Developmental Programming of Muscle Health: Impact of a Maternal Fiber- and Polyphenol-Rich Diet on Microbiota, Immunity, and Epigenetics

Offer description

This full-time thesis will be conducted at PhyMedExp, University of Montpellier (Karen Lambert), and in collaboration with the Department of Biochemistry and Physiology, University of Barcelona (Francisco Perez Cano).

Rationale of the thesis

The Developmental Origins of Health and Disease (DOHaD) hypothesis refers to the influence of environmental factors during both in utero and postnatal developmental stages on the risk of developing chronic diseases later in life (1). This hypothesis has been proposed to explain the current disease burden faced by our society from an evolutionary perspective (2).

More than 150 million EU citizens suffer from chronic allergic diseases, half of whom are underdiagnosed or poorly managed, highlighting a major public health issue that needs to be urgently addressed (3).

In this context, several dietary interventions, such as the Mediterranean diet, have been shown to prevent or manage allergies in adults, notably through their ability to modulate gut microbiota composition and immune responses. Polyphenols, in particular, are known to exert both microbiota-modulating and immunomodulatory effects (4).

We have previously demonstrated that polyphenols, at nutritional doses, can increase muscle mass and reduce chronic inflammation (5). In addition, offspring muscle metabolism is known to be influenced by maternal diet (6). Furthermore, alterations in the immune system, whether associated with dysbiosis or increased intestinal permeability, have recently been linked to musculoskeletal consequences (7). Since muscle health plays a central role in the prevention of many chronic diseases, it is essential to better understand the impact of a maternal Mediterranean diet rich in fiber and polyphenols (FP) on muscle metabolism and function in the offspring.

The main objective of this thesis is therefore to establish the impact and underlying programming mechanisms of an FP-enriched maternal diet on epigenetic regulation, neonatal immune development, and the prevention of muscle and metabolic alterations later in life.

We hypothesize that maternal FP intake induces long-term metabolic and immune programming through microbiota-mediated and epigenetic mechanisms affecting muscle function in offspring.

Specific objectives

1a. To analyse changes in muscle function and metabolism in both offspring and mothers following the FP diet.
1b. To assess the impact of maternal FP dietary intervention on the microbiota–gut–muscle axis in the offspring.
1c. To determine the epigenetic programming effects of the maternal FP diet in male and female offspring.

Job Information

Full-time PhD
The gross monthly salary is €2,300
Contract duration: 3 years
Contract date from 01/09/2026 to 31/08/2029

Where to apply

E-mail : karen.lambert-cordillac@umontpellier.fr
Application Deadline : 6 June 2026 - 23:59 (Europe/Paris)

Skills/Qualifications

- Master's degree (or equivalent) in Molecular biology, Nutrition, Physiology, Health Biology, Sports Science with a specialisation in exercise physiology and energy metabolism.
- Technical skills: Proficiency in basic techniques in molecular biology and biochemistry (Western blot, RT-qPCR, histology). Experiences in bioinformatics or exercise physiology (exercise testing, calorimetry) are desirable. Skills in animal experimentation are a major asset.
- Analytical skills: Ability to process and analyse complex biological and physiological data.
- Personal qualities: Scientific rigour, intellectual curiosity, ability to work within a multidisciplinary team (researchers, clinicians, biochemists) and to manage various aspects of a research project. Good written and oral communication skills in French and English.

Additional Information

Selection process

The application must include the following:

- A CV
- A cover letter
- A copy of the qualification required for enrolment or, failing that, the most recent transcripts from the second year of the Master's degree (semester 1 and/or semester 2) with ranking in the Master's program, and any awards or distinctions.

After a preliminary selection based on applications, candidates will be interviewed by a selection committee in June.

Please send your application to the email addresses of the thesis supervisor:

Prof. Karen Lambert Cordillac (karen.lambert-cordillac@umontpellier.fr),

References :

1. Hanson MA, Gluckman PD. Early developmental conditioning of later health and disease: physiology or pathophysiology? Physiol Rev. 2014;94(4):1027–19. doi:10.1152/physrev.00029.2013.
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6. Simar D, Chen H, Lambert K, Mercier J, Morris MJ. Interaction between maternal obesity and post-natal over-nutrition on skeletal muscle metabolism. Nutr Metab Cardiovasc Dis. 2012 Mar;22(3):269-76. doi: 10.1016/j.numecd.2010.11.007. Epub 2011 Jan 3. PMID: 21208789.
7. Migliorini F, Simeone F, Schäfer L, Katusic D, Vaishya R, Memminger MK. Musculoskeletal consequences of coeliac disease. Eur J Med Res. 2026 Mar 5. doi: 10.1186/s40001-026-04010-x. Epub ahead of print. PMID: 41787590.