COLLEGE OF PHARMACY
PHARMACEUTICAL SCIENCES
UNIVERSITY OF MICHIGAN

Pharmaceutical Sciences Seminar Series

Wednesday, April 17, 2024
4:00pm
2548 North University Building
Zoom

"Identifying Techniques for Assessing and Inducing Durable Humoral Immunity"

Presented by:

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Abstract: Most vaccines are believed to protect against disease by stimulating antibody production. However, the durability of these antibody responses varies greatly, with the half-lives of vaccine-induced antibody responses ranging from months to decades. To better understand how long-lasting antibodies can be generated through vaccination, I am using a novel system of virus-like immunogens developed by the Cheng Lab called synthetic virus-like structures (SVLS). SVLS mimic the biochemical and biophysical features of enveloped viruses, allowing us to determine how basic viral signals act alone and cooperatively to influence humoral immunity.

Our studies in mice have revealed that protein arranged on the surface of a virion-sized liposome above a threshold epitope density (ED) induces neutralizing antibody (nAb) responses independently of T cells or Toll-like receptor (TLR) signaling. Introducing a TLR9 agonist within the SVLS interior makes CD19 dispensable, lowers the ED needed to elicit a nAb response, and increases antigen-specific IgG concentrations to levels which rival those induced by conventional virus-like particles. A single injection of SVLS induced IgGs which last up to 600 days, exhibit potent pseudovirus neutralization, and demonstrate affinity maturation, establishing SVLS as a potential vaccine platform.

I am now investigating the influence of efficient CD4+ T cell engagement on antibody durability in mice and evaluating the antibody response towards SVLS in nonhuman primates. These studies aim to deepen our understanding of B cell biology while also informing the development of future vaccines. Lastly, I have developed a novel assay to accurately quantify antigen-specific IgG from serum. This method addresses the limitations of conventional techniques such as ELISA, providing an accurate measurement of the concentration, percentage, and affinity of antigen-specific antibodies produced in an immune response.