to estimate protein and potassium intake by a face to face and a telephone interview. Recalls represented all days of the week. In two 24 h urines, collected during the same days as the 24-h recalls, we determined nitrogen and potassium as biomarkers of intake.

**Results:** On average, men and women underreported protein intake by 8%. Men underreported potassium intake by 7% and women by 4%. The variability of bias in protein and potassium intake was up to 7% between the European centres. The bias in protein intake was smaller by telephone than by face-to-face interviews in Czech Republic and Norway (p=0.01). Intakes of protein in France and of potassium in Belgium reported by the second recall were less accurate than intakes from the first recall (p=0.01 and 0.04, respectively).

The bias in protein and potassium intake collected during weekdays were comparable to those during the weekend in all centres, except in Czech Republic ( $p=0.01$ ).

**Conclusions:** Two 24-h recalls appeared to be sufficiently valid to estimate protein and potassium intake across the five European centres, although variability in bias was observed. In addition, interviews by telephone were more accurate than by face-to-face, and first recalls more than second recalls

**Key Words:** Validity; Diet; 24-H Recall; Biomarker; Protein; Potassium

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### 27/799. Nutrition Research and Education in Europe **To eat fish or not to eat fish: results from the QALIBRA Project**

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**Introduction:** Many (inter)national food and health agencies advocate the consumption of one or two portions of especially oily fish per week because of the health benefits from the long chain n-3 polyunsaturated fatty acids. However, eating fish introduces potential risks through the presence of contaminants like methyl mercury (MeHg), dioxins and dioxin like contaminants (DLC). Do the benefits of eating fish outweigh the risks?

**Objectives:** A quantitative risk-benefit assessment is made in which risks and benefits are both expressed in the same health metric Disability Adjusted Life Years (DALY) and compared using a method and software tool developed by the QALIBRA project ([www.qalibra.eu](http://www.qalibra.eu)).

**Method/Design:** The net health effect as a result of eating 200 grams of fish per week instead of the current intake is calculated and compared for the Dutch population. The following health effects were taken into account: a decreased risk of fatal cardiac heart disease (CHD), a decreased risk of stroke, an increase and a decrease of IQ in newborns, a decrease in sperm count (infertility) in newborns, a decrease in the production of TT4 hormone and diffuse fatty change in the liver.

**Results:** If the Dutch population makes a long term change to their fish intake (to 200 grams/week), there is a potential average annual net health benefit of approximately 2.5 DALYs per 1000 inhabitants. This is mainly caused by the prevention and delay of stroke and fatal CHD. The loss in IQ points due to MeHg in fish is compensated by the gain in IQ points due to n-3 fatty acids in fish.

**Conclusions:** Despite a considerable uncertainty and variability about the DALY outcome, it remains very likely that the net effect of eating 200 grams of fish per week is beneficial.

**Key Words:** Fish, Daly, Benefit-Risk, Health Effects, Integrative Measure

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### 27/803. Nutrition Research and Education in Europe **Nutritional risk in surgical patients: how to screen?**

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**Introduction:** No gold standard exists to assess nutritional risk in hospitalized patients, including surgical patients

**Objectives:** We aimed to investigate the capacity to identify patients at nutritional risk, by comparing with Subjective Global Assessment(SGA) as the Standard, various other methods: Body Mass Index(BMI), %weight loss, Nutritional Risk Screening(NRS), Malnutrition Universal Screening Tool(MUST), Nutritional Risk Index(NRI). The main purpose was to select the most consistent method for effective integration for risk screening in daily surgical wards' practice.

**Method/Design:** 300 surgical patients were evaluated at admission. Nutritional parameters: BMI categorized according to WHO's criteria, %weight loss in previous 6 months (significant if >5%), NRS, MUST, NRI, SGA. Concordances, correlation, sensitivity, specificity, positive predictive value(PPV), negative predictive value(NPV), were calculated to evaluate the level of performance of all methods vs the Standard(SGA).

**Results:** According to SGA, 64% patients were undernourished. Prevalence of nutritional risk was 66% by NRS or MUST & 87% by NRI. There was a strong agreement between all methods & SGA ( $k=0.85-0.91, p<0.001$ ), except BMI & NRI ( $k=0.07-0.34, p<0.01$ ). NRS, MUST & %weight loss were highly effective in detecting patients at undernutrition risk, reaching sensitivity values of 0.8-0.89, specificity 0.89-0.93, PPV 0.81%-0.89%, NPV 0.89%-1.0%. Conversely, BMI & NRI were ineffective, with sensitivity 0.29-0.43, specificity 0.27-0.39, PPV 0.24%-0.35% & NPV 0.27%-0.31%. We also explored %weight loss alone vs MUST & NRS: sensitivity 0.79-0.87, specificity 0.85-0.89, PPV 0.84%-0.85%, NPV 0.87%-0.89%, thus a high capacity to identify patients at nutritional risk.

**Conclusions:** Both MUST & NRS are valid methods for nutritional screening in surgical patients; %weight loss in the previous 6 months proved almost as efficacious. Its calculation is easy & quick, facilitating adherence by health professionals for its integration in their routine & justifying its registry as a minimum mandatory in clinical practice.

**Key Words:** undernutrition, nutritional risk, screening, surgical patient



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**27/826. Nutrition Research and Education in Europe**  
**Metabolic response to animal vs vegetable protein intake in rats**

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**Introduction:** Excessive animal protein consumption might result in metabolic acidosis and hepatic and renal affectation.

**Objectives:** We aimed to analyze the differences between animal and vegetable protein intake on some metabolism-related parameters in rats.

**Method/Design:** A total of 160 adult male Wistar rats were randomly distributed in 2 experimental groups (n=80) corresponding to animal or vegetable protein diets. Diets were based on commercial hydrolyzates of whey or soybean. Experiments lasted for three months during which daily food intake and weight gains were controlled on a weekly basis.

**Results:** No differences between animal and vegetable protein diets were observed on the final weight of the animals (327.3±41 vs. 324.4±44 grams, respectively). Liver weight was higher in the experimental group fed the animal when compared to the vegetable protein diet (8.17±1.9 vs 7.56±1.2 grams, respectively, P=0.003) whereas we did not find any differences on kidney weight (P=0.727). Among the biochemical and acidity parameters studied, we have only observed differences between animal vs. vegetable protein diet in plasmatic total cholesterol (40.7±10.7 vs. 50.3±11.9 mg/dl, P<0.001), LDL-cholesterol (6.36±4.7 vs. 4.87±2.7mg/dl, P<0.05) and urinary pH (6.44±0.4 vs. 6.70±0.5, P<0.01). The descriptive results for the rest of variables were the following (showed for animal vs. vegetable protein diet): plasma albumin: 2.68±0.5 vs. 2.76±0.7mg/dl; creatinine: 0.39±0.2 vs.0.46±0.1mg/dl; triglycerides: 55.6±33.2 vs. 73.7±70.9mg/dl; urea: 32.3±16.1 vs. 31.2±7.9mg/dl; bilirubin: 0.064±0.13 vs.0.062±0.07mg/dl and urinary volume: 3.68±1.5 vs.3.77±1.8ml.

**Conclusions:** After three months of experimental period, the group of rats fed a vegetable protein diet had lower liver weight, plasmatic LDL-cholesterol and urinary acidity (higher urinary pH) when compared to the group of rats fed the animal protein diet, whereas total cholesterol was higher in the former experimental group probably due to a higher concentration of HDL-cholesterol, but within normal ranges.

**Key Words:** Animal Protein Diet, Vegetable Protein Diet, Liver, Kidney, Metabolic Acidity, Lipid Profile and Rats.

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**27/830. Nutrition Research and Education in Europe**  
**Nutrient intakes and nutritional status of people living with hiv in Ghana**

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**Introduction:** HIV causes changes in nutritional status, including loss of appetite, weight loss, and malnutrition. HIV can therefore compromise the nutritional status of infected individuals and consequently worsen the effects of the disease. To maintain good nutrition, an adequate intake of energy-giving foods, proteins, vitamins and minerals, fibre and water are vital

**Objectives:** The study investigated dietary practices, nutrient intakes and nutritional status of people living with HIV (PLHIV).

**Method/Design:** The study design was a cross-sectional survey. One hundred and ten adults infected with HIV, who were receiving treatment at the Koforidua Central Hospital, were purposively selected for the study. Structured interviews, diet assessment methods and anthropometry were used to collect information on respondents' dietary practices, energy and nutrient intakes and nutritional status. The data collected were analyzed using the SPSS program version 11. The Chi-squared test and regression analysis were used to determine the relationships between dietary practices, nutrient intakes and nutritional status of respondents.

**Results:** A high proportion (86%) of respondents ate three times a day. The qualities of diet of 92% were rated poor to fair and lacked variety. The diets of the respondents were low in calories, iron and folate, thiamine, riboflavin and niacin and nearly one third (31%) were underweight. A significant relationship existed between the frequency of access to nutrition information and the number of times respondents ate per day. But there was no relationship between the number of times eaten daily and nutritional status of respondents. A significant relationship (r= 0.24; p=0.011) existed between the quality of diet and nutritional status, suggesting that the quality of diets of respondents somehow determined their nutritional status.

**Conclusions:** Respondents' dietary practices were generally poor, reflecting negatively on their nutrient intakes and nutritional status. The findings are significant for the operations of both governmental and non-governmental organizations working on HIV and nutrition issues in Ghana.

**Key Words:** Nutrient intakes, diet quality, nutritional status and PLHIV.

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**27/835. Nutrition Research and Education in Europe**  
**Chronic stress, body composition and micronutrient-status among children: measuring micronutrients in human hair**

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**Introduction:** Chronic stress has been shown to influence the development of obesity through different routes. One of these pathways is through the interaction with food intake regulation, leading to altered energy intake and craving for comfort foods. This inadequate nutrition and poor diet quality may however also result in changes in micronutrient-status or even micronutrient-deficiencies. For instance, it has been reported that obese children may be at higher risk for micronutrient-deficiencies like iron deficiency. Chronic stress may thus not only be involved in the instability of the energy balance, but also in mineral malnutrition and micronutrient-deficiencies.

**Objectives:** his study aims to examine the utility of scalp hair as a diagnostic tool to determine the micronutrient-status in children, more specifically for the elements iron, copper, zinc, magnesium and calcium. The micronutrient-status of the above mentioned elements will also be examined in blood samples. The correlation between the micronutrient-statuses in these bio-samples and the dietary pattern of the child (FFQ and 24-hour recall) will be investigated. Finally, the relationship between biomarkers of chronic stress (saliva- and hair-cortisol), body composition measurements and micronutrient-status of the child will be investigated.

**Method/Design:** 222 Belgian elementary school girls (6-10 years old) participated in this study. Hair samples were taken from the vertex posterior region of the head and as close to the scalp as possible. The 6cm of the hair sample closest to the scalp (representative for the last 6 months) will be analyzed for cortisol and for the micronutrients iron, copper, zinc, magnesium and calcium.

**Results:** The described project is currently ongoing. Preliminary results are expected by September 2011 and will be presented at the conference.

This abstract describes the core research of the author's PhD project, that started in October 2009 (promoter Prof. Dr. De Henauw S).

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**Key Words:** micronutrients, hair, child, stress, obesity

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**27/855. Nutrition Research and Education in Europe**  
**Meal-Q - a new meal-based FFQ on the web**

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**Introduction:** Food frequency questionnaires (FFQs) are a common dietary assessment method in epidemiological studies. However, misreporting and inconsistent results indicate a need for methodological improvement.

**Objectives:** We have developed and validated the web- and meal-based questionnaire Meal-Q intended to assess habitual dietary intake in the Swedish adult population. A classic food group-based FFQ was also included in the validation study for comparison.

**Method/Design:** We recruited 178 healthy volunteers from the Stockholm County, aged 20-63 years, to participate in the validation study. All participants were asked to fill out the 185-item interactive Meal-Q as well as the 71-item classic FFQ, both on the web. The questionnaires were compared to a 7-day weighed food record (WFR) and to doubly labelled water (DLW) (n = 40).

**Results:** Total mean intake of energy and macronutrients were higher for Meal-Q than the classic FFQ, except for alcohol that was captured equally. Comparison to DLW showed underestimation of energy intake for both Meal-Q and the Classic FFQ with 702 and 1075 kcal, respectively. Spearman correlation coefficients between Meal-Q and WFR were 0.24 for energy, 0.49 for protein, 0.50 for fat, 0.66 for carbohydrates and 0.62 for alcohol. Corresponding correlations between the classic FFQ and WFR were similar for macronutrients, however, energy was not significantly correlated. In a user-evaluation, Meal-Q got higher overall user grade than the classic FFQ.

**Conclusions:** Both Meal-Q and the classic FFQ are valid instruments for assessment of habitual dietary intake, although Meal-Q performed better overall and was regarded as more user-friendly. Meal-Q is included in the Swedish cohort studies LifeGene (n=500,000), KARMA (n=100,000) and STHLM-2 (n=100,000).

**Key Words:** FFQ, web, validation, doubly labelled water, epidemiology

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**27/867. Nutrition Research and Education in Europe**  
**Evaluation of diet quality indices for European adolescents: the HELENA study**

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**Introduction:** Food-based dietary guidelines (FBDG) are promoted worldwide to stimulate a healthy diet, in order to meet nutrient needs and to reduce risk for non-communicable diseases. However, it should be investigated whether adherence to these FBDG leads to better nutrient intakes and optimal serum vitamin profiles.

**Objectives:** To investigate whether adherence to the Flemish FBDG is associated with better nutrient intakes and serum vitamin profiles in European adolescents.

**Method/Design:** The present study comprised 2672 (1427 females) healthy European adolescents aged 12.5-17.5 years who participated in the HELENA-study. Dietary intake was assessed by two, non-consecutive, 24h recalls. To assess adherence to FBDG, Diet Quality Index (DQI) scores (based on varying combinations of the pillars dietary quality, variation, equilibrium, meal frequency and physical activity) were calculated for all respondents. Fasting blood samples were collected by venipuncture at school between eight and ten o'clock in the morning. The association between DQI scores and nutrient intakes and serum vitamin profiles was investigated using partial Pearson correlations adjusted for age and stratified by gender.

**Results:** All indices were strongly positively correlated with vitamin D status ( $p < 0.01$ ) and active vitamin B12 status ( $p < 0.04$ ) in both genders. In girls, all DQI scores were negatively correlated with glucose status ( $p < 0.04$ ). All DQI indices were positively correlated with vitamin A, D and K intakes and vitamins from the B group in both genders ( $p < 0.01$ , except from thiamine in girls:  $p < 0.04$ ). All DQI scores were positively associated with protein, fiber, calcium, potassium, sodium, magnesium, iodine, phosphorus and zinc intakes in both genders ( $p < 0.01$ ). Furthermore they were negatively associated with monosaccharide intakes ( $p < 0.01$ ). In boys, DQI scores were positively correlated with polysaccharide intakes ( $p < 0.01$ ).

**Conclusions:** Higher adherence to the FBDG as reflected in the DQI is associated with more favorable nutrient intakes and better serum vitamin D and active vitamin B12 profiles.

**Key Words:** diet quality index, adolescents, Helena

27/895.

## Best Practices in Risk-Benefit Analysis

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**Introduction:** Risk-taking is normal in everyday life if there are associated (perceived) benefits. Benefit-Risk Analysis (BRA) compares the risk of a situation to its related benefits and addresses the acceptability of the risk. Over the past years BRA in relation to food (ingredients) has gained attention. Food, and even the same food ingredient, may confer both beneficial and adverse effects.

**Objectives:** Thus, measures taken to guarantee food safety may lead to suboptimal or insufficient levels of ingredients from a benefit perspective. In BRA, benefits and risks of food (ingredients) are assessed in one go and can be expressed into one currency. This allows for a qualitative and quantitative comparison of adverse and beneficial effects. A BRA should help policy-makers to make more informed and balanced benefit-risk management decisions. Not allowing food benefits to occur in order to guarantee food safety is a risk management decision much the same as accepting some risk in order to achieve more benefits.

**Method/Design:** BRA in food and nutrition is making progress, but difficulties remain. The field could benefit from looking across its borders to learn from other research areas. The BEPRARIBEAN project (Best Practices for Risk-Benefit Analysis: experience from out of food into food) project aims to do so, by working together with Medicines, Food Microbiology, Environmental Health, Economics & Marketing-Finance and Consumer Perception.

**Results:** All perspectives are described and subsequently integrated to identify opportunities for further development of BRA for food and food ingredients. Interesting issues that emerge are the varying degrees of risk that are deemed acceptable within the areas and the trend towards more open and participatory BRA processed.

**Conclusions:** A set of 6 'state of the art' papers covering the above areas and an introduction to the project will be published in 2011. A paper integrating the separate (re)views will follow shortly thereafter. Information: <http://en.opasnet.org/w/Bepraribebean>

**Key Words:** Benefit-Risk, Best Practice, Bepraribebean

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## 27/912. Nutrition Research and Education in Europe

### **A web-based system for nutritional surveillance. The project asso – adolescents and surveillance system for obesity prevention**

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**Introduction:** Adolescence is a crucial period characterized by many changes involving also food habits and lifestyles. Statistics on such information and on the prevalence of obesity are often fragmentary and incomplete, since so far interventions have been short in duration, relative to local areas, not continuous or standardized. Nutritional prevention and promotion programmes targeted to adolescents have led to define some examples of good practices, but a structured surveillance system has not been set up yet.

**Objectives:** Project ASSO (Adolescents Surveillance System and Obesity prevention) is a three-year project financed by the Italian Ministry of Health, and involves few other national and international partners. The main objective is to develop and test an innovative web-based system that allows a continuous and standardized collection of data from schools on food habits and consumptions, lifestyles and anthropometry in the whole adolescent population.

**Method/Design:** The project is structured in six work packages. The first three involve a Systematic Literature Review and validation of questionnaires, the software/website programming and delivery, and the school sampling and training activities. In a second phase the system will be tested within the schools and the analysis of data and the evaluation of the project will be performed.

**Results:** We are still in the process of the literature reviewing and the software programming. By the end of October we will have the first results.

**Conclusions:** The establishment of a well-defined surveillance system represents the first step to understand the public health problems related to the diet of the adolescent population. A synergy with other European projects in the same field is envisaged, in order to propose an example of good practice by delivering a tool that allows an effective nutritional surveillance.

**Key Words:** Adolescents, surveillance, nutrition, obesity, lifestyles

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## 227/930. Nutrition Research and Education in Europe

### **An estimate of Eicosapentaenoic acid intake in the diet of the British adults**

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**Introduction:** There have been few studies on dietary eicosapentaenoic acid (EPA) intake of European countries; and very few studies on EPA intake of the UK population. There is no accurate and extensive database of EPA content of UK foods and construction of such a database is a research priority.

**Objectives:** To estimate the intake of EPA in the diet of adults in the UK.

**Method/Design:** A table of EPA contents of foods was constructed from several databases included in Dietplan-6 (Forestfield Software, Horsham, UK). It was then applied to the nutrient databank of the National Diet and Nutrition Survey (NDNS). The study is a retrospective reanalysis on daily consumption of foods and drinks from the NDNS of adults conducted in 2000-1, based on dietary intake assessed by 7 day weighed record. The nonparametric Mann-Whitney and Kruskal-Wallis tests were used to compare the differences among gender and age groups using PASW software (SPSS Inc., Chicago, USA).

**Results:** Although the median EPA intake for men was not significantly different from women (42.5 Vs. 51.2 mg/d respectively,  $P>0.05$ ), after adjusting for difference in energy intakes, the median dietary density of EPA for men (18.6mg/1000Kcal) was significantly lower than women (33.5mg/1000Kcal,  $p<0.05$ ). The median EPA intake significantly increased with age, being the lowest for adults aged 19-24 years (20.5mg/d) and highest for adults aged 50-64 years (77.2mg/d). This difference was not associated with different energy intake among the age groups. Overall, the main sources of EPA were fish and fish dishes, dietary supplements, meat and meat products, egg and egg dishes and fat spreads respectively.

**Conclusions:** This study used available data on the EPA content of foods and demonstrated age and gender variation in the diet of UK adults. Further research should focus on the generation of an accurate and complete database of EPA content of UK foods, to reanalyse the recent NDNS.

**Key Words:** EPA, food sources, diet, adults, UK

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## 27/931. Nutrition Research and Education in Europe

### **Assessment of food additive exposure in the diets of Irish children and teenagers**

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**Introduction:** Recent research found a significant relationship between the consumption of a cocktail of seven target additives and the onset of hyperactive behaviour in children.

**Objectives:** The objectives of this research were to assess the actual exposure of Irish children and teenagers to the seven target additives – six colours (Sunset Yellow (E211), Carmoisine (E122), Tartrazine (E102), Ponceau 4R (E124), Allura Red (E129) and Quinoline Yellow (E104)) and one preservative – Sodium Benzoate (E211) using 3 scenarios.

**Method/Design:** The Irish National Food and Ingredient Databa-

se (INFID) is a multi-faceted database that records, at brand level, detailed information on all ingredients in foods consumed by participants in the National Children's Food Consumption Survey (NCFS) (2003–2004) and the National Teenager's Food Survey (2005–2006). SPSS food files generated from the NCFS and NTFS recorded data for each food consumed per eating occasion per subject per day. Each eating occasion was recorded at brand level, thus linking eating occasion to the brand codes in INFID. This chemical occurrence data can therefore be accounted for in subsequent exposure assessments. Three scenarios were run to assess the levels of exposure - Scenario 1 uses Maximum Permitted Levels (MPL) and assumes if the additive is legally permitted, it is always present. Scenario 2 uses MPLs, but also applies chemical occurrence data (from INFID). Scenario 3 uses chemical concentration data with chemical occurrence data.

**Results:** Mean intakes (mg/kg/bw) were below Acceptable Daily Intakes (ADI) for both children and teenagers for all 3 scenarios, ranging from the most conservative (scenario 1) to the least conservative (scenario 3).

**Conclusions:** Irish children and teenagers have low exposure levels to these 7 target additives and do not exceed EU safety levels. The results also suggest that the application of chemical occurrence and concentration data is necessary in realistic chemical exposure analyses.

**Key Words:** Exposure, risk assessment, food additives, diet

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## 227/966. Nutrition Research and Education Impact of school fruit program on fruit consumption by children

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**Introduction:** It is widely accepted that adequate intake of fruit and vegetables is associated with health benefits. Several projects and food policies have been implemented all over the world. The program of the School Fruit Program is an European Program that consist on biweekly distribution of fruit per day, per child.

**Objectives:** Evaluation of the short-term impact of the Program of School Fruit Program on the consumption of fruit by the children involved in this program.

**Method/Design:** A cross-sectional study was developed. 148 children from 1st year of elementary level of education from Braga municipality was evaluated. Date was collected by using an array of weekly consumption of fruit to be completed by parents and a checklist for assessing children's school lunches. Two assessments were performed before and after School Fruit Program implementation on November 2010 and January 2011.

**Results:** The majority (51.4%) of children were of male gender. A significant increase ( $p = 0.001$ ) on fruit consumption was observed after School Fruit Program implementation. Females significantly increased consumption of fruit after the implementation of the program ( $p = 0.002$ ). The supply of fruit at meals significantly contributed for

the increase on fruit consumption ( $p < 0.001$ ). An increase in fruit composition was found on the composition of school dinners after program implementation.

**Conclusions:** Free distribution of fruit and vegetables at school is potential strategies to promote fruit and vegetable consumption by children. The crucial question remains in the best way to encourage children to eat more fruit and vegetables.

**Key Words:** School Fruit Program; Fruit; Children; School; Consumption

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## 27/971. Nutrition Research and Education in Europe Obesity and hypertriglyceridemia in ICR-CD1 obese mice

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**Introduction:** Obesity is an epidemic health problem that is associated with other pathologies, including diabetes, cancer and cardiovascular disease. Animal models are used to study mechanisms that control body weight and pathological alterations observed in obese individuals. Obesity in animals can be induced by a hypercaloric diet with a high fat concentration.

**Objectives:** In this study we evaluated the effects of a diet supporting 60% of calories from fat for 5 weeks on weight and biochemical parameters in mice.

**Method/Design:** Female ICR-CD1 mice (8 weeks old) were fed with a diet containing 60% of total calories from fat (Harlan Laboratories), ad libitum, for 5 weeks. Mice fed with a diet of maintenance (Harlan Laboratories) were used as controls. Food and water intake as well as weight levels were determined twice per week. Serum glucose, triglyceride and cholesterol levels were measured with Accutrend GCT (Roche) strips in blood obtained from mice tail.

**Results:** Diet 60% induced the increase of body weight of mice from beginning of treatment. The body weight of treated mice ( $42.16g \pm 6.89$ ,  $n = 8$ ) was higher than weight of control mice ( $33.30g \pm 2.78$ ,  $n = 8$ ) after 5 weeks ( $P = 0.007$ ). Obese mice showed higher levels of triglycerides ( $139.9mg/dL \pm 36.38$ ,  $n = 8$ ) than control mice ( $96.38mg/dL \pm 10.43$ ,  $n = 8$ ,  $P = 0.012$ ). There were not observed differences in glucose and cholesterol blood concentration. Triglyceride levels correlate with weight of mice ( $r = 0.529$ ,  $P = 0.042$ ,  $n = 16$ ).

**Conclusions:** These results showed that 5 weeks of treatment with a diet containing 60% of total calories from fat induces obesity and hypertriglyceridemia in ICR mice.

**Key Words:** Diet-Induced Obesity, Triglyceride Blood Levels, Icr-Cd1 Mice

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**27/986. Nutrition Research and Education in Europe**  
**The pathologies during pregnancy and fatty acids composition in mothers' milk**

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**Introduction:** The mother's milk is the most precious source of building and energetic components for their newborn children. One of the most important components of the woman's milk are fatty acids (FAs) responsible for the correct development of the child's nervous system, metabolism of the neuron cell membranes and other cells, as well as general biochemical metabolism.

**Objectives:** The objective of the present studies was to analyze fatty acids in transitional milk (TM) and mature milk (MM) in groups of mothers who delivered at term, preterm and low-birth-weight newborns.

**Method/Design:** The study population consisted of 99 women. The patients were qualified into three groups. Group A – women who delivered an infant at term. Group B – women who delivered an infant with some prematurity features. Group C – mothers of infants with some features of interuterus malnutrition.

The total number of lipids from the breast milk was extracted with chloroform-methanol (2:1 v/v containing 0.01% BHT) according to Folch. The fatty acids methyl esters (FAME) were analyzed by gas-liquid chromatography using a HP 6890 gas chromatograph equipped with a split injector (split ratio 1:10) and a MS detector.

**Results:** 34 FAs were determined in transitional and mature milk. Then the relationship of FAs content in the transitional milk was determined and the FAs were compared between the studied groups of women. In group A, 20 statistically significant differences between FAs of transitional milk and FAs of mature milk were observed. In group B and C there were respectively 16 and 8 statistically significant differences. In most cases, the ratio of medium-chain FAs in transitional milk to mature milk was higher in group A. In groups B and C, the same ratio was higher for long-chain fatty acids.

**Conclusions:** The results of our research showed differences in content and fatty acids mutual relations in the studied groups of mothers. These results may demonstrate that mammary glands adjust their metabolism to condition and age of the child, by the synthesis of milk of an optimal composition for them.

**Key Words:** Transitional Milk, Mature Milk, Fatty Acids and, Newborn

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**27/1001. Nutrition Research and Education in Europe**  
**Health promotion of competitive youth table tennis players. Effects of a nutritional intervention plan.**

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**Introduction:** Table tennis is a high-demand sport, and young players need an adequate diet to sustain growth and repair tissues. We are carrying out a nutritional interventional plan involving four interrelated steps: assessment to identify potential individual health/nutrition problem(s), plans to meet their nutritional needs, implementation of developed systems to reduce the problems, and evaluation of implemented plans.

**Objectives:** The aim is to evaluate the effects of a nutritional intervention plan on health promotion in Spanish competitive youth table tennis players over the course of 12 months.

**Method/Design:** Via biochemical profile (blood analyses), anthropometric profiling (weight, height, BMI, % bone, % muscle, % lipids), 24-hour dietary recalls and food preference and consumption questionnaires, we sought to understand the health status of 7 intermediate-school competitive table tennis players (four boys and three girls). During monthly sessions, we engage the players, parents, coaches, and trainers in groups and individual nutritional counselling sessions.

**Results:** The boys (8 to 13 years) weighed from 32.2 to 49.3 kg, measured from 1.39 to 1.47 m and had BMI's from 15.3 to 23.1. The girls (12 to 15 years) weighed 43.5 to 51.7 kg, measured 1.53 to 1.66 m and had BMI's from 16.0 to 21.9. We identified potential problem(s) via blood analysis, anthropometric profiling, 24-hour recalls and questionnaires. Generally the players lack sufficient fruit/vegetable intake as well as enriched grains. To meet these needs, we conduct group nutrition education sessions and individual counselling sessions, and developing supporting instruction for parents, coaches and trainers. Players complete monthly follow-up activities. We will continually monitor the progress of each player to ensure adherence to nutritional advice.

**Conclusions:** Predicted outcomes are that the players choose an appropriate diet in day-to-day life and during competitions. We expect that this will lead to the improvement of their health and nutritional status and their performance.

**Key Words:** competitive table tennis players, nutritional intervention study, BMI, healthful diet, health promotion.

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**27/1012. Nutrition Research and Education in Europe**  
**The level of selected minerals and cadmium in chicken livers in dependence of age**

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**Introduction:** Liver is a rich source of valuable minerals for human health. However it is also exposed to chemical contaminations, especially for heavy metals such as cadmium.

The aim of the study was to assess the selected minerals and cadmium content in chicken livers in dependence of age.

**Objectives:**

**Method/Design:** The study was carried out on 40 chickens from 3 different age groups (3-week, 6-week and 22-week old) obtained from National Research Institute of Animal Production in Balice, Poland. Determinations of Fe, Mn, Zn, Na, K, Ca and Mg levels were performed using AA240FS spectrometer. The content of Cd and Cu was detected using Varian AA240Z spectrometer, after microwave digestion (MARS Xpress, CEM).

**Results:** The results for iron content in chicken livers ranged from 32.69 mg/kg (3-week) to 83.41 mg/kg (22 weeks). Mean copper concentration in all samples ranged between 3.39 and 4.71 mg/kg in 6-week and 3-week chickens, respectively. The data obtained ranged from 1.29 mg/kg (3-week) to 4.04 mg/kg (22-week) for manganese, from 16.53 mg/kg (3-week) to 40.19 mg/kg (22-week) for zinc, from 837.81 mg/kg (22-week) to 1453.18 mg/kg (3-week) for sodium, from 1987.47 mg/kg (3-week) to 2953.83 mg/kg (6-week) for potassium, from 63.14 mg/kg (6-week) to 98.91 mg/kg (22-week) for calcium, and from 196.96 mg/kg (3-week) to 235.34 mg/kg (22-week) for magnesium. The highest cadmium level was detected in the livers of chickens aged 22-week (0.044 mg/kg), the lowest one (0.001 mg/kg) – at the age of 3 weeks.

**Conclusions:** There were considerable differences in the content of minerals in liver samples in dependence of chicken age. The level of cadmium found in chicken liver is lower than the limits established by European Union legislation.

**Key Words:** chicken liver, minerals, cadmium.

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**27/1015. Nutrition Research and Education in Europe**  
**Changes on Zn and Cu dental content caused by magnesium deficiency in rats**

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of Nutrition. Biomedical Research Center. University of Granada. Spain.

**Introduction:** Epidemiological studies have shown the mean dietary intake of magnesium to be below recommended levels (350 and 330 mg/day for adult men and women). Therefore, we designed the present study to elucidate the relationship between magnesium, copper and zinc and to determine whether the first indirectly contributes to the development of structural symptoms in the teeth.

**Objectives:** The objective is to study dental mineral effects of rats fed on a magnesium-deficient diet by analyzing magnesium, copper and zinc as biomarkers of mineral status comparing with control group.

**Method/Design:** A longitudinal and prospective study of 72 male Wistar rats was carried out. The sample was randomized into eight groups four fed a control diet and four a magnesium deficient diet. Dental mineral status was determined after 3, 5, 7 and 10 weeks. Magnesium, copper, and zinc content of wet mineralized samples were determined by flame atomic absorption spectrometry. Student t test was used to statistical comparative study.

**Results:** Mg deficient group had lower dental magnesium content than control group after 10 weeks: 2.84±0.7 vs. 4.64±0.72 (p<0.05). Significant increase in zinc and copper content were obtained in Mg deficient group: 453.09±78.85 vs. 592.23±151.37; 0.75±0.14 vs. 1.5±0.7; respectively (p<0,05) after 10 weeks

**Conclusions:** Long- term Mg deficiency causes important alterations on Zn and Cu teeth content, and could be the origin of several dental disturbances attributed to other causes or unknown.

**Key Words:** Mg deficiency, Zn, Cu.

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**27/1021. Nutrition Research and Education in Europe**  
**Nutrition education for parents with young children aged 0-3 and pregnant women in Germany**

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**Introduction:** After a pilot study the project run by the Bavarian State Ministry for Food, Agriculture and Forestry was extended all over Bavaria including 47 regional offices of the Ministry since January 1st 2011.

**Objectives:** The aim of this project is to improve nutrition habits and physical activities in daily life of children aged 0-3 years. Attending specific offers young parents and pregnant women will reflect and modify their own lifestyle.

**Method/Design:** Innovative cooperative approaches are explored by networking with other experts in the field of nutrition and physical activity. By cooperating with other institutions and persons involved in health promotion new groups of parents can be reached. Pilot phase was analysed by a standardised questionnaire. Supportive

new attractive media is developed by only using photography.

**Results:** Established networks include partners from various professional domains, e.g. nutritional consultants, representatives of health insurance companies, youth welfare offices, non-governmental organisations, and sport clubs. The networks yield access to families who typically do not respond to health promotion programs. Families attending the different activities preferred a combination of theoretical and practical activities in nutrition subjects and in physical activities. The developed photo-flyers on nutrition not only visualize portion size for babies and children aged 2-3 years, but also trigger an emotional response with the viewer and can strongly motivate imitation.

**Conclusions:** Focused networking is state-of-the-art in developing promising approaches to promote a healthy lifestyle in nutrition and sports. To yield an enduring effect long-time continuation of effective measures is required.

**Key Words:** health promotion, networking, nutrition education, physical activity, children

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### 27/1028. Nutrition Research and Education in Europe Assessment of sodium intake with daily diets by adolescents

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**Introduction:** Sodium is an essential element for human organism, however excessive intake of this mineral in the daily diet may lead to increased risk of hypertension, cardiovascular and kidney diseases.

**Objectives:** The aim of the study was to assess sodium intake with daily diets by adolescents (aged 10–18) living in Malopolska Region, Poland.

**Method/Design:** The subjects were 568 respondents divided into three age categories: 10-12 years (80 boys and 95 girls), 13-15 years (114 boys and 103 girls) and 16-18 years (50 boys and 126 girls). Daily sodium intake was estimated by 24-h dietary recall and calculated using 'Diet 2.0' computer software. Obtained results were compared to the Adequate Intake (AI) and Tolerable Upper Intake Levels (UL).

**Results:** The results obtained showed that boys had a significantly higher intake of sodium than girls in each studied age group. It was found that the AI value was exceeded for all respondents. Daily intake of Na among boys aged 10-12 was 3114.0 mg and among girls 2678.0 mg, on average. In the age group of 13-15, the intake was 4006.8 mg and 2762.2 for boys and girls, respectively. Daily diets of pupils 16-18 aged contained 4759.0 mg (for boys) and 2902.0 mg (for girls) sodium. Intake of sodium by about 84% of examined subpopulations was above UL.

**Conclusions:** The excessive intake of sodium among adolescents was observed. Integrated action directed towards young people education, involving families, school and industry is necessary.

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**Key Words:** Adolescents, Sodium Intake, Daily Diet

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### 27/1029. Nutrition Research and Education in Europe- Prenatal maternal folate levels and neuro- development of the child

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**Introduction:** Folate plays a critical role in protein-, lipid- and DNA synthesis. Reduced serum folate in pregnancy has been associated with low birth weight and an increased risk of neural tube defects (Pitkin, et al.,2007). Even in the absence of neural tube defects it is possible that low folate levels have subtle influences on prenatal development, although there has been little research done in this area.

**Objectives:** In a large population-based cohort, we recently found that low maternal folic acid levels were associated with smaller fetal ultrasound measures of head circumference and trans cerebellar diameter. Thus, the goal of this study is to utilize high-resolution structural MRI to assess brain differences in a subgroup of these children at approximately seven years of age.

**Method/Design:** The study was conducted within the Generation R Study, an ongoing population-based cohort study of approximately 6,000 children that examines early determinants of growth, development, and health beginning from fetal life (Jaddoe, et al.,2010). The current study was based on information from 205 children of whom a structural Magnetic Resonance Imaging (MRI) of brain has been assessed. Maternal folate blood levels were measured during early pregnancy. Children of mothers with low folate levels (< 8 nmol/L) during pregnancy were defined as cases (n=54). Brain measures were obtained using high-resolution structural (0.9 mm isotropic voxels) magnetic resonance imaging and the data was processed using FreeSurfer (Dale, Fischl, et al.,1999). The measures of interest included the cerebral gray and white matter volumes, cerebellum, lateral ventricles, and the corpus callosum. The brain measures were analyzed using ANCOVAs with intracranial volume and sex used as covariates.

**Results:** An ANCOVA controlling for sex showed no difference in intracranial volumes between the two groups. An ANCOVA, controlling for sex and intracranial volume, showed no significant difference in the cerebellum, cortex, lateral volume and the brain stem between the cases and controls. The mid anterior region of the corpus callosum was smaller in cases compared to controls (F<sub>1,201</sub>) = 7.37,



p=0.007)

**Conclusions:** Overall we found few differences in the follow-up volumetric brain measures between children who were exposed to low and normal folic acid levels during pregnancy. The exception is the mid-region of the corpus callosum, which is smaller in children whose mothers had lower folic acid levels during pregnancy. There are a number of possible reasons why we did not find more striking brain differences between children exposed to low folic acids levels during pregnancy. One possibility is the small number of subjects does not provide the power to detect small differences. However, a more likely explanation is that the inherent plasticity of the developing brain, coupled with complex genetic and environmental factors influence and mold ongoing development and these factors exert a greater influence in molding the postnatal brain. However, healthy amounts of folic acid could still play a critical role in optimizing early neurodevelopment.

**Key Words:** Neurodevelopment, Magnetic Resonance Imaging

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### 27/1033. Nutrition Research and Education in Europe **Development and validation of a magnetic resonance spectroscopy technique for measuring stomach emptying rate**

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**Introduction:** The overall absorption rate of dietary nutrients is strongly influenced by the rate of gastric digestion and stomach emptying (SER).

**Objectives:** Develop and validate a magnetic resonance spectroscopy (MRS) technique for the routine measurement of SER in rats.

**Method/Design:** Sprague-Dawley male rats were fasted overnight and gavaged with a single dose of a mixture of semi-synthetic diet (beef-muscle protein or soybean protein isolate [SPI]), marker (AIC13) and water at pH 2. AIC13 can only be detected in an acidic environment, and so can be measured directly in the stomach but not in the small intestine. The rats were immediately placed in the MRS and SER was estimated from the real-time decrease in the AIC13 signal over 130 min. Several methodological parameters were investigated in order to optimise the MRS technique including: moving the rats in/out of the MRS between scans; minimum scanning time required; rat size; gavage volume; diet and marker concentration. Finally, the MRS method was compared with the traditional (slaughter) method for determining SER

**Results:** The SER obtained after scanning for 150 min was not different ( $P>0.05$ ) from that measured after 360 min. Moving the rats in/out of the MRS between scans, the diet (170-300 mg/ml) and marker (55-85 mg/ml) concentrations as well as rat size (276-313 g bodyweight) did not affect the SER ( $P>0.05$ ). The SER was influenced by gavaged volume ( $P<0.05$ ), 2 ml was the optimal volume in terms of data variability. Similar slopes were obtained between the SER obtained with the MRS and the slaughter method for both beef-

muscle- and SPI-based diets ( $P>0.05$ ).

**Conclusions:** MRS is a reliable technique for measuring SER in rats, giving lower variability and requiring less rats (up to 7-fold less) compared to the traditional method. In addition a more robust statistical analysis can be performed (analysis of repeated measures).

**Key Words:** stomach emptying rate, dietary proteins, rats

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### 27/1035. Nutrition Research and Education in Europe **Effect of Stevia Reb. On serum lipid profile in experimental rats.**

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**Introduction:** Increasing prevalence of chronic non communicable diseases forced to seek new methods of prevention. One of the recent direction of therapy of diet-dependent diseases is using of medicinal properties of plants, i.e. Stevia Rebaudiana Bertoni (Stevia).

**Objectives:** The purpose of this study was to evaluate the effects of Stevia leaves on the serum lipid profile and glucose level in experimental rats.

**Method/Design:** Wistar rats (n=18, male), 5 weeks old, after the adaptation period were randomly divided into three groups and fed experimental diets. Group I, control - was fed hypercholesterolemic diet (1% of cholesterol in AIN-93G diet), Group II hypercholesterolemic diet with 10% addition of Stevia, group III- hypercholesterolemic diet with 15% of Stevia. Leaves of Stevia were freeze-dried grounded and added to the experimental diets. After six weeks of experiment, fasted rats were anaesthetized; blood was drawn from a hart puncture and collected in test tubers. In serum total cholesterol (TC) HDL cholesterol (HDL), triacylglycerol (TAG) and glucose level were measured with commercial kits. Concentration of LDL cholesterol was calculated as the difference between TC and HDL cholesterol.

**Results:** The level of TC was significantly higher ( $P<0.05$ ) in serum of rats fed with 10 addition of Stevia in comparison to animal fed control diet. The concentration of HDL and LDL cholesterol was significantly higher in serum of rats fed diets with 10, 15% addition of Stevia in comparison to control group. Concentration of TAG and glucose were lower in serum of rats fed diet with 15% addition of Stevia to diet in comparison to control group and group of rats fed with 10% Stevia.

**Conclusions:** Obtained results do not give unequivocal answer if Stevia can be used as the plant which has healthy properties.

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**27/1036. Nutrition Research and Education in Europe**  
**The effect of folic acid and methionine supplementation of the AIN-93G semi-synthetic diet on the serum homocysteine levels and lipid profile of experimental rats**

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**Introduction:** Humans hyperhomocysteinemia is connected with high consumption of animal proteins (the products rich in methionine). Folic acid is the essential vitamin for the synthesis of DNA and methylation of homocysteine to methionine. In addition the level of homocysteine in serum may be affected by folic acid.

**Objectives:** The objective of the studies was to determine the relationship between increasing dietary levels of folic acid on serum homocysteine concentration and lipid profile in male growing rats fed AIN-93G diet supplemented with methionine.

**Method/Design:** Thirty rats (six rats per group) were fed six AIN-93G diet supplemented with methionine (32 g/kg diet). The following diets were used: I – control, II-VI – folic acid supplemented diets, containing 2, 4, 8, 18 and 28 mg folic acid/kg diet. After 52 days of the experiment, the rats were anesthetized with thiopental and blood was collected. There were assessed enzymatically, in rats' blood serum, the contents of homocysteine (Immolute Homocysteine LKHO1), serum total cholesterol (TC) and HDL fraction (BioVendor cat.-no 10851 and BioVendor cat.-no 10855 respectively) and triacylglycerols (BioVendor cat.-no 12805). In addition, the LDL+VLDL cholesterol content was calculated.

**Results:** In the blood serum of rats fed diet with highest edition of folic acid (28 mg folic acid/kg diet), the homocysteine content was significantly lower, as compared to control group (I). Lower doses of folic acid caused only a tendency to decrease in homocysteine level ( $P>0,05$ ). At the same time, folic acid supplementation of the diet caused only a tendency to decrease in serum triacylglycerols level and no effect on TC, HDL, LDL+VLDL concentrations ( $P>0,05$ ).

**Conclusions:** The folic acid supplementation of the diet was found to be highly negatively correlated with the homocysteine content ( $r = -0.910$ ) and negatively correlated with the triacylglycerols content ( $r = -0.857$ ) in the blood serum of experimental animals'.

**Key Words:**

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**27/1045. Nutrition Research and Education in Europe**  
**An estimate of intake of n-3 long chain fatty acids in the diet of the British Adults**

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**Introduction:** There have been several studies on the beneficial effects of Eicosapentaenoic acid (EPA) and Docosahexaenoic acid (DHA), however few studies estimated the overall intake of these fatty acids in the diet of adults at national level. There is no accurate and extensive database of EPA and DHA content of UK foods and construction of such a database is a research priority

**Objectives:** To estimate the intake of EPA+DHA in the diet of adults in the UK.

**Method/Design:** A table of EPA and DHA content of foods was constructed from several databases included in Dietplan-6 (Forestfield Software, Horsham, UK). It was then applied to the nutrient databank of the National Diet and Nutrition Survey (NDNS). The study is a retrospective reanalysis on daily consumption of foods and drinks from the NDNS of adults conducted in 2000-1, based on dietary intake assessed by 7 day weighed record. The nonparametric Mann-Whitney and Kruskal-Wallis tests were used to compare the differences between gender and age groups using PASW software (SPSS Inc., Chicago, USA).

**Results:** Although the median EPA+DHA intake for men was not significantly different from women (88.2 Vs. 104.6 mg/d respectively,  $P>0,05$ ), after adjusting for difference in energy intakes, the median dietary density of EPA+DHA for men (40.1mg/1000Kcal) was significantly lower than women (67.8mg/1000Kcal,  $p<0,05$ ). The median EPA+DHA intake significantly increased with age, being the lowest for adults aged 19-24 years (40.6mg/d) and highest for adults aged 50-64 years (165.2mg/d). This difference was not associated with different energy intake among the age groups. Overall, the main sources of EPA+DHA were fish and fish dishes, dietary supplements, and meat and meat products respectively.

**Conclusions:** This study used available data on the EPA+DHA content of foods and demonstrated significant age and gender variation in the diet of UK adults. Further research should focus on the generation of an accurate and complete database of EPA+DHA content of UK foods, to reanalyse the recent NDNS.

**Key Words:** EPA, DHA, diet, adults, UK

**An estimate of Decosahexaenoic acid intake in the diet of the British Adults**

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**Introduction:** There have been few studies on dietary Decosa-hexaenoic acid (DHA) intake of European countries; and very few studies on DHA intake of the UK population. There is no accurate and extensive database of DHA content of UK foods and construction of such a database is a research priority.

**Objectives:** To estimate the intake of DHA in the diet of adults in the UK.

**Method/Design:** A table of DHA contents of foods was constructed from several databases included in Dietplan-6 (Forestfield Software, Horsham, UK). It was then applied to the nutrient databank of the National Diet and Nutrition Survey (NDNS). The study is a retrospective reanalysis on daily consumption of foods and drinks from the NDNS of adults conducted in 2000-1, based on dietary intake assessed by 7 day weighed record. The nonparametric Mann-Whitney and Kruskal-Wallis tests were used to compare the differences among gender and age groups using PASW software (SPSS Inc., Chicago, USA).

**Results:** Although the median DHA intake for men was not significantly different from women (47.0 vs. 52.9 mg/d respectively,  $P>0.05$ ), after adjusting for difference in energy intakes, the median dietary density of DHA for men (21.6mg/1000Kcal) was significantly lower than women (36.1mg/1000Kcal,  $p<0.05$ ). The median DHA intake significantly increased with age, being the lowest for adults aged 19-24 years (21.0mg/d) and highest for adults aged 50-64 years (89.4mg/d). This difference was not associated with different energy intake among the age groups. Overall, the main sources of DHA were fish and fish dishes, dietary supplements, and meat and meat products respectively.

**Conclusions:** This study used available data on the DHA content of foods and demonstrated age and gender variation in the diet of UK adults. Further research should focus on the generation of an accurate and complete database of DHA content of UK foods, to reanalyse the recent NDNS.

**Key Words:** DHA, food sources, diet, adults, UK

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