EFFECT OF CYCLIC STRAIN ON ADIPOSE-DERIVED STEM CELLS

LABORATORY: Taby Ahsan, Ph.D. (Principal Investigator/Factuly Advisor)
Assistant Professor, Tulane University
Department of Biomedical Engineering
Lindy Boggs Center, Suite 500
New Orleans, LA 70118
office: (504) 865-5899
email: tahsan@tulane.edu
website: www.tulane.edu/~tahsan

OVERVIEW OF RESEARCH

Stem cells, like all cells, are influenced by their microenvironment, including both chemical and physical cues. In vitro, these cues can serve to influence stem cell fate (e.g., maintain stem cells undifferentiated or promote differentiation along a pathway) and/or to facilitate regenerative medicine applications (e.g., expand stem cells to large numbers or promote uniformly differentiated populations). Until now, chemical cues, such as soluble factors and substrate coatings, have been the primary means by which stem cell self-renewal and differentiation have been influenced. Recent efforts have begun focusing on controlling the cellular microenvironment by applying controlled and well-defined physical forces. This project will focus on the effects of applied cyclic tensile strain on adipose-derived stem cells.

PROJECT OBJECTIVES

1) Learn to culture and expand adipose-derived stem cells.
2) Learn to use the fluorescent LIVE/DEAD assessment (to assess for cellular viability)
3) Learn real time PCR to detect changes in mRNA expression (indicative of phenotype).
4) Determine the effect of culture on Fibronectin and Collagen type I-coated silicone on adipose-derived stem cell viability and phenotype.
5) Determine the effect of 10% cyclic strain at 0.1 and 1 Hz on cellular viability and phenotype of adipose-derived stem cells on protein-coated silicone.

At the end of the summer program, the student will be able to culture stem cells, assess for biological markers, and apply mechanical cues to stem cells.

PREREQUISITES

No technical prerequisites, but the student needs to be responsible, meticulous, and scientifically curious.