# Measures of T cell Affinity to other cell types in Lymph Nodes

Humayra Tasnim, Janie R. Byrum, G. Matthew Fricke, Melanie E. Moses, and Judy L. Cannon

## Abstract

T cells are a key immune cell type which plays a vital role to eliminate pathogenic infections. To activate, T cells need to encounter dendritic cells (DCs) bearing cognate antigen in lymph nodes (LNs), and some studies have suggested that DC localization may facilitate T cell-DC interaction. Our work previously demonstrated that there are “hotspots” in LNs that can induce differential T cell motion, however, movement of T cells in LNs may involve other cells types and structures in the LNs, including T cell crawling along fibroblastic reticular cells (FRCs) as well as entry points from high endothelial venules (HEVs). Here we use novel computational methods to determine whether T cell motility is influenced by DCs, FRCs, and/or HEVs. We apply mutual information analysis to determine whether T cell localization is most closely aligned with DCs, FRCs, or HEVs. We then analyze whether a key motility chemokine receptor, CCR7, affects T cell localization and motility in LN hotspots. Our results show that mutual information analysis can shed light on T cell interactions with LN cell types and structures. In addition, we find that CCR7 deficiency has a marginally significant impact on the localization of naïve T cells with DCs. These results demonstrate that novel analytical approaches that combine in vivo imaging of T cell motion in LNs using two photon microscopy with computational methods such as hotspot modeling can reveal novel insights into determinants that drive T cell motion leading to productive T-DC interactions.