

Thesis Portfolio

Sex Differences in Human Aortic Smooth Muscle Cell Phenotypes

(Technical Report)

Racism and Trust in American Healthcare and Biomedical Research

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science
University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree
Bachelor of Science, School of Engineering

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Spring, 2021

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Sociotechnical Synthesis

Coronary Artery Disease (CAD) is a substantial contributor to the fatalities accounted for by heart disease and has various environmental, lifestyle, and genetic factors that increase disease risk. Sex differences have been investigated as a significant determinant of disease incidence, prevalence, morbidity, and mortality for many diseases. However, sex differences as related to CAD have not yet been investigated. The proposed project will utilize systems genetics and bioinformatics to investigate differentially expressed genes (DEGs) in males and females that are associated with CAD using a unique cohort of human aortic smooth muscle cell (huASMC) RNA sequencing (RNA-seq) datasets. Investigations of the effect of sex on the SMC phenotypes including migration, proliferation, and calcification, which contribute to disease development and pathogenesis will additionally be investigated.

Heart disease disproportionately affects African Americans in the United States. Historically, due to the racism and discrimination present in the American healthcare and biomedical research system, deep-rooted mistrust has developed between the Black American community and the medical system.

In this two-part thesis, I will be investigating the racial aspects of healthcare and biomedical research as associated with the Black American community in the STS portion, while investigating the sex-specific aspects of CAD through differential gene expression in the technical portion. The investigation in the STS portion of the thesis will expand further than CAD and will look at racism as a whole in the United States health system. Additionally, the results of the technical portion of the thesis may aid future research into discovering more specific methods to address CAD to improve the lives of many affected individuals.