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THE DEPARTMENT OF MECHANICAL & AEROSPACE ENGINEERING
STANFORD S. AND BEVERLY P. PENNER
DISTINGUISHED LECTURES

Emergence of In Vitro Vascularized Models and their Application to Studies of Metastatic Cancer

Roger D. Kamm

Cecil & Ida Green Distinguished Professor of Biological & Mechanical Engineering
Massachusetts Institute of Technology
Dept. of Biological Engineering
Dept. of Mechanical Engineering

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3:00 p.m.-4:00 p.m.
Cymer Auditorium, SME 248, UCSD

ABSTRACT

Over the past 10 years, our ability to realistically model the critical biological steps in disease have dramatically improved, due in part to advances in microfluidic technologies. In particular, the capabilities to create realistic 3D microenvironments, including microvascular perfusion, have led to in vitro models for disease that offer considerable advantages over in vivo experiments. In this talk, I will present some recent advances in creating microvascular networks in vitro through the emergent behaviors of heterotypic cell populations and using these to model the successive stages of metastatic cancer. I will also present the evolution and stabilization of these networks as characterized by the mechanical properties of the vascularized tissue, proteomic analysis of the corresponding extracellular matrix, and genomic analysis of the different cell types present.

BIO

The Kamm lab has been developing microfluidic platforms over the past 10 years with the aim of studying various aspects of metastatic disease. The basic platform technology (Chen, Nature Prot, 2017) that facilitates simultaneous 3D, multi-cell type cultures has been applied to investigations of EMT (Aref, IB, 2013), tumor cell migration with interstitial flow (Polacheck, PNAS, 2011), intravasation (Zervantonakis, PNAS, 2013 and extravasation (Chen, Integr Biol, 2013, Chen, Cancer Res, 2016), both through planar monolayers and vascular networks grown by a vasculogenesis-like process. In addition, Kamm's Mechanobiology Lab has contributed significantly to our general understanding of the fundamental processes leading to mechanotransduction, and the factors that both transmit forces through cells, and convert those forces into biochemical signals. Kamm has served as PI on several multi-investigator programs, including a Program Project Grant on mechanotransduction (NHLBI), a Biomechanics Training Grant, an Interdisciplinary Research Group in Singapore, and currently directs an NSF Science and Technology Center on Emergent Behaviors of Integrated Cellular Systems. His is also co-founder of AIM Biotech, a company that has commercialized microfluidic systems for 3D culture. He is a member of the US National Academy of Medicine.

The Professional Community is Cordially Invited

Information: (858) 534-0113