SUMMER 2022 – SC EPSCOR / INBRE RET PROJECT DESCRIPTION FORM

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Research Subject Area	Genetics/Developmental Biology

A. Briefly describe overall research program at your laboratory.

I am interested in understanding intestinal development and intestinal healing in response to injury, particularly in the context of Inflammatory Bowel Disease (IBD) and Necrotizing Enterocolitis (NEC). It is important that the intestines maintain a barrier to prevent unwanted organisms and molecules from entering our tissues. A breakdown in this barrier can lead to IBD or NEC. Mutations in the multidrug resistance gene (*MDR*) have been linked to IBD, and also have been shown to cause a defective barrier. I aim to further understand the changes caused in intestinal barrier formation when *MDR* is mutated. Using the small, nonpathogenic nematode *C. elegans*, we seek to understand the role of *MDR* in the developmental process of the intestine. These studies will further our knowledge in understanding intestinal diseases through the role of development of the intestinal barrier.

B. Briefly describe specific project(s) for your teacher:

C. elegans are small, non-pathogenic nematodes, approximately 1mm in length and extremely easy to care for. This makes the organism a good choice for a high school classroom. This summer, I aim to conduct experiments to allow the visualization of intestinal development within C. elegans. In order to accurately measure and visualize the development of intestinal cells, it is necessary to “mark” the intestinal cells using a fluorescence marker that can be easily imaged using a fluorescence microscope *C. elegans* have 20 intestinal cells, collectively known as E cells, which all develop from a single cell. Strains exists that contain green fluorescence protein marker within the E cells, allowing easy tracking and counting of the cells during development. Using the drug verapamil, we will monitor intestinal development by counting the number of E cells, and visualize damage during the lifecycle of *C. elegans*. Additionally, leakage will be monitored using FITC-Dextran and green fluorescent protein-labeled food, and gene expression will be measured through Reverse Transcriptase-PCR.

C. Will any other people (post docs, grad students, undergraduate students, colleagues, etc.) be involved directly with your teacher?

Undergraduate students will be involved.

D. Will you require any advanced reading/preparation for the teacher? If yes, please briefly describe.

No, all readings and training would be completed during the summer in the laboratory.