




Jun 1st, 12:00 PM - 12:30 PM

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A mathematical model of the immune system response to *Leishmania* parasite

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Macrophages are an important component of the immune system, activated in response to infection and are drivers of inflammation. However, *Leishmania* parasites have developed pathways that render macrophages harmless, turning them into shelters from the rest of the immune response. The parasite then grows intracellularly in host macrophages. We present a basic model of the immune response to infection and use it to study the effect that genes have on disease progression for leishmaniasis. The model is formulated as a system of differential equations. Numerical simulations of the model demonstrating bifurcation for knock-out genes in murine infections are provided. Further analysis of the model is also provided.