Announcing the Final Examination of Dilshan Ranadewa for the degree of Master of Science

Time & Location: April 5, 2019 at 9:00 AM in Engineering 1 381J
Title: Altering Endothelial Cell-Cell Junctions Through Fluid Shear

Variable blood flow regimes influence a range of cellular properties ranging from cell orientation, shape, and permeability, which are dependent on endothelial cell-cell junctions. In fact, cell-cell junctions have shown to be an integral part of vascular homeostasis through the endothelium by allowing intercellular signaling and passage control through tight junctions (TJs), adherens junctions (AJs) and gap junctions (GJs). It was our objective to determine the structural response of both AJs and TJs under steady and oscillatory flow. Human brain microvascular endothelial cells (HBMECs) were cultured in a parallel plate flow chamber and exposed to separate trails of steady and oscillatory fluid shear stress for 24 hours. Steady flow regimes consisted of a low laminar flow (LLF) of 1 dyne/cm2, a high laminar flow (HLF) of 10 dyne/cm2 and oscillatory flow regimes consisted of low oscillatory flow (LOF) +/- 1 dyne/cm2 and high oscillatory flow (HLF) of +/- 10 dyne/cm2. We then imaged the TJs ZO-1 & Claudin-5 and AJs JAM-A & VE-Cadherin and subsequently analyzed their structural response as a function of pixel intensity. Our findings revealed an increase in pixel intensity between LLF and LOF along the boundary of the cells in both TJs ZO-1 & Claudin5. Therefore, our results demonstrate the variable response of different cell-cell junctional structure and reorganization among steady and oscillatory flow regimes.

Major: Mechanical Engineering

Educational Career:
Bachelor's of Mechanical Engineering , BS, 2016, University of Central Florida

Committee in Charge:
Robert Steward, Chair, Mechanical & Aerospace Engineering
Jihua Gou, Mechanical & Aerospace Engineering
Hansen Mansy, Mechanical & Aerospace Engineering

Approved for distribution by Robert Steward, Committee Chair, on March 22, 2019.

The public is welcome to attend.