FIU Engineering & Computing
Department of Biomedical Engineering

Wallace H. Coulter Foundation
Biomedical Engineering Seminar Series

KARTIK BALACHANDRAN, PHD, received his bachelor's degree in Mechanical Engineering from the National University of Singapore, and his master's degree in Mechanical Engineering and Ph.D. in Bioengineering from Georgia Institute of Technology. His primary expertise is in mechanobiology, mechanics, structure-function relationships, and organ-chip engineering. His research group is interested in how altered mechanics and structure contributes to the biological progression of cardiovascular, neurovascular and epithelial diseases, and how this knowledge can be utilized to develop therapeutic strategies and early disease detection strategies. His research is funded by NIH, NSF and the DoD. He joined the University of Arkansas in 2012, where he is currently Professor and Graduate Program Director in the Department of Biomedical Engineering.

2/16/24

Dr. Kartik Balachandran

Professor of Biomedical Engineering

University of Arkansas

Friday, February 16th | 9:00 AM | MMC, PVH 100

Label-free Assessment of Early Calcific Aortic Valve Disease Progression – The Role of Altered Metabolism

ABSTRACT: Calcific aortic valve disease (CAVD), represents the most prevalent form of valvular heart disease, comprising about 40% of all valve disease cases. It is also the most common indication for valve replacement surgery. CAVD patients have approximately a 50% increase in risk of death from cardiovascular causes. There are currently no therapeutic strategies to treat CAVD – surgical intervention is the only option. The lack of cellular biomarkers of disease progression, as well as the lack of effective human cell-based benchtop, or animal models, limit our ability to develop effective drug treatments or intervene at an early stage of CAVD. We recently demonstrated that cellular activation and proliferation within valvular cells occurring during CAVD progression correlated with altered optical metabolic redox ratio of the ratio of flavin adenine and nicotinamide (FAD and NADH) dinucleotides (FAD/FAD + NADH), measured by label-free multiphoton microscopy. In this talk, I will go over this work that our group has done to elucidate how label-free metrics derived via multiphoton microscopy correlate with early progression of CAVD in two-/three-dimensional organ-on-chip in vitro models, and in vivo models.

Through the generous support of the Wallace H. Coulter Foundation, the Department of Biomedical Engineering facilitates weekly lectures each year during academic terms. Experts in all areas of Biomedical Engineering are invited to provide a research seminar and to meet with faculty and students to discuss the latest developments and research in Biomedical Engineering.

Friday, February 16th, 2024 | 9:00AM - 10:00AM | MMC, PVH 100
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