Supervisor Project Idea

Supervisor

Insert a brief CV and/or external link, the total number of publications, the ORCID link, 5 of the most significant/recent publications, and a list of funded projects and awards. max 300 words

Current Position (since 2015): Associate Professor of Human Anatomy.
Bachelor's degree in science (University of Ancona), Master in Science (University of Windsor, Ontario, Canada) and PhD in Neuroscience (UNIVPM). The main area of expertise is related to the study of molecular mechanisms involved in the control of energy balance. This includes central mechanisms of action in the hypothalamus but also peripheral signaling pathways in adipose tissue, muscle, and liver. I am interested in the biology of adipose tissue in physiological as well as in pathological conditions such as obesity and diabetes. Associate Editor Frontiers in Cell and Developmental Biology, Editorial board member in Biomolecules. Guest Editor of 2 special issues for IJMS; ad Hoc Reviewer for Nature Communication; Journal of Lipid research; Journal of Clinical Endocrinology and Metabolism. Memberships of Italian Society of Anatomy and Histology and Italian Society for the Study of Obesity. Currently I teach Human Anatomy for students of Biological Sciences and Nutrition and Metabolism for students enrolled in the degree of Human Nutrition. Invited speaker in about 20 National and International congress organized by scientific associations working in the field of obesity and metabolic disorders.
Author of 66 peer-reviewed publications in international journals and book chapters; h index= 37; 6500 citations (from Scopus). h-index: 39; i10-index: 51; citations 9400 (Google Schoolar).
Orcid profile: https://orcid.org/0000-0002-7381-4107

Significant and recent publications:

Sahu BS et al., (2023). Mol Metabolism 76:101781;
Lyons CE et al., (2020). FASEB J. 34(2):2765-2773;
de Jong JMA et al., (2019). Nature Metabolism 1(8):830-843;
Pellegrinelli et al., (2018). Nat Communication 26;9(1):4974;
Frontini A and Cinti S (2010). Cell Metabolism 11(4):253-6.

Founded projects:

- Scientific expert on FP7-DIABAT
- PI grant by Ethicon endo-surgery (Johnson&Johnson Med Tech)
- RSA by Università Politecnica delle Marche.
- Awarded by FFABR (2017) by MIUR

Research Group Description

Morpho-functional laboratory and the Q-Lab, Department of Life and Environmental Sciences (DiSVA). The working unit is composed by 2 Associate Professors, 1 Assistant professors, 2 Postdocs and 2 PhD. Research efforts of our team are primarily concerned with the role of mitochondrial dysfunction and oxidative stress in models of aging and degenerative disease. The working unit has a multidisciplinary expertise ranging from analytical biochemistry for the quantification of small molecular weight bioactive molecules in food and biological specimens to bioavailability assessment as well as to the histochemical and physiological analysis of muscle, adipose and nervous tissues. The group has created preclinical stress and senescence models to investigate the efficacy of bioactive substances such as nutrients, with particular attention to those targeting mitochondrial function, in enhancing cellular health and delaying the senescence phenotype. Adipose tissue health, skeletal muscle function and sarcopenia, endothelial functionality, and neurodegenerative process of the nerve cells have all received attention. These molecular pathways have also been explored in several clinical research in humans and animal models. The group has access to an HPLC facility equipped with UV/VIS, electrochemical, fluorometric, and chemiluminescent detectors. Cell culture systems, complemented by a wide range of cytometric and molecular biology tools, including fully automated extraction and expression analysis systems for protein and nucleic acids. We co-coordinate the activities of the advanced microscopy laboratory, equipped with an image-based flow cytometer (Flowsight), Nikon AR1 Confocal Microscope and High-throughput Automated Microscope (Agilent)

Title and goals

Provide the title of the topic and a short summary of the project idea. max 200 words

The project Nutrition and integrate metabolism in aging (NUMAGE) is designed to study the adaptations induced by exercise and nutritional factors, stimuli which may have important implications in the protection from metabolic and neurodegenerative age-associated disorders. To this purpose, the first objective will be the development of different co-culture systems, such as muscle/neurons, muscle/adipocytes and neurons/glia.
The following research objectives will be addressed, aimed at contributing to healthy aging:
1. to detail the molecular mechanisms underlying the combination of physical exercise and nutrients on the modulation of mitochondrial plasticity, improving biogenesis, respiration and consequently fatty acid oxidation and aerobic performance, and indirectly also affecting brain cells.
2. to investigate the molecular mechanisms underlying myelin production and regeneration.
3. to evaluate the role of exercise-induced EVs on adipocytes biology. We'll analyze if oxidative stress and pro-inflammatory conditions can be modulated to curb the development of insulin resistance in sarcopenic obesity.
The project is expected to have impacts in providing new insights on the molecular adaptation, in the young as well as in the senescent cells, underlying physical exercise, brain functionality, and adipose tissue metabolism. Identification of optimal exercise protocols and nutrients combination will provide useful insight on optimizing health at advanced age and achieve a successful ageing.

Contact details (*including email address of the supervisor*)

Department of Life and Environmental Sciences (DISVA), Università Politecnica delle Marche, via Brecce Bianche, 60131 Monte d'ago (Ancona). a.frontini@univpm.it