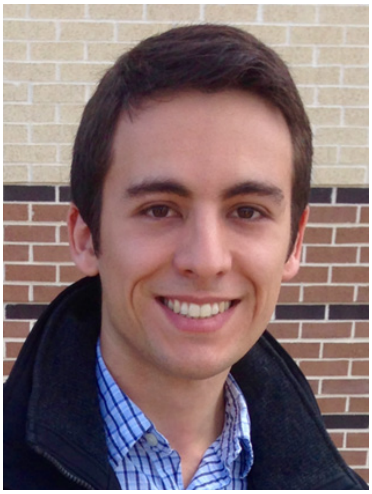
CARNEGIE MELLON UNIVERSITY
BME 2023 SPRING SEMINAR SERIES

Predictive Multiscale Models of Cardiovascular Biomechanics and Mechanobiology



PRESENTED BY

Bruno V. Rego
Postdoctoral Associate
Department of Biomedical Engineering
Yale University

SCHEDULE

Hall of Arts (HOA) 160

Thursday,
March 16, 2023
(11:00AM-12:00PM)

Cardiovascular tissues bear dynamic loads and must adapt to preserve their function, a process continually governed by tissue-resident cells and influenced by immune cell infiltration. While progress has been made over recent decades to better understand the biomechanical and mechanobiological mechanisms underpinning the maintenance and adaptation of cardiovascular tissues, long-term clinical outcomes of disease (e.g., myocardial infarction, congenital defects, aneurysms/dissections) and therapies (e.g., surgery, medication) remain difficult to predict. It is thus vital to further elucidate how the structure and function of cardiovascular tissues are mediated via mechanotransduction and subsequent remodeling of the extracellular matrix to promote homeostasis or understand its loss. Moreover, while individual tissues are mostly studied in isolation, there is a critical need to model subsets of the cardiovascular system as unified biomechanical units to improve prognostic and therapeutic predictions, particularly in pathologies that involve multiple tissue types. In this seminar, I will present an overview of recent and ongoing efforts to construct mathematical and computational models that span the cellular, tissue, and organ scales with the goal of predicting cardiovascular growth and remodeling under both normal and diseased conditions. Clinical applications in personalized medicine will be highlighted, as well as potential future directions.

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