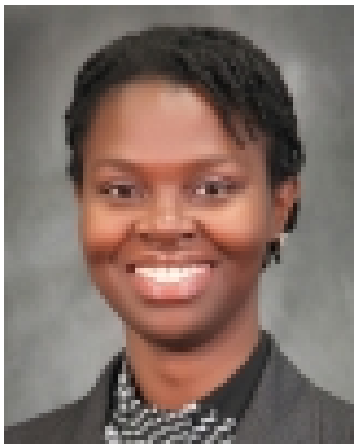
University of Houston - Biomedical Engineering Seminar
Friday, September 6, 2019 Noon, Rm 204 SEC

Microdevices in Cardiovascular Diseases



Professor Renita Horton

Abstract

Traditional *in vitro* studies poorly recapitulate properties of the native *in vivo* microenvironment. Creating *in vitro* systems capable of mimicking features such as tissue architecture, shear, and cell-cell interactions may prove beneficial in studying disease mechanisms and identifying novel therapeutics. Further, these models can serve as testbeds for drug efficacy and toxicity assays. We seek to build physiologically relevant models to investigate cardiac-related disease mechanisms.

We previously designed a cardiac dysfunction model using engineered cardiac tissues and angiotensin II (ANG II), a peptide involved in cardiac remodeling, growth, and apoptosis. Dysregulation of ANG II has been associated with hypertension, hypertrophy, and heart failure. We questioned whether exposing engineered cardiac tissues to ANG II would induce disease features in our model. We found that ANG II exposure led to functional decline in the engineered tissues evident by depressed contractile stress generation and elevated early after depolarization events. ANG II tissues also exhibited the reactivation of fetal related genes. The goal of this study was to demonstrate that our system could effectively recapitulate features of cardiac dysfunction by testing the effects of ANG II on the structure, function and pathological remodeling of engineered cardiac tissues. We are now expanding our focus to investigate the effect of chronic diseases on heart health.

Biosketch

Dr. Renita E. Horton is an assistant professor in Biomedical Engineering department at the University of Houston where she is the director of the Cardiovascular Tissue Engineering Laboratory. She received her Ph.D. in Engineering Sciences with an emphasis in Biomedical Engineering from the John A. Paulson School of Engineering and Applied Sciences at Harvard University. She completed a postdoctoral fellowship at the Wyss Institute for Biologically Inspired Engineering in Boston.

Horton's graduate and postdoctoral work focused on understanding the role of microenvironmental cues in heart development and heart disease. During her studies, she investigated the effect of extracellular matrix presentation and oxygen levels on cardiogenesis in human embryonic stem cells. She also examined work on organs-on-chip based disease models. Currently, her team focuses on designing organs-on-chip models to investigate cardiovascular related disease mechanisms, chronic diseases, and sickle cell disease. Horton is a member of the Biomedical Engineering Society, American Society of Hematology, and the American Heart Association.