INSTITUTO DE INGENIERÍA
BIOLÓGICA Y MÉDICA
PONTIFICIA UNIVERSIDAD CATÓLICA DE CHILE

IIBM extraordinary-Seminar
"Computational Modeling of Engineered Heart Microtissues"

Javiera Jilberto Vallejos
Ph.D. in Biomedical Engineering and Scientific Computing
University of Michigan

Wednesday 4th January 2023 - 13:00h - Lunch included
Hybrid Seminar – Sala C-306 Const. Civil
Zoom link: Contact **secretariaiibm@uc.cl**

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"Computational Modeling of Engineered Heart Microtissues"

Overview:

Cardiac tissue engineering enables the in-vitro study of diseases and drug therapy in patient-specific tissues. However, developing engineered heart tissues (EHTs) that resemble adult heart tissue remains a challenge due, in part, to our incomplete understanding of the mechanobiology of these constructs. This challenge is further exacerbated by the fact that changing extracellular matrix structure and composition, as well as varying cardiomyocyte formation within EHTs, is left to be deciphered through single measures of twitch force. To decode the mechanobiology of EHTs, we developed a data-driven computational modeling pipeline to study how the mechanics drive tissue maturity. The experimental data were obtained from a mechanically tunable fibroTUG setup, where cells are seeded on top of a fibrous substrate suspended between two flexible posts. Using image processing techniques, we built finite element models of the microtissues and used them to quantify the active stress that cardiomyocytes generate under different mechanical environments. We further use the computational models to simulate non-experimental conditions that allow us to study the importance of each structural characteristic (fiber alignment, fiber orientation, sarcomere alignment) and its impact on the microtissue's ability to generate force.