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# Development of innovative food-base fortification solutions to sustain health in older people using co-creation approach

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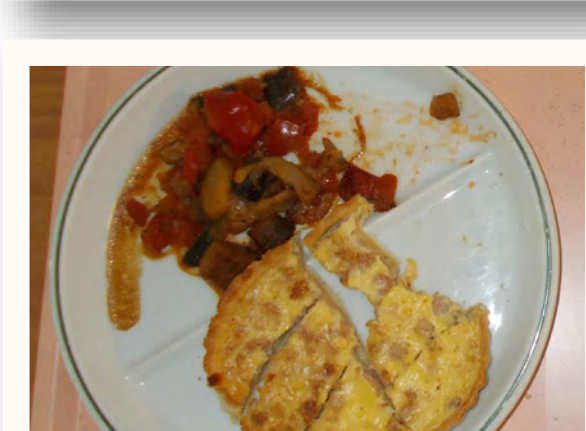
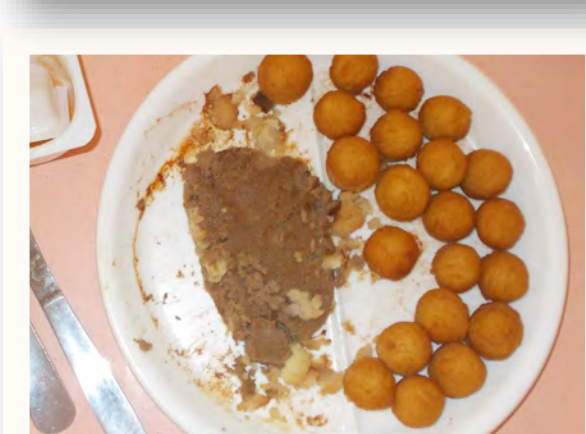
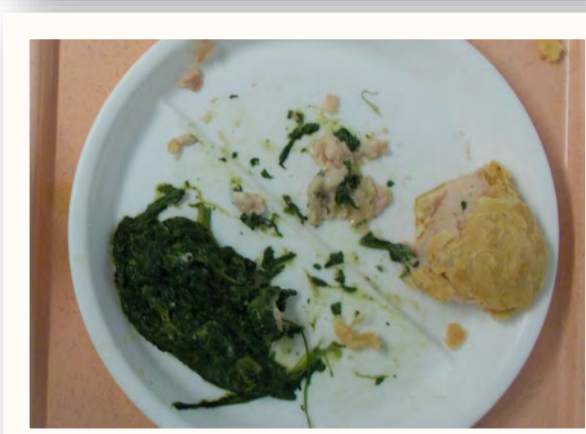


## Small eaters in old age

Several epidemiological studies highlighted a *small eater* pattern ranging from 23% to 55% in community-dwelling older population<sup>1</sup>.

Two recent studies have shown that about two thirds of dependent older people do not meet their protein requirements<sup>2</sup>.

Insufficient protein intake leads to loss of muscle mass and impaired immune function, with negative effects on the autonomy and health of older people. In fact, poor appetite is a strong and major determinant of protein-energy undernutrition<sup>3</sup>.



After 65 years old:  
1 to 1.2 g of protein  
per kg of body weight per day



## Food-based fortification

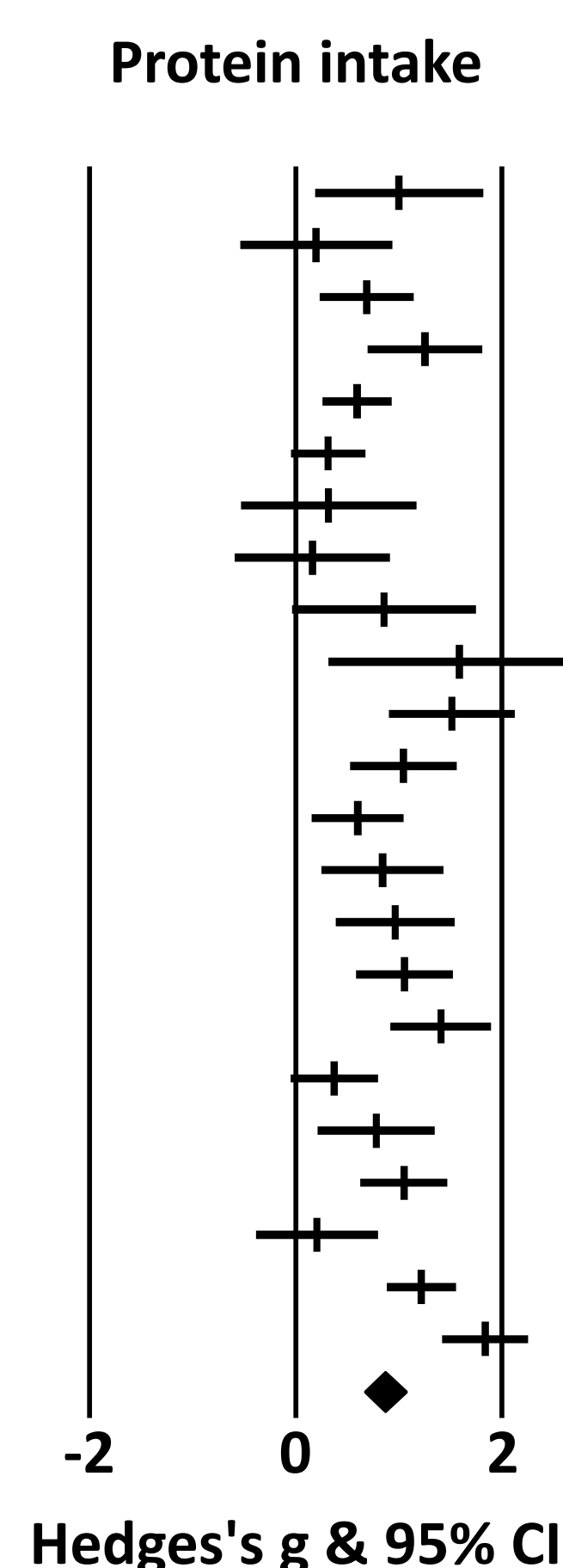
Food-based fortification consists of incorporating ingredients of nutritional interest (*fortificants*) into everyday foods without increasing the volume to be ingested.

Fortificants can be:

- ✓ Regular food products (semolina, oils, butter, cream, pureed nuts, egg...)
- ✓ Macronutrients extracts (whey protein isolate, milk protein concentrate, caseinate, maltodextrin...)

Fortification is a flexible solution that allows better adaptation to older people's food preferences and better guarantees the maintenance of a varied diet.

Systematic literature review:  
significant increase in protein  
intake and body weight<sup>4</sup>



## Bridging the gap between nutrition and sensory

Systematic review reveals the acceptability of fortified recipes is seldom done:

- ✓ Identification of 44 original studies on fortification in older people<sup>4</sup>
- ✓ Only 10 reported both nutritional and acceptability outcomes
- ✓ The quality of acceptability testing is often poor: low sample size & convenient sample, qualitative tests, incomplete reporting

Acceptability is more than liking: we need to design fortified foods that people will choose to buy, cook, eat and enjoy, in order to ensure nutritional efficacy.



Fortiphy

1. Schroll 1996 Eur J Clin Nutr; Corrêa-Leite 2003 Eur J Clin Nutr; Samieri 2008 J Am Diet Assoc; Gazan 2016 Brit J Nutr; Thortpe 2016 Int J Behav Nutr Phy; 2. Borkent 2019 J Nutr Sci; Sulmont-Rossé 2019 Cah Nut Diet; 3. Pols-Vijlbrief 2014 Ageing Res Rev; 4. Geny submitted Clin Nutr;

## Database of protein extracts

A database including all protein extracts available on the EU market was built. Each product was assessed on the following domains:

- ✓ Technology
- ✓ Regulatory
- ✓ Sustainability
- ✓ Sensory
- ✓ Nutrition



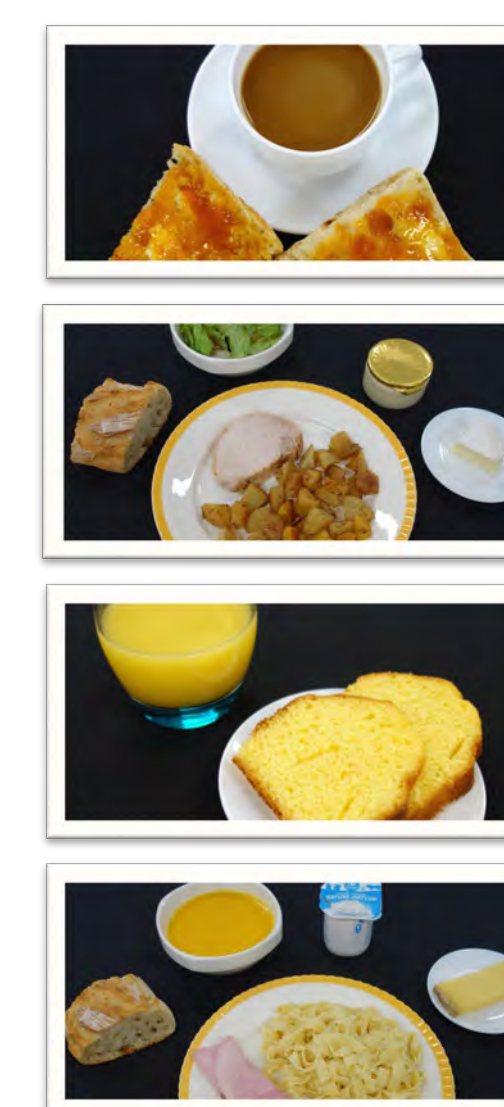
135 products were identified  
38% from animal and 50% from plant  
Protein rate varies from 9 to 98%

## Usage constraints

Focus groups were conducted in each country (FR, N, UK) with older people and caregivers to gather insights on attitudes to usage of high-protein ingredients

- ✓ Nutrition awareness
- ✓ Fortification
- ✓ Proteins extracts

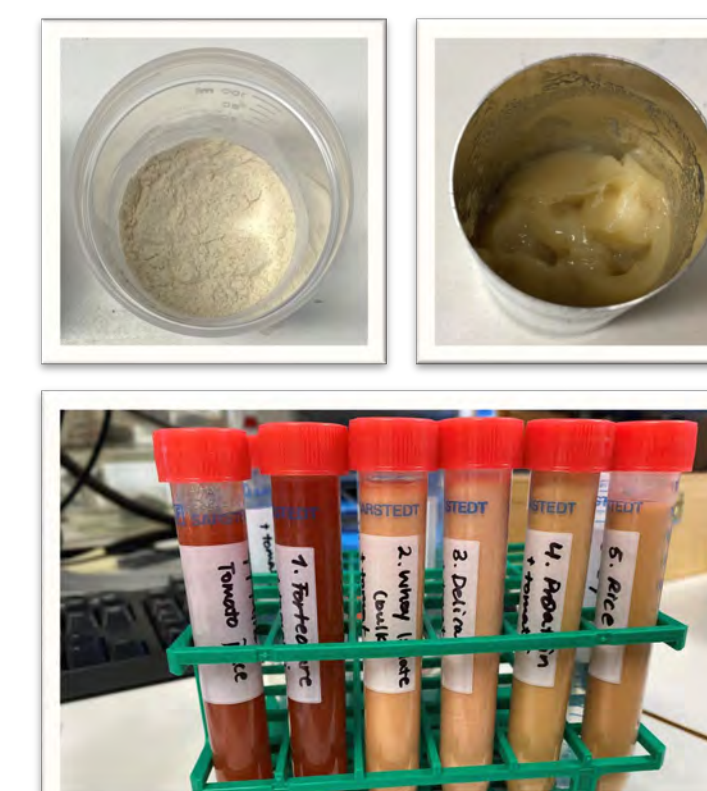
Posters on session 2  
ECR2.1 ECR2.3



## Technological constraints

Eleven protein extracts were selected and assessed for their technological constraints

- ✓ Tested in water, milk and tomato juice
- ✓ Cooking stirring viscometer
- ✓ Gas Chromatography/Mass Spectrometry

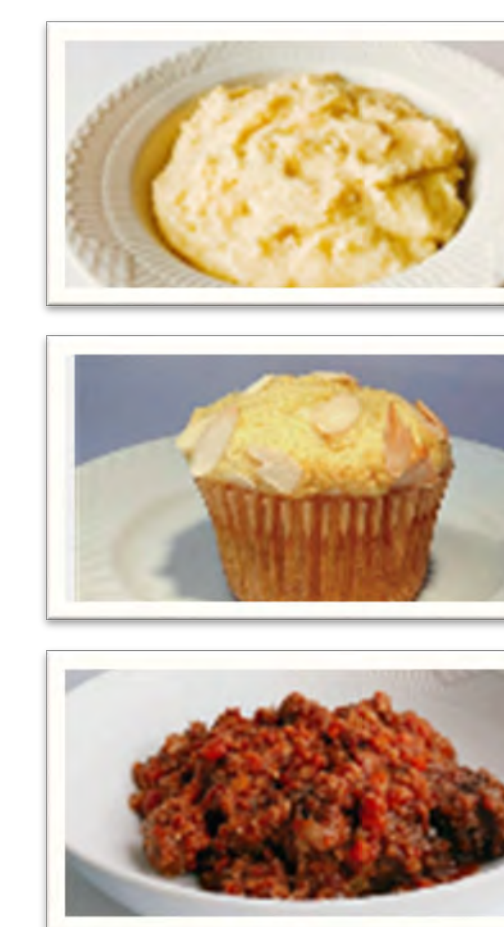


Major challenges:  
formation of aggregates when heated,  
increased viscosity and lipid oxidation

## Development of fortified recipes

Several recipes were developed by a chef in collaboration with a food technologist and a nutritionist

- ✓ Culinary ingredients (dairy, almonds, eggs...)
- ✓ 2 protein extracts (milk protein & extruded soya)
- ✓ Cooking from scratch and from ready-to-heat



Each recipe provides an additional load  
of 10-12g of protein and 250-300 kcal

## Home-usage tests

Home-usage tests were conducted in three countries (FR, N, UK) with people aged over 70 (n=50 per country)

- ✓ Ease of preparation and palatability

Additional central location tests were conducted in France to compare standard *versus* fortified food (n=56; 37 ♀; 70-84 yo)

Fortified foods (M=4.6/7; SE=1.7)  
are less liked than standard foods  
(M=5.2/7; SE=1.4; p<0.001)

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