The Effects of Oscillatory Shear Regulation on Paracrine Signaling Between Vascular Endothelial Cells and Vascular Smooth Muscle Cells

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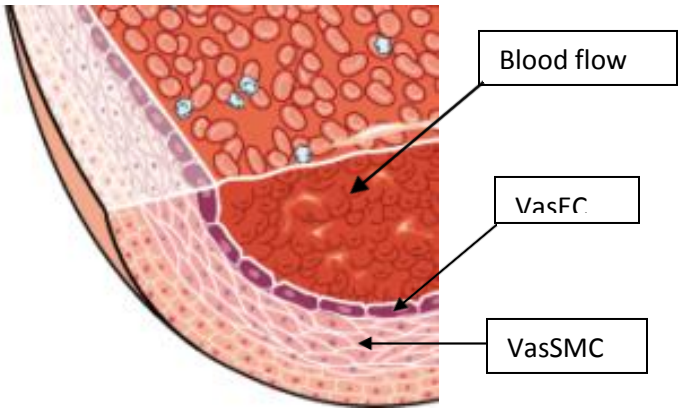
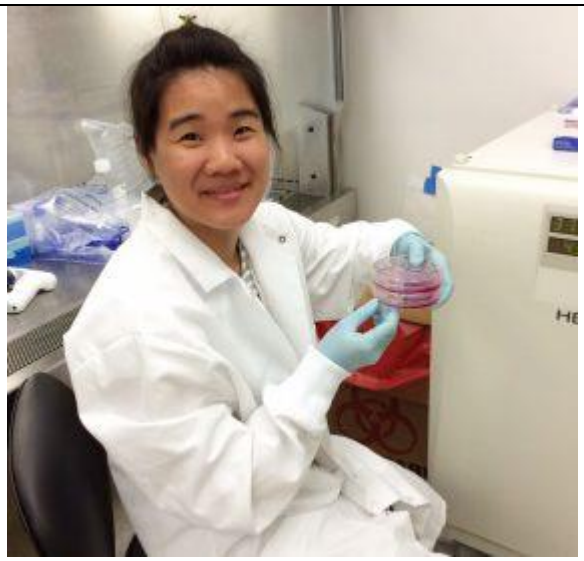
Figures





Student's picture

Abstract (200 words)

The vascular wall consists of a layer of vascular endothelial cells (VasEC) and a sublayer of vascular smooth muscle cells (VasSMC). Vascular remodeling often involves paracrine signaling between VasECs and VasSMCs and diseases such as calcification can result from improper communication between these cells. Various oscillatory flow profiles alter cell responses to its immediate environment via both cell-to-cell paracrine and autocrine communication. Different flow groups experienced by VasECs may lead to the secretin of factors that enable paracrine regulation of VasSMC's phenotype. There may be a range of oscillations that maintains vascular tissue integrity. In this study, we conditioned VasECs under various specific oscillatory flow profiles quantified by the oscillatory shear index (OSI) parameter. With this parameter, we are able to determine the most suitable physiological relevant pulsatile flow conditions for valve tissue maintenance and development by assessing the cell phenotype. Oscillation dependent changes in vascular cell communication and molecular regulation have not been thoroughly investigated, we therefore would like to examine the paracrine signaling of biochemical end-products between VasECs and its sublayer, VasSMCs through the biochemical environment resulting from physiologically relevant oscillations.