

1048-00-207

Juilee Thakar* (juilee.thakar@gmail.com), 104 Davey Lab, #167, University Park, PA 16802, and **Timothy Reluga**. *Modeling of the implications of vaccine on the within-host dynamics of the closely related pathogens*. Preliminary report.

We developed within-host models of respiratory infections caused by two human pathogens, namely *Bordetella parapertussis* and *B. pertussis*. *B. pertussis* is a causative agent of whooping cough, a potentially severe childhood disease. Despite widely available vaccines, *B. pertussis* is still prevalent in the world and is one of the re-emerging diseases. Furthermore, current vaccines have low efficacy against the closely-related human pathogen *B. parapertussis*. A series of models was developed to simulate the in vivo dynamics of immune components and bacterial numbers in single and mixed infections and in the presence and absence of *B. pertussis* vaccine. The model reproduced bacterial numbers and the qualitative dynamics of immune components remarkably well. The model makes quantitative predictions regarding proliferation rates, binding rates and phagocytosis rates in single and mixed infections in agreement with experimental observations. Our research suggests the reasons why *B. parapertussis* might have a competitive advantage in vaccinated individuals. (Received February 08, 2009)