Northeastern University
College *of* Engineering

Please join us for a

Chemical Engineering Seminar

Monday, April 11, 2011
450 Dodge Hall
11:45 a.m. – 1:00 p.m.

"Regenerative Medicine: From Synthetic Polymeric Scaffolds to Engineered Stem Cells"

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ABSTRACT

The development of new biomaterials and our ability to control the fate of cells are essential for the future of regenerative medicine. This talk will cover my research in both areas. I will first present on the development of biodegradable elastic scaffolds for peripheral nerve regeneration. In this study, polyester elastomers were optimized and fabricated into nerve guidance conduits, which outperformed FDA-approved collagen tubes in repairing rat sciatic nerve defects as assessed by electrophysiology. To further increase the elasticity of conduit materials under hydrated conditions, a family of poly(ester amide) elastomers was created by rational design. These second generation materials were screened using a series of *in vitro* and *in vivo* tests, and selected according to overall performance. I will also briefly discuss the fabrication of intraluminal scaffolds with aligned electrospun fibers. In the second part of my talk, I will present the engineering of stem cell membranes. Major challenges of cell based therapy in regenerative medicine include the inefficient homing and engraftment of therapeutic cells in targeted tissues. My research aims to overcome these hurdles. I will discuss the *ex vivo* engineering of cell membranes with nanoparticles and peptides as a means to utilize stem cells as carriers of nanomedicines, and to enhance stem cell homing to inflammatory tissues to promote tissue regeneration. A mouse myocardial infarction model was used to demonstrate that membrane engineering can significantly improve stem cell homing to the inflammatory tissue, infarcted heart, after systematic administration, illustrating the potential clinical applications of this emerging technology.

Refreshments will be served