

PhD Thesis Proposal CIFRE

Metabolic signatures resulting from acute (postprandial) ingestion of yoghurt or milk in humans: effect of age

PhD thesis project

In France, two thirds of the population aged 3-75 years consume dairy products (DPs) every day. In addition, 30 kg of fermented fresh dairy products (FFDPs) are consumed in France per person per year.

Despite these high rates of consumption, it is currently very difficult to establish by conventional biochemical blood tests whether a person has ingested an FFDP or simply a DP, even though these products may have different biological, metabolic and health effects. However, the metabolic footprint left by their consumption might be influenced by the age of the consumer. In the elderly, the processes of digestion, assimilation and metabolism may be impaired compared to those in healthy adults. As a result, a different metabolic signature might appear in the elderly, demonstrating less efficient utilisation and metabolism, and thus different or impaired biological effects.

The two main objectives of this project are:

- To identify the plasma and urinary metabolic signatures resulting from acute (postprandial) ingestion of yoghurt or milk in humans.
- To characterise the metabolic signature following consumption of these dairy products in the elderly, and to compare this with the reference signature (adult); to understand the metabolic mechanisms and pathways involved in the utilisation/production of discriminant metabolites.

These two objectives will be complemented by a third, namely to identify the discriminant metabolites when dairy products and FFDPs are withdrawn for three weeks.

The experimental protocol will therefore be a nutritional intervention in healthy elderly and adult subjects at the Centre de Recherche en Nutrition Humaine d'Auvergne. Classical and clinical biochemical analysis will be carried out within the iMPROVINg team at the Unité de Nutrition Humaine (Clermont-Ferrand, France). The second part of the project will take place at Agroscope (Bern, Switzerland), where metabolomic analysis will be carried out to identify the metabolic signatures and to characterise the biomarkers of DP and FFDP consumption. A third step – data integration – is envisaged at the end of the project.

The doctoral student will participate in developing and conducting the human intervention, as well as in the biochemical and clinical chemistry measurements. He or she will also conduct LC-MS measurements and analysis of LC-MS and GC-MS data (including metabolite identification).

The project will have a term of three years, starting in late 2017 or early 2018.

Candidate profile

The ideal candidate will therefore have a background focusing on biology (biochemistry, nutrition) or analytics (food sciences, analytical chemistry) with a particular interest in the other field. Learning a variety of skills under specialist supervision at the heart of a transdisciplinary project must be a key motivation of the candidate. Knowledge of statistics (univariate, multivariate) is especially desirable. All candidates must have fluency in French and English.



Host laboratories

This CIFRE PhD involves the INRA Unité de Nutrition Humaine (UNH, UMR1019) at Clermont-Ferrand (France), the 'Food Microbial Systems' and 'Method Development and Analytics' Divisions of Agroscope (Bern, Switzerland), the Centre National Interprofessionnel de l'Economie Laitière (CNIEL) and the Syndicat National des Fabricants de Produits Laitiers Frais (Syndifrais). The doctoral student will conduct his or her PhD work at the two host laboratories.

Research partners

Persons responsible: Guy Vergères (Agroscope), Sergio Polakof (UNH, INRA), Dominique Dardevet (UNH, INRA).

Industrial and financial partners

Véronique Fabien-Soulé, General Secretary of Syndifrais and Corinne Marmonier, Head of the Health and Nutrition Research Unit at CNIEL.

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Agroscope

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