

## Host-pathogen interactions from a systems perspective: studying bacterial virulence and host response to viral infection

The study of infectious disease and the complex interplay between pathogens and their hosts has gotten a boost from the ability to generate many different high-throughput measurements of systems, including transcriptomics, proteomics, and metabolomics. Ways to represent, interpret, and model such multimodal datasets allow improved understanding of the host-pathogen relationship at a systems biology level. I will present recent results from systems biology studies of bacterial enteropathogens, *Salmonella* Typhimurium and *Yersinia pestis*, as well as respiratory viruses, influenza H5N1 and SARS coronavirus, interacting with their hosts. I will describe the use of network-based approaches to interpretation of high-throughput data and prediction of important components of the system, including experimental validation of some of these predictions. I will also describe how predictive modeling approaches can be used to model important aspects of the interaction and provide predictions of control points for pathogenesis and host response. Finally, I will discuss critical gaps that exist in the systems biology study of infectious diseases and future directions to address those gaps.