

Nayar Prize II Phase I Quarterly Progress Report **April 2017**

Project: Microfluidic Drug-Microbiota Interaction Platform

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Progress Summary of Nayar Prize II Phase I

Since January, we have made significant progress on the construction and testing of the microfluidic intestinal platform. Our overall project goals are to study the role microbiota play in influencing drug metabolism. To facilitate study of interactions between the large number of potential combinations of drugs and microbiota, we are developing a microfluidic platform to carry out the study in high-throughput. We have made progress on a number of areas related to our phase I milestone of a customizable microfluidic platform including: 1) construction of first generation of microfluidic devices with biomembranes and 2) establishment of gut cells in the biomembrane device. A poster was presented in the recent national conference, Pittcon, where the work received very positive feedback. Another poster has been selected to be presented at Experimental Biology later this month.

1) Establishment of gut cells in the device. We have successfully cultured intestinal cells on the membrane in the device. Cells in the two-layer device have excellent viability for extended periods of time than the cells in a single layer device.

2) Oxygen transport model. The gut microenvironment has varying levels of oxygen. For instance, the microbiota are at a relatively anaerobic environment compared to the cells. To mimic this dual-environment in our platform, we have established a mathematical model that represents this dual-environment.

Abstracts Presented

Tung Nguyen, Abhinav Bhushan, "A simple, multilayer PET microfluidic device to reduce hydrophobic molecule absorption", Pittcon, Chicago, IL March 2017

Abstract Accepted

Chengyao Wang, Nida Tanataweethum, Genoveva Murillo, Rajendra Mehta, Abhinav Bhushan, "A novel microfluidic device with an extracellular matrix based membrane", Experimental Biology, Chicago, IL April 2017.