

DEPARTMENT OF INTERNAL MEDICINE  
COLLEGE OF MEDICINE

SUMMER RESEARCH OPPORTUNITIES FOR UNDERGRADUATE students

FOR APPLICATION YEAR: 2024

PROJECT TITLE: Targetted drug delivery to limit luminal neutrophils in Clostridioides difficile infection

Shinsmon Jose  
College of Medicine  
MSB 6105A  
231 Albert Sabin Way  
Cincinnati, Ohio, 45267  
Phone: 513-558-4717  
josesn@ucmail.uc.edu

**Project Description**

Clostridioides difficile infection (CDI) is categorized as one of the top five "urgent" public health threats that cost the US healthcare system an estimated \$4.8 billion/year. Exaggerated host neutrophilia is a crucial driver of CDI-associated epithelial injury and disease severity and worsens clinical outcomes. We now propose to develop a microencapsulated drug delivery system for the colonic delivery of drugs to prevent luminal recruitment of neutrophils and to evaluate the efficacy of the delivered drug in reducing epithelial injury and disease severity.

In this project, we will optimize the encapsulation of CXCR2 antagonist SB225002 for oral delivery and determine its efficacy in preventing CDI-induced transepithelial neutrophil migration to the colonic lumen, thereby limiting IEC injury. The proposed experiments will combine innovative drug delivery systems that utilize colonic microbiota and an established understanding of host immune response to develop a novel approach for limiting CDI-induced IEC damage. Completing the studies proposed here will improve our understanding of the effects of targeting CXCR2 to manage neutrophil-mediated inflammation. This foundational knowledge can potentially create new avenues for the design of host-specific CDI therapeutics.