

WHITAKER BIOMEDICAL ENGINEERING INSTITUTE

DEPARTMENT OF BIOMEDICAL ENGINEERING FRIDAY SEMINAR SERIES

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“A Mutli-scale Approach to Understanding Granuloma Formation in the Human Lung during Infection with *M. tuberculosis*”

DATE: February 11, 2005

TIME: 1:00 p.m. – 2:00 p.m.

PLACE: **Traylor 709**

Host: Ping Ye

Abstract:

The use of different mathematical tools to study biological processes is necessary to capture effects occurring at different scales. Here we study as an example the immune response to infection with the bacteria *Mycobacterium tuberculosis*, the causative agent of Tuberculosis (TB). Immune responses are both global (body-wide) as well as local (site of infection) in nature. Interestingly, the immune response in TB at the site of infection results in the formation of spherical structures comprised of cells, bacteria and effector molecules known as granulomas. In this work, we use four different mathematical tools to explore both the global immune response as well as the more local one (granuloma formation) and compare and contrast results obtained using these methods. Applying a range of approaches from continuous deterministic models (such as ODE and compartmental models) to discrete stochastic ones (such as PDE and agent-based models) allows us to make predictions and suggest hypotheses about the underlying biology that might otherwise go unnoticed. We also employ sensitivity and uncertainty analysis to explore our multi-dimensional parameter space. The tools developed and applied here are also applicable in other settings such as tumor modeling

Any questions, contact 410-955-3132.

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