

DEPARTMENT OF INTERNAL MEDICINE
COLLEGE OF MEDICINE

SUMMER RESEARCH OPPORTUNITIES FOR UNDERGRADUATE students

FOR APPLICATION YEAR: 2024

PROJECT TITLE: Clostridioides difficile - neutrophil interactions in CDI recurrence

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

Project Description

Clostridioides difficile infection (CDI) is a significant public health concern, causing healthcare-associated diarrhea and colitis. Although antibiotic treatment for the initial episode of CDI is effective, recurrence rates remain high, prompting the exploration of alternative treatment mechanisms. This research project aims to unravel the role of neutrophils in CDI recurrence, challenging conventional understanding. The study hypothesizes that *C. difficile* utilizes toxins and the Spo0A protein to evade neutrophil responses, contributing to recurrence. Preliminary data indicate that neutrophils fail to clear *C. difficile* and, intriguingly, may enhance toxin production and spore entry into intestinal epithelial cells. The project comprises two key aims: (1) Investigate the protective role of toxins and Spo0A in *C. difficile* survival during neutrophil responses in vitro and in vivo; (2) Examine whether neutrophils facilitate spore entry into intestinal tissue, influencing CDI recurrence. The research strategy involves in vitro and in vivo experiments using mouse models, organoids, and cell cultures, employing advanced techniques like flow cytometry and confocal microscopy. The anticipated results promise a deeper understanding of pathogen factors involved in *C. difficile* survival and the contribution of neutrophils to CDI recurrence, laying the groundwork for future comprehensive investigations.