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

Antonio Giordano is a Medical Doctor who obtained the Specialization in Psychiatry in 1995 and the PhD in Neuroscience in 1999. He is currently Full Professor of Human Anatomy and is author of over 150 scientific publications in the fields of health and life sciences including full papers, monographs, book chapters, and congress communications and abstracts. In particular, he is author of over 90 full papers published in international peer-reviewed journals. The mean impact factor for each scientific publication is over 7. In February 2024, the number of citations was about 5,835 by Google Scholar and about 4,119 by Scopus and the h-index is 38 by Google Scholar and 33 by Scopus.
ORCID : https://orcid.org/0000-0003-1401-5855

Most recent/relevant publications

5) Severi et al. (2024) Activation of a non-neural cholinergic system in visceral white adipose tissues of obese mice and humans. *Molecular Metabolism* 79:101862.

4) Emont et al. (2022) A single-cell atlas of human and mouse white adipose tissue. *Nature* 603:926-933.

3) Colleluori et al. (2022) Early Life Stress, Brain Development, and Obesity Risk: Is Oxytocin the Missing Link? *Cells* 11:623.

2) Sun et al. (2020) snRNA-seq reveals a subpopulation of adipocytes that regulates thermogenesis. *Nature* 587:98-102.

1) Venema et al. (2020) Ciliary Neurotrophic Factor Acts on Distinctive Hypothalamic Arcuate Neurons and Promotes Leptin Entry Into and Action on the Mouse Hypothalamus. *Frontiers in Cellular Neuroscience* 14:140.

Recent funded projects

2014-2022 PSR Marche, PI: Innovation in dairy production using A2A2 milk and assessment of beneficial effects on human health (60.000,00 Euro)

2019-2021 Cariverona, PI: The ciliary neurotrophic factor: a possible novel regulator of body weight and energy balance in mammals (300.000,00 Euro)

2017-2020 PRIN, MIUR, Local Coordinator: Mechanisms of adipose tissue dysfunction in obesity: a target of future weight loss strategies for the prevention of diabetes and cardiovascular diseases (149.984,00 Euro)

2022-2023 Foundation of Molecular Medicine and Cellular Therapy, Ancona, Italy; PI: Role of oxytocin and leptin on proneness to develop obesity after early post-natal stress (20.000,00 Euro)

Research Group Description

Provide the name the reference department and a brief description of the research group, including external links, and available instrumentations and infrastructures. max 300 words

The research group works in the Department of Experimental and Clinical Medicine, Università Politecnica delle Marche, Ancona, Italy, and is currently composed by 2 assistant professors, 1 postdoctoral fellow, 1 PhD student and 1 laboratory technician. Since 1996, Giordano's research has been focused on the study of the functional anatomy of mammalian white and brown adipose tissue in normal and pathological conditions (obesity, type 2 diabetes, dyslipidemia, and hypertension) at the gross, histological and ultrastructural levels. However, over the past few years, Giordano's research work has also involved the central nervous system, specifically the centers regulating energy balance and metabolism in adulthood and during postnatal development. The research group has strong experience in the use of morphological techniques - in particular unbiased stereology, morphometry, immunohistochemistry, immunofluorescence, confocal microscopy, fluorescent in situ hybridization, transmission electron microscopy and high-resolution scanning electron microscopy – for the study of brain and peripheral organs, from experimental animals or humans. The group has also an established expertise in the conduction of *in vitro* studies on mouse and human primary and secondary (hMADS) cell cultures. We have 3 transgenic mice colonies (CNTF-/-, POMC;Cre-GFP and NPY;Cre-GPF) and C576BL/6 mice. Human samples are usually provided by the surgery unit, which together to the Giordano's group, belongs to the Interdepartmental Center for the Study and Research on Obesity.

Available instrumentation includes a Philips CM10 Transmission Electron Microscope, a Leica TCS-SL confocal microscope, a StepOnePlus RT-PCR system, a cryostat, a hybridizer, vibratomes, inverted microscopes for cell culture studies and an ELISA plate reader. Laboratories are equipped for all instruments, reagents, and consumables necessary to perform gene and protein expression studies; immunohistochemical and *in situ* hybridization studies on paraffin embedded tissues, cryostat sections and free-floating brain sections; ultrastructural studies from tissues and cells; pre- and post-embedding immunoelectron microscopy; functional studies in cultured cells; and mouse metabolic and inflammatory assessments (ITT, GTT, HOMA index, etc.).

Title and goals

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

THE IMPACT OF EARLY LIFE STRESS ON THE VULNERABILITY TO OBESITY

Environmental stimuli acting during critical periods of postnatal development permanently shape individual behavior and metabolism; early life stress (ELS) is associated with overweight and obesity in humans and animal models, however, how it impacts the development of white and brown adipose tissues and the circuitry regulating energy balance needs to be elucidated. ELS reduces plasma levels of two important energy balance modulators: oxytocin (Oxt), a neurohormone released by hypothalamic nuclei, and leptin (Lep), a fat-derived hormone. Both induce satiety and hold central and peripheral differentiative functions during early post-natal life. Importantly, Lep anorectic effect is in part mediated by Oxt. The main study hypothesis is that ELS increases the vulnerability to obesity in adulthood permanently shaping the development of: i) adipose tissues, ii) neural circuitry regulating feeding behavior, and iii) the Lep and Oxt systems and their reciprocal interaction.

In this project, C57BL/6 mice exposed to ELS consisting of limited bedding and or to ELS plus high-fat diet in adulthood will be used to establish the ELS effect on obesity vulnerability in adulthood. To this end we will mainly employ our expertise in the performance of morphological studies, but also perform behavioral and molecular biology assessments.

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

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