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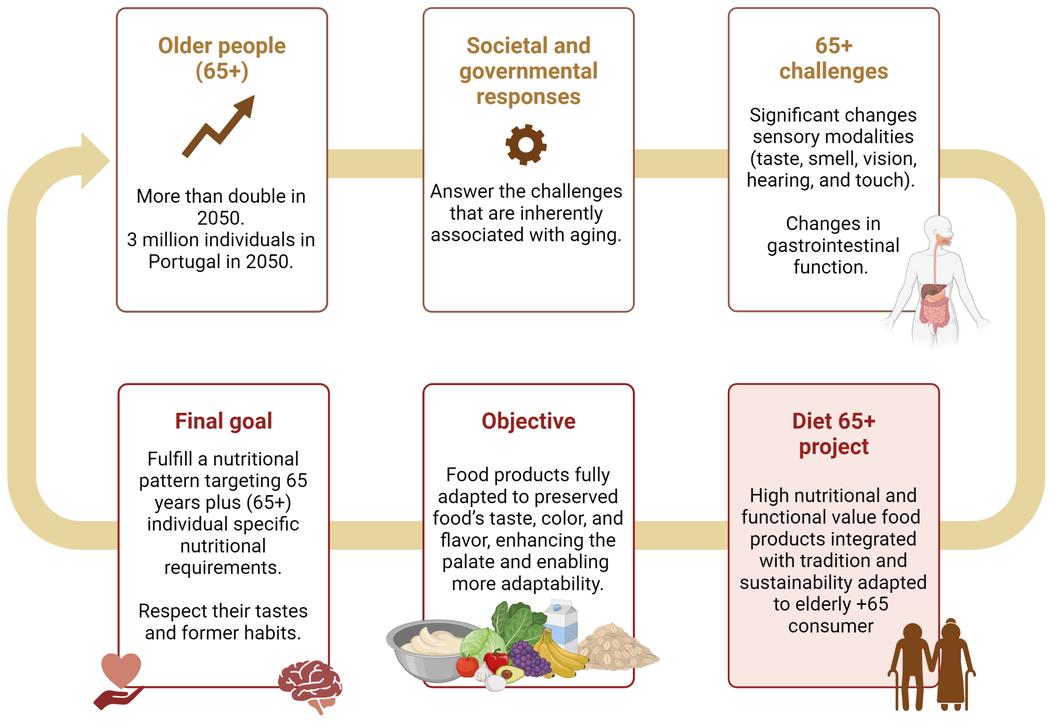
The application of a static *in vitro* digestion model adapted to the general older adult population (INFOGEST) as an assistance tool for the development of food formulations adapted to the elderly - Diet65+ project

Ana Sofia Salsinha[a], Marta Correia[a], Beatriz Silva[b], Miguel Azevedo[b] and Manuela Pintado[a]

a. Universidade Católica Portuguesa, CBQF - Centro de Biotecnologia e Química Fina –Laboratório Associado, Escola Superior de Biotecnologia, Rua de Diogo Botelho, 1327, 4169-005 Porto, Portugal
b. Decorgel Produtos Alimentares S.A, Rua do Progresso, 363 – Lantemil, 4785-647 Trofa, Portugal

Correspondence contacts: Manuela Pintado: mpintado@ucp.pt and Ana Sofia Salsinha: asalsinha@ucp.pt

The Diet 65+ Project



Experimental design

Food formulations adapted to the elderly (65+)

Fruit and Cereal Pureé

Adaptable Vegetable Paste

	Fruit and Cereal Purée	Adaptable Vegetable Paste	Spreadable Cream	Instant Soup/Purée
Protein	≥1 g	≥5.2 g	≥0.9 g	≥15 g
Fiber	≥1 g	≥4.5 g	≥1.1 g	≥ 3 g

g/100 g

Gastrointestinal tract digestion simulation

1 Oral phase
Manual mincing to produce food particles before adding SSF (same composition, pH 7.0, 2 min)

2 Gastric phase
SGF (same composition)
pH adjustement to 3.7 (vs. pH 3.0)
Duration adjustement to 3h (vs. 2 h)
Pepsin 1200 U/mL (vs. 2000 U/mL)
Gastric Lipase 36 U/mL (vs. 60 U/mL)

3 Intestinal phase
SIF ([Ca^{2+}]=1mM, pH 7.0, 2 h)
pH adjustement to 3.7 (vs. pH 3.0)
Trypsin 80 U/mL (vs. 100 U/mL)
Bile salts 6.7 mM (vs. 10 mM)

Static *in vitro* digestion model adapted to the older population (60+) (INFOGEST consensus)[1]

Major differences in relation to INFOGEST standard protocol signaled

What is the impact of gastrointestinal tract on the food products?

Nutritional charaterization after gastrointestinal tract simulation

What is the impact of these products on gut microbiota?

GC-FID
Fatty acids quantification and characterization

HPLC-DAD-FLD
Amino acids quantification and characterization

Centesimal composition
Total Protein
Total Fat
Carbohydrates
Ashes
Relative Humidity

Dietary fiber composition (soluble and insoluble) and quantification

Fecal inoculum (Human donors)

Fecal Fermentations with the food formulations

Anaerobic incubation for 48h

Improve the food formulations in test

Improve the food formulations in test

Spreadable Cream

Instant soup/Purée

1. O. Menard, et al. Static *in vitro* digestion model adapted to the general older adult population: an INFOGEST international consensus, *Food and Function* 14 (2023) 4569–4582. **https://doi.org/10.1039/d3fo00535f**.

Expected results

Incorporating protein isolates like pea and chickpea protein powder isolates along with various legumes such as chickpea, pea, and lupin into food formulations can enhance the release of free amino acids and peptides during intestinal digestion. Indeed, legume globulins are expected to be resistant to gastric digestion, being hydrolyzed into peptides and amino acids during the intestinal phase[2]. Thus, digestion-resistant peptides are expected to be detected after intestinal digestion phase. Moreover, the incorporation of cereals such as oats will improve the essential amino acids/ nonessential amino acids ratio[3]. Moreover, considering the presence of different fermentable plant-based dietary fiber, it is expected a prebiotic effect in the human gut microbiota.

2. M. Santos-Hernández, et al. Compared digestibility of plant protein isolates by using the INFOGEST digestion protocol, *Food Research International* 137 (2020). https://doi.org/10.1016/j.foodres.2020.109708.
3. R. Sousa, et al. Protein digestion of different protein sources using the INFOGEST static digestion model, *Food Research International* 130 (2020). https://doi.org/10.1016/j.foodres.2020.108996.

Acknowledgements

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