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Wen Zhou* (riczw@iastate.edu), 396 Carver Hall, Department of Mathematics, Iowa State University, Ames, IA 50010. *Mathematical modeling of MHC class II mediated immune responses in tissues.*

MHC class II mediated immunity, which is managed by $CD4^+$ T cells, plays essential role in immune response against infectious diseases. Motivated by Dr. Zinkernagel's postulate that the immune response is determined by the dynamics of antigen load, we developed a self-regulated functional mathematical framework to model MHC class II mediated immune response.

To recapitulate realistic scenarios, we have carefully modeled immune cells' movement by concepts of homogenization, B cell activation in the lymph nodes, helper T cell subtype activation and switch, and various type of activation of professional phagocytes. A framework to capture distinct types of pathogens is also introduced. We demonstrate using numerical simulations that the model can successfully respond to broad classes of pathogens. A highly skewed T_H1 response is generated against some virtual pathogens (e.g. Mycobacterium tuberculosis, Leishmania major etc.) and granuloma formation is observed, other virtual pathogens lead to an unskewed or mixed response (e.g. Leishmania mexicana etc.) and some virtual pathogens lead to a T_H1 to T_H2 switch (e.g. M. avium paratuberculosis), and a T_H2 responses is generated against sole extracellular pathogens (e.g. parasitic worms such as nippostrongylus etc.). (Received February 13, 2010)