IMMUNE RESPONSES

Seeing is believing

Two-photon microscopy has been used in recent years to visualize the complexity of immune cell interactions *in vivo*. Now, Robey and colleagues provide further insights into these dynamic interactions during pathogen recall responses.

The authors used a model of *Toxoplasma gondii* infection in which mice that contained fluorescently labelled naive T cells specific for ovalbumin (OVA) were first challenged with irradiated parasites and then infected with live fluorescent parasites, both of which expressed OVA. This allowed the authors to visualize the behaviour of memory T cells during a recall response.

As previously described, the parasites were found in subcapsular sinus (SCS) macrophages in the draining lymph node 5 hours after infection. Analysis of T cell localization in the draining lymph node during the recall response showed that memory T cells migrated more rapidly and accumulated more extensively than naive T cells at the SCS; this migration was shown to be antigen independent. In addition, as early as 5 hours after infection, both naive and memory T cells formed stable clusters with parasite-containing cells (mainly dendritic cells and macrophages) in an antigen-dependent manner. Furthermore, the authors observed direct parasite invasion of both naive and memory T cells that were in contact with infected target cells. More memory T cells than naive T cells were infected with *T. gondii*, and antigen recognition enhanced T cell invasion by the parasites. T cells that contained parasites remained motile and approximately half of the infected leukocytes in the draining lymph nodes and blood 5–7 days after oral infection were T cells.

Blocking T cell egress from lymphoid tissues following oral infection significantly reduced the number of parasites in the spleen and non-draining lymph nodes but not in the draining lymph nodes. This suggests that parasites might disseminate throughout the body by invading T cells during antigen-dependent contacts with infected target cells in the draining lymph nodes.

So, this study sheds light on the dynamics of immune cell interactions during recall responses and identifies a mechanism by which parasites might spread by exploiting T cell–target cell interactions.

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ORIGINAL RESEARCH PAPER Chtanova, T. *et al.* Dynamics of T cell, antigen-presenting cell, and pathogen interactions during recall responses in the lymph node. *Immunity* **31**, 342–355 (2009)