University of Houston

Department of Biomedical Engineering

In Partial Fulfilment of the Requirements for the Degree of
Doctor of Philosophy

Nikita Patel

Will defend her dissertation

Bioengineering A Three-Dimensional Cardiac Left Ventricle

Abstract

Hypoplastic left heart syndrome is a congenital condition characterized by an underdeveloped left ventricle. The current treatment options are surgery and/or heart transplant. Current tissue engineering strategies focus on graft models. The development of an engineered 3D cardiac left ventricle would provide a therapeutic option to overcome current treatment limitations.

A series of five *in vitro* models were developed, in order to bioengineer a 3D cardiac left ventricle. Initially, the ideal material platform was studied, to produce the acellular ventricular extracellular matrix (AVEM) model. A synthetic model of the left ventricle chamber was developed to emulate left ventricle geometry and architecture; the Bioengineered Open Ventricle (BEOV) model. The BEOV model was optimized with using the two-stage perfusion cultured ventricle (TPCV) model and the pulsatile flow conditioned ventricle (PFCV) model. Finally, we developed a bioengineered trileaflet valve, to produce the Bioengineered Complete Ventricle (BECV) model.

This thesis defense will review the development of the five bioengineered models, and summarize the future of this work both in hypoplastic left heart syndrome and in the field of tissue engineering.

Date: Monday, 23rd March 2015

Time: 10:00am

Place: SERC, Second Floor, SmartBoard Room

Faculty, Students and the general public are invited

Advisor: Dr. Ravi K. Birla