A Mathematical Model for Within-host Toxoplasma gondii Invasion Dynamics

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Toxoplasma gondii (T. gondii) is a protozoan parasite that infects a wide range of intermediate hosts, including all mammals and birds. Up to 20% of the human population in the US and 30% in the world are chronically infected. This paper presents a mathematical model to describe intra-host dynamics of T. gondii infection. The model considers the invasion process, egress kinetics, interconversion between fast-replicating tachyzoite stage and slowly replicating bradyzoite stage, as well as the host’s immune response. Analytical and numerical studies of the model can help to understand the influences of various parameters to the transient and steady-state dynamics of the disease infection.

A compartmental model representing the dynamics of T. gondii.