

Department of Applied and Computational Mathematics and Statistics Colloquium

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will give a lecture entitled:

Mathematical modeling of the within-cell and within-host dynamics of Mycobacterial infections

Abstract

Mycobacterial infections, such as *Mycobacterium tuberculosis* (MTB), the etiological agent of tuberculosis in humans and *Mycobacterium avium* subsp. *paratuberculosis* (MAP), the cause of chronic gastroenteritis in ruminants, are characterized by a persistent and slow infection progression in most cases. Yet, disease progression can be rapid under certain circumstances. These pathogens can adapt to, subvert and invade host bacteria-specific immune responses. The underlying mechanisms of how the bacteria persist despite the robust immune responses are not completely understood. I will present two novel mathematical models: (i) a model that integrates gene expression data and biochemical systems theory to provide insights into the mechanisms that MTB bacilli use to persist within host cells, and (ii) a second model of the immune response to MAP that predicts how the switch occurs from a strong cell-mediated T cell response (Th1) early in infection to a strong antibody (humoral-Th2) response late in the infection/disease. I will emphasize how mathematical models can be used to interpret experimental data coming from immunological experiments, and how modeling can drive hypothesis generation and make testable predictions in specifically designed experiments.



**Friday, February 28, 2014
4:30 p.m. to 5:30 p.m.
127 Hayes-Healy Center**

Colloquium Tea 4:00 p.m. to 4:30 p.m. 154 Hurley Hall