Title: Digestibility, anabolic and immunomodulatory properties of plant-based proteins.

Thesis program's description

The use of plant-based foods as legumes in human food constitutes a key element in the food transition. This food transition is associated to a real challenge for protein supply as more than 65% of dietary proteins are of animal origin in Western countries. The ability of a dietary protein to meet the needs of the body and in particular to preserve muscle health depends on its digestibility by the digestive tract but also on its intrinsic amino acid composition. Differences exist between different protein sources, and plant-based proteins have a lower quality due to a low quantity of one or more essential amino acids as well as lower digestibility compared to animal proteins. Their contribution to the preservation of muscle health is therefore a point of attention. However, the use of innovative technological processes on plant proteins could likely have an impact on the bioavailability or quality of the amino acids produced, and ultimately on their physiological properties.
The objective of the thesis is to explore the health effects of digested pea and fava bean proteins. Given the crucial role of amino acids resulting from digestion in regulating muscle metabolism, the anabolic capacity of digested proteins will be evaluated using co-cultures of human intestinal and muscle cells. Intestinal cells will be exposed to digested proteins and the activation of different markers of muscle protein synthesis (Akt, S6, mTOR, 4EBP, etc.) as well as myotube morphology will be assessed. Potential bioactive peptides resulting from the digestion of plant proteins will be identify using peptidomic analyzes. Beyond their effects on muscle, numerous recent studies indicate that plant-based proteins can impact the immune system, potentially exhibiting anti- or pro-inflammatory effects and even inducing allergies. During this project, immune cells (lymphocytes and macrophages) will be exposed to plant-based digested proteins to study their impact on the host's immune system polarization and inflammation response.
In summary, these analyzes will enable us to predict the consequences of consuming plant-based proteins on muscle health and their potential pro- or anti-inflammatory effect.

Start date: October 1, 2024

Key words: plant-based protein, muscle, anabolic properties, immunity, inflammatory effect, digestion
Skills: *in-vitro* digestion, cell culture (not mandatory)
Eligibility conditions: Master 2 level in research, average above 12 and ranking in the first half of the promotion.

Workplace: Faculté de médecine/pharmacie de Clermont-Ferrand, FRANCE
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Application Deadline: July 26, 2024

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