PAGE MORTON HUNTER DISTINGUISHED SEMINAR SERIES

What You Don't Know Can Kill You: Improving Health Outcomes with Innovative Diagnostic Technologies

Rapid, inexpensive detection of disease biomarkers at the point of care is vital for many clinical purposes. For analytes where point-of-care testing is possible, improved disease screening, diagnosis, monitoring, and management have been achieved. The first half of my talk will describe two technologies I developed to detect bacterial infections at the point of care. First, I will discuss a portable fluorescence microscope with associated one-step sample staining disposable cartridge that performs a white blood cell count and partial differential from a single drop of blood. Second, I will describe a lateral flow assay (LFA) to detect two protein biomarkers of bacterial infections leading to sepsis, highlighting key drawbacks to the use of LFA diagnostic technology. The LFA is one of the most common point-of-care diagnostic tests to detect protein biomarkers of disease, but due to a lack of signal amplification it often suffers from false negative results for low concentration biomarkers. As such, the second half of my talk will focus on my current work developing synthetic in vitro protein signaling networks incorporating self-amplifying enzymatic pathways to detect and amplify signals from low-concentration antigen biomarkers of disease. My talk will conclude with a summary of the exciting future for in vitro protein engineering and its potential to enable a wide variety of healthcare solutions.

Catherine Majors, Ph.D.

Assistant Professor, Chemical & Biomolecular Engineering, Clemson University

Dr. Cat Majors is an Assistant Professor of Chemical & Biomolecular Engineering at Clemson University. Her research focuses on engineering novel protein signaling networks to enable ultrafast, ultrasensitive diagnostic tests that can be deployed at the point-of-care. Dr. Majors completed a B.Eng in Biomedical Engineering at Vanderbilt University and a PhD in Bioengineering at Rice University, where her research focused on the development of optical and microfluidic methods to detect bacterial infections. She completed her postdoctoral fellowship in Chemical & Biological Engineering at Northwestern University where her research focused on split enzyme engineering and she was awarded an NIH Ruth L. Kirschstein National Research Service Award (F32), an NIH K99/R00 Pathway to Independence Award, and a Baxter Young Innovators Award for her work. When not in the lab, Dr. Majors can be found attempting to train her beagle Winston, raising chickens, riding her bike, and knitting sweaters.

October 3, 2024 • 3:30 p.m.

Location:

111 Rhodes Annex, Clemson University

Department of BIOENGINEERING Clemson University