RESEARCH TOPIC MECM_16

Identification of heart secreted factors underlying systemic metabolic changes in heart failure

Curriculum
MECM Standard

Research Area
Cardio

Laboratory name
Circadian Metabolism Lab

Research Supervisor
Prof. Carolina Magdalen Greco carolina.greco@hunimed.eu

Abstract
Heart failure (HF), the ultimate outcome of many cardiovascular pathologies, imposes a significant global health and economic
burden while remaining associated with high mortality rates. Most HF research has focused on the pathophysiology of the heart, only partially covering the role of non-cardiac organs, despite HF being a complex multiorgan syndrome. The extent to which extra-cardiac organs, particularly those playing a key role in metabolism control, contribute to HF remains largely unknown. Importantly, our metabolism is temporally coordinated across tissues by the circadian clock system, which orchestrates myriad of physiological and metabolic processes. Our recent work has highlighted the significance of peripheral tissue-tissue communication for daily metabolic homeostasis. Combining multi-disciplinary approaches, we aim to 1) dissect systemic diurnal metabolic changes throughout the progression of heart failure; 2) identify and functionally screen cardiac-secreted factors capable of regulating circadian whole-body metabolism.

Main technical approaches
The project offers a multidisciplinary training, integrating metabolic and cardiac phenotyping with various omics approaches (RNA-seq, ATAC-seq, metabolomics, proteomics). The ideal candidate will have experience in cell culture and molecular biology.

Scientific references
1. Capone F, et al. “Decoding the Liver-Heart Axis in Cardiometabolic Diseases”. Circulation Research 2025

2. Caputo R, Greco CM. “Circadian rhythms and cardiac physiology: An essential interplay.” International Review of Cell and Molecular Biology 2024

3. Panico C, et al. “Single-Cell RNA Sequencing Reveals Metabolic Stress-Dependent Activation of Cardiac Macrophages in a Model of Dyslipidemia-Induced Diastolic Dysfunction. Circulation. 2024

4. Carolina M. Greco, et al. “Integration of Feeding Behavior by the Liver Circadian Clock Reveals Network Dependency of Metabolic Rhythms” Science Advances 24;7(39) 2021

Type of contract

PhD scholarship of € 21.000 gross per year awarded by Humanitas University. This sum is exempt from IRPEF income tax according to the provisions of art. 4 of Law no. 476 of 13th August 1984 and is subject to social security contributions according to the provisions of art. 2, section 26 and subsequent sections, of Law no. 335 of 8th August 1995 and subsequent modifications.

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Humanitas University – Via Rita Levi Montalcini, 4 – 20072 Pieve Emanuele (MI) Italy
CF 97692990159 – Tel. 02.8224.3777 – info@hunimed.eu – hunimed.eu