Faculty Name:

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Faculty Email:

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Lab:

Laboratory for Stem Cells and Tissue Engineering

Project Title:

Characterization of fibrotic responses in a human tissue engineered model of myocardial ischemia reperfusion injury

Description:

Ischemic heart disease is one of the leading causes of death and disability worldwide, but few therapeutic options exist to protect the myocardium during an acute myocardial infarction (MI). Although timely mechanical reperfusion is necessary to prevent necrosis of the entire area at risk, reperfusion itself causes cellular injury beyond that of the initial ischemic insult, eventually contributing to pathological remodeling and heart failure. Mitigating this so-called ischemia reperfusion injury (IRI) is a promising therapeutic focus to maximize the amount heart tissue that can survive MI and minimize the pathology during remodeling. Therapeutic development, however, is hindered by the lack of in vitro, human-specific models of IRI that can be used experimentally to gain insight into disease pathogenesis and to test candidate interventions. The Vunjak-Novakovic laboratory is developing an iPSC-derived tissue engineered model of IRI to meet this need that recapitulates both the acute effects of IRI and the longer-term remodeling. A major component of this development is characterizing the profibrotic responses of the model following IRI to ensure biological fidelity and to study the mechanisms leading to remodeling. The goal of this summer project is to conduct such characterization. We will first characterize the fibrotic changes that do occur in the model using a variety of techniques, including contractility measurements, mechanical testing, and immunohistochemical staining, and then compare these with clinical benchmarks. Gene expression studies and transcriptomics will then be leveraged to investigate the mechanisms that drive such changes, and these findings will be compared to those gleaned from animal models. This project will contribute significantly to validating the engineered model and to generating hypotheses for therapeutic interventions.

Location of Research:

On-Site

# of hrs/week:

35

Department/Program:

Biomedical Engineering

Eligibility:

MS

To apply, please contact:

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