

A Model of Local Immune Responses by T cells

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A mathematical model for immune responses by $CD4^+$ T with inhibition of interleukine 2 (IL-2) secretion due to $CD4^+$ $CD25^+$ Regulatory T cells (Treg) is presented together with its bifurcation analysis. This model has a quorum T cell population threshold that needs to be overtaken in order to assure an immune response and a lower threshold to reach again the controlled state, thus meaning that an hysteresis is present. The inhibition of IL-2 secretion by Tregs increases both thresholds. This shift can be controlled locally for different tissues by adjusting the local Treg population size. Cross reactivity to pathogens and bystander proliferation on unrelated immune responses can overcome an initially controlled state, being the trigger to an autoimmune response by T cells.

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