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Shelby N. Wilson* (shelby.wilson@gmail.com). *Mathematical Modeling of Adaptive Immune Regulation.*

It is widely accepted that the primary immune system contains a subpopulation of cells, known as regulatory T cells (Tregs) whose function is to regulate the magnitude of the immune response. Recent experiments have highlighted a phenomenon known as “Treg Switching”, wherein regulatory T cells lose their immunoregulatory function and transition into immunostimulatory cells. Here, we develop mathematical models to investigate the effects of Treg switching on the immune response. We consider this mechanism both in the context of a simple, ordinary differential equation (ODE) model and in the context of a more biologically detailed, delay differential equation (DDE) model of the primary immune response. Both models express the usual characteristics of an immune response with the added capabilities of being able to correct for initial imbalances in T cell populations. We also observe an increased robustness of the immune response with respect to key parameters. (Received September 17, 2013)