

# ACMS and ICSB Colloquium

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will give a lecture entitled:

*Within-Host Modelings of Malaria Infection and Agent-Based Communities*

Thursday, April 7th, 2011

4:00 PM

Location: 117 Hayes-Healy Center

## Abstract:

Conventional approaches to infection transmission exploit population-based (SIR) methodology. Agent-based modeling, where a "community" is made of individual hosts, offers an attractive alternative. It gives a better (more detailed) account of within-host processes and naturally accommodates heterogeneity of 'host-vector-parasite' populations and realistic transmission environment. For malaria, a suitable "agent" model should include the pertinent parasite-replication dynamics regulated by host immunity. The talk will outline the basic malaria biology, offer some modeling strategies, and discuss a few examples of within-host models ranging from a simple "3-state Markov chain" to detailed parasite-immune systems. All our models were optimized for numeric simulations, which allows long-term runs on individual level, as well as for large "host ensembles" and "communities." Some of them were calibrated using data sets collected in several "malaria-therapy" (MT) trials. The net result of our calibration was to produce a data-set of "MT-like" hosts (their 'within-host' parameters) that can serve a basis for Agent-based Communities (ABC). We conducted several preliminary experiments with such ABC, looking at the effect of transmission intensity on infection patterns in sample populations, and disease severity. We outline some future projects, development, and application of agent-based modeling.