

Abstract Submitted  
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**A mathematical model for T-cell differentiation in Asthma episodes** DAVID QUESADA, Saint Thomas University — Asthma is a respiratory disorder resulting from a combined response of the immune system to environmental agents (allergens) and the expression of different genes (complex trait disorder). Asthma episodes are characterized at least by an increase in levels of Immunoglobulin E (IgE) and by the bronchial hyper-responsiveness (BHR). These two effects are consequences of the proliferation of different T-helper cells ( $T_{h1}$  and  $T_{h2}$ ). A coarse graining approach has been adopted for developing a mathematical model for T-cell differentiation during asthma episodes and related illness as well. The model considers the input from the thymus, two different kinds of competitions between immune cells (a Lotka-Volterra interspecies competition and a hierarchical one) and a feedback control onto the production of helper T cells on the side of cytokines. The Lotka-Volterra model has been used for the self control of  $T_{h1}$  and  $T_{h2}$  cells. The hierarchical model is used to account for cytokines secreted by each one of helper T cells. The obtained system of differential equations has been solved and a phase diagram has been obtained.

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