Guest Seminar

Vascular Repair & Vascular Adaptation: Challenges and Opportunities

by

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Date : 29 Oct 2014 (Wed)
Time : 2:00 pm
Venue : Room 5583 (Lift 29-30)

Abstract

Vascular Repair: Secondary interventions after endovascular repair (EVAR) remains significant despite substantial improvements of aortic endografts over multiple generations. Understanding the interactions between the aortic anatomy, aortic wall characteristics, biomechanical forces and the endograft to be implanted could potentially predict poor outcomes and future secondary interventions. We will present our protocol in imaging and fluid dynamic for analyzing long term follow up of EVAR and show some of our preliminary finding.

Vascular adaptation following local injury occurs through a combination of intimal hyperplasia and wall (inward/outward) remodeling. Over the past two decades, researchers have applied a wide variety of approaches to investigate neointimal hyperplasia and vascular remodeling in an effort to identify novel therapeutic strategies. However, despite incremental progress over these decades, specific cause/effect links between hemodynamic factors, inflammatory biochemical mediators, cellular effectors, and vascular occlusive phenotype remain lacking. We propose a multiscale computational framework of vascular adaptation to systematically test hypothesis and confront the theory to clinical and experimental observation. Our model implements the feedback mechanism between environment condition described by continuous dynamic and tissue plasticity described at the cellular level with an agent based model. Our implementation is (i) modular, (ii) facilitates the agile development of the model and (iii) starts from basic mecano-biology principle at the cell level.

Biosketch of Prof. Marc Garbey
Marc Garbey hold a PHD in Applied Mathematics from Ecole Centrale de Lyon (1984) and an Habilitation from University of Lyon (1989). He is professor of computational science at university of Houston, director of research integration at the Methodist Institute for Technology Innovation and Education (MITIE). MITIE is a unique forty million dollar facility that uses simulation technology to recreate the patient care environment including the operating room.

The scientific work of Marc Garbey covers multiple aspect of computational science. His main focus is currently computational surgery - see http://www.computationalsurgery.org

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