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University Seminar Series

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Building a "Body-on-a-Chip" System: Applications to Drug Development

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ABSTRACT

We describe a general approach to an in vitro platform technology that could be used as either 1) a biosensor to test for potential toxicity in the environment or 2) as a surrogate for animal and clinical trials in drug development for rapid evaluation of drugs/vaccines to be used as medical counter measures. We called this in vitro system a micro cell culture analog (microCCA) or a "Body-on-a-Chip". A microCCA device contains mammalian cells cultured in interconnected micro chambers to represent key body organs linked through the circulatory system and is a physical representation of a physiologically based pharmacokinetic model. MicroCCAs can reveal toxic effects that result from interactions between organs as well as provide realistic, inexpensive, accurate, rapid throughput toxicological studies that do not require animals and when human cells are used, directly relevant to human response. We will discuss the challenges to adapting this platform technology to the needs of DTRA and regulatory agencies for methods to assess safety, toxicity, and efficacy of possible medical countermeasure products.

BIOGRAPHY

Michael L. Shuler is the James and Marsha McCormick Chair of the Department of Biomedical Engineering as well as the Samuel B. Eckert Professor of Chemical Engineering in the School of Chemical and Biomolecular Engineering at Cornell University, Ithaca, New York. He is currently the director for a NCI funded Physical Sciences-Oncology, the Center for the Microenvironment and Metastasis. Shuler's research is focused on biomolecular engineering and includes development of "Body-on-a-Chip" for testing pharmaceuticals and chemicals for toxicity, production systems for useful compounds, such as paclitaxel from plant cell cultures, and computer models of cells relating physiological function to genomic structure. His research has helped to lay the foundation for modern biochemical engineering and has led to commercial processes for production of the anticancer agent, Taxol, to tools to produce proteins from recombinant DNA (the "High Five" cell line), to software to support systems biology, and to devices for drug development (HuRel has licensed Body-on-Chip patents from Cornell). He has received numerous national and international awards for his research as well as several teaching awards from Cornell. Shuler has been elected to membership in the National Academy of Engineering and the American Academy of Arts and Science and is a fellow of numerous other professional societies.

EVENT DETAILS

DATE:
Wednesday Nov. 14, 2012

TIME:
11:00 AM

LOCATION:
Babbio Center, Room 122
Stevens Institute of Technology

ATTENDANCE:
This event is open to Stevens' Faculty, Students, Staff, and Invited Guests

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