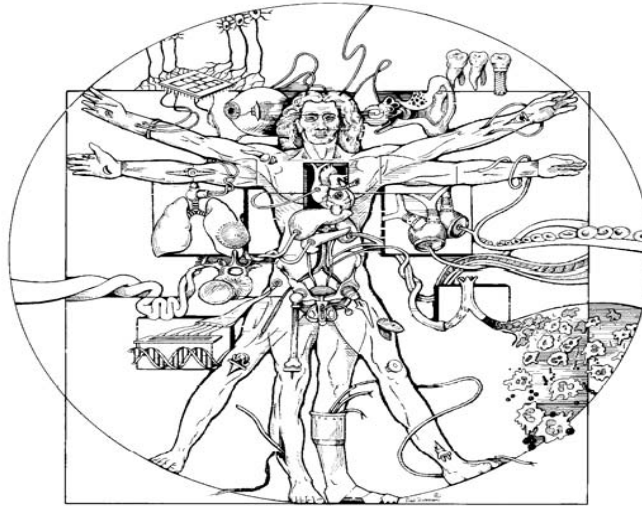


Biomedical Engineering Seminar



Doctoral Defense of
Carlos Chang, Ph.D. Candidate
University of Arizona

“Development of In-vitro Three-Dimensional Microvascular Tissues”

Abstract: Microvasculatures may become damaged by a variety of acute and chronic diseases. In many cases, microvessel function is irreversibly compromised, leading to the dysfunction and even death of surrounding tissues. Currently, there are few therapies that directly address the treatment of microvascular insufficiency. Responding to this need, researchers are developing methods to fabricate *in vitro* blood vessels. Typical strategies include; cellular sodding within polymers and/or biopolymers, the formation of cylindrical cellular monolayers around polymer mandrels, and the modification of biocompatible surfaces for cellular adhesion. Using currently available techniques, simple, individual vessel conduits have been engineered with internal diameters down to 150 μ m. However, no evidence has been provided illustrating the formation of patent, interconnected microvessel networks without the aid of a host's circulatory system.?

In response to this challenge, it is hypothesized that a novel flow-based experimental system will support the *in vitro* development of three-dimensional microvascular tissues. The presented work focused on three specific aims: Specific Aim 1. Pattern planar *in vitro* three-dimensional microvasculatures. Specific Aim 2. Engineer a Dynamic *In vitro* Perfusion Chamber for *in vitro* microvascular investigation. Specific Aim 3. *In vitro* perfusion of microvessel fragments within the DIP Chamber. Through the supporting experiments, evidence is provided of the directed, branched formation of new blood vessels from isolated microvessel fragments. In addition, patent *in vitro* microvessel networks were successfully developed. Currently, the presented models are the first systems to achieve these experimental results. It is believed that the presented experimental model will provide a unique method for future investigations of microcirculatory phenomena. Since no exogenous growth factors or cell signals were introduced into the constructs, it is believed that this system presents a physiological platform for future investigations into angiogenesis, angioadaptation, and network remodeling. Moreover, this model may offer a useful foundation for future tissue engineering applications.

Monday, December 17, 2007

2:30 p.m.

AHSC 5403

Host: Jay Hoying, Ph.D. (626-9134)

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