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# Elimination dynamics of intra-hepatic malaria parasites by antigen-specific CD8+ T cells

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Malaria is an infectious disease caused by parasites from genus *Plasmodium* that kills an average of a half a million people around the world annually. *Plasmodium* sporozoites are injected to humans by mosquitoes during their probing for blood. Injected sporozoites migrate to liver and invade hepatocytes. The liver stage that lasts 7 to 10 days is a target for vaccine development for humans using antigen-specific killer CD8+ T cells. However, how CD8+ T cells kill parasites in the liver is not fully understood. Here, we investigate how the numbers of CD8+ T cells, clustering around the rodent malaria parasite, *P. yoelii* (Py), in the mouse liver, is related to the likelihood of parasites' death. We use previously published data on the viability of GFP-expressing Py-sporozoites and the movement patterns of Py-specific T cells, obtained using intravital microscopy. The data are compared with mathematical models that incorporate different mechanisms of how T cells cluster around Py-infected hepatocytes, and T cells kill the parasite, with the ultimate goal of predicting the optimal number of T cells needed to kill the parasite in a given time period (liver stage lasts 2 days in mice). Preliminary analyses indicate that there is a functional relationship between the states of the vitality indices, which is measured as the relative intensity of the GFP of the labeled parasites, and the number of T cells near the parasites. We will present the data and alternative models that could fit and fail to fit the data to understand the underlying dynamics of the killing process. We will also outline the limitations of the current data and provide details for future experimentations with sufficient power to discriminate between alternative models.

**Primary author:** RAJAKARUNA, Harshana (University of Tennessee)

**Co-authors:** COCKBURN, Ian A. (Australian National University ); GANUSOV, Vitaly V. (University of Tennessee)

**Presenter:** RAJAKARUNA, Harshana (University of Tennessee)

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