THE UNIVERSITY OF ARIZONA
COLLEGE OF ENGINEERING

Biomedical Engineering

BME is proud to announce the Doctoral Defense of

Kaitlyn Ammann
BME PhD Candidate

"Modulation of Vascular Cell Specific Growth: Electroceutical Mechanisms and Biomaterial Constructs"

Abstract: Atherosclerosis is a diffuse degenerative disease of the arteries, often leading to arterial narrowing and occlusion, with resultant tissue ischemia, infarction or death. Percutaneous intervention, e.g. balloon angioplasty or stenting, has emerged as the main form of therapy to re-canalize blood vessels and restore blood flow to ischemic tissues. While effective, PCI remains limited by progressive arterial re-narrowing or "restenosis," in a significant number of patients post-procedure. Restenosis of arteries involves a complex biological cascade beginning with injury and endothelial denudation, leading to media smooth muscle cell migration and proliferation with eventual neointimal hyperplasia and luminal narrowing. The advent of drug-eluting stents (drug impregnated, polymer-coated stents) has significantly reduced clinical restenosis rates after 6 months via local delivery of anti-proliferative agents, though not without cost. Current DES, while limiting SMC-mediated restenosis, also limit endothelial cell regrowth at the site of injury. The net effect has been highly persistent arterial thrombogenicity, leaving patients at risk for sudden thrombosis and its consequences.

As such, it is important to minimize smooth muscle cell luminal invasion and thrombus formation while coordinately increasing endothelial cell growth, to establish a non-thrombogenic blood-contacting surface. Drug therapies are limited by their non-specificity in targeting cells for growth modulation, coupled with side effects and exhaustion of drug release. It is the focus of this study to explore approaches which will increase specificity of cell response, i.e. enhance endothelial growth while diminishing smooth muscle growth, without the adverse effects of drugs. We hypothesize that therapeutic "electroceuticals"—locally applied electromagnetic fields, to preferentially direct cell growth, i.e. galvanotaxis, coupled with extensive analysis of polymer processing methods can inform optimal cell-specific responses. We aim to address this question by investigating the basic cell growth response of vascular cells, with and without the influence of electroceuticals, and identify optimal electrical and polymer parameters for interaction with vascular endothelial and smooth muscle cells.

Friday, November 16th, 2018
Sarver Heart Center 4137
2:00 pm
Host: Dr. Marvin Slepian

Persons with a disability may request a reasonable accommodation by contacting the Disability Resource Center at 621-3268 (V/TTY).