ILLINOIS TECH
YOUR GIFT. **YOUR IMPACT.**

Nayar Prize II Phase II Quarterly Progress Report – July 2018

Project: Microfluidic Drug-Microbiota Interaction Platform
Team: Abhinav Bhushan, Genoveva Murillo, Rajendra Mehta
Postdoctoral Scholar: Sonali Karnik
Graduate Students: Chengyao Wang, Rongfei Wu, Kihwan Kim
Undergraduate Students: Andrea Cancino, Thao Dang, Victor Quiroz, Andrew Chezark

Our main activities have been focused toward establishing cultures of the primary colon and characterizing the role of bacteria in modulating the enzymatic activity of colon cells. Our overall project goal is 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. In this quarter, we have made excellent progress. We have been successful in establishing primary colon monolayers in the microfluidic devices (**Figure 1**).

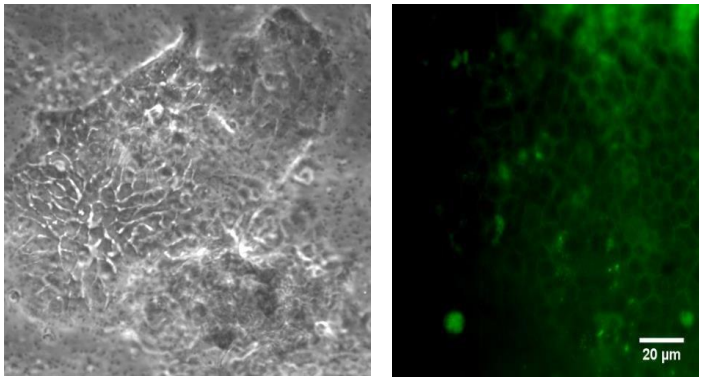

Figure 1. (L) Brightfield image showing primary colon organoid derived epithelial layer in microfluidic devices. (R) E-cadherin stain showing formation of tight junctions.

These cells were isolated from primary tissue and incorporated into our microfluidic device; the cells have excellent viability, formation of tight junctions, and cell coverage. In a parallel effort, we have extended our characterization of the modulation of Cytochrome P450 activity in response to the bacteria and their metabolites (**Figure 2**). We have found significant changes in CYP activity induced by the bacteria. This data is pending intellectual property evaluation by the Office of Technology Development and will be included in the next quarterly report.

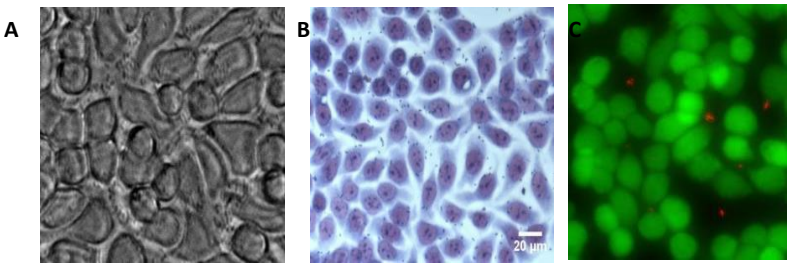

Figure 2. Images showing bacteria-colon cell interactions. The green image shows high viability of colon cells due to optimized culture conditions.

Intellectual property - (1) Provisional patent filed by the university. (2) Disclosure under evaluation by the Office of Technology Development.

Awards – Chengyao Wang received the Starr Fieldhouse Research Fellowship. Thao Dang received support from the Armour College of Engineering PURE program.

Mentions – Our work was profiled in *Science News*. http://bit.ly/colondevice