

CHEMICAL, BIOLOGICAL & MATERIALS ENGINEERING

100 E. Boyd, Sarkeys Energy Center, T-301

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The University of Oklahoma

Norman, Oklahoma

PHILLIPS 66 SEMINAR SERIES, 2016 – 2017

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CHEMICAL AND BIOMOLECULAR ENGINEERING

CORNELL UNIVERSITY

ITHACA, NEW YORK

Our seminar

"BUILDING A "BODY-ON-A-CHIP" TO IMPROVE DRUG DEVELOPMENT"

The current drug development process is costly (> 1 billion dollars) and requires considerable effort (ca. 12 to 15 yrs). Currently, only one in ten drugs entering human clinical trials becomes an approved product. The results of animal testing are only marginally useful in predicting human response. Development of a human-based in vitro system has the potential to reduce or possibly eliminate dependency on animal testing and to make better predictions of human response to drugs.

Our efforts to construct human surrogates uses a combination of cell cultures and microfabrication. These devices have been referred to as "Body-On-a-Chip" systems or microphysiological systems. These devices are designed to be physical replicas of a physiologically based pharmacokinetic (PBPK) model where cell cultures or tissue engineered constructs are used to replace the differential equations for each organ compartment in the PBPK. A microfluidic system is used where each compartment is interconnected as they might be in a PBPK model. By using cell cultures in place of equations, interactions of the drug with each tissue and communication between each tissue can be replicated.

Construction of a "pumpless" system that might serve as a basis for a larger system (e.g. 13 compartments) will be discussed. Functional response of the system can be measured as chemical, biological, electrical or mechanical changes in the pseudo organs. Such "chips" should be relatively low cost to construct and have the potential for broad application in drug development or potentially to evaluate the toxicity of chemicals. I will discuss some of the issues in the design, construction and use of such devices.

THURSDAY, APRIL 27, 2017

COOKIES AND COFFEE -- 1:30 P.M.

SEMINAR -- 1:45 P.M.

SARKEYS ENERGY CENTER, M-204

THIS IS A REQUIRED SEMINAR FOR CHE 5971

Accommodations on the basis of disability are available by contacting the office.