



**Pharmaceutical Sciences Seminar Series**

Wednesday, June 14, 2023  
4:00pm  
NCRC Building 10 Research Auditorium  
Zoom

**“The Development of an Oral Nanovaccine for the  
Prevention of *Clostridioides difficile* Infections”**

Presented by:



**Zera Montemayor**  
Ph.D. Candidate, Pharmaceutical Sciences  
University of Michigan

**Abstract:** *Clostridioides difficile* (*C.difficile*) is a spore forming bacterium that causes 500,000 infections every year in the United States. Pathogenesis is mediated by two toxins (TcdA and TcdB). Toxin production in the colon results in fluid secretion, inflammation, and tissue damage. In extreme cases this can lead to pseudomembranous colitis and even death. Vaccines in clinical trials are limited to toxin-based antigens and parenteral administration. While this produces serum anti-toxin antibodies, it still fails to prevent infection in the gut. An effective vaccine against this pathogen should produce a dual immune response: systemic (IgG) and mucosal (IgA) antibodies. A way to achieve this is via oral vaccination. We designed a viral antigen-cluster mimicry nanovaccine with B and CD4 T cell epitopes (VAM-B/CD4) to facilitate B cell-antigen-presentation-mediated B/CD4 T cell crosstalk to achieve long-term efficacy. The unique structure of VAM-B/CD4 promoted lymph nodes trafficking, crosslinking with B cell receptor (BCR), and B cell-mediated antigen presentation to induce B/CD4 T cell crosstalk. Delivery of the liquid vaccine via oral gavage failed to produce an antibody titer. We hypothesize that delivering the vaccine in an enteric coated capsule will circumvent this issue. The vaccine will be protected from degradation in the stomach and make it to the small intestine when antigen uptake and processing can occur.