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Capturing the Mechanisms Guiding T Cell Motion within Lymph Nodes

The recent application of two-photon microscopy to the visualization of T cell movement has presented trajectories of individual T cells within lymphoid organs both in the presence and in the absence of antigen-loaded dendritic cells. Remarkably, even though T cells largely move along conduits of the fibroblastic reticular cell (FRC) network, they appear to execute random walks in lymphoid organs rather than chemotaxis. Here, we will present results from our analysis of experimental trajectories of T cells using computer simulations of idealized random walks. Comparisons of simulations with experimental data provide estimates of key parameters that characterize T cell motion in vivo. For example, we find that the distance moved before turning is about twice the distance between intersections in the FRC network, suggesting that at an intersection a T cell will turn onto a new fibre about 50% of the time. Finally, recent, more detailed models from other groups will also be discussed. [Talk presented at CMS/MITACS 2007.]