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

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## Abstract

T cells play a vital role in eliminating pathogenic infections. To activate, T cells need to encounter dendritic cells (DCs) bearing cognate antigen in lymph nodes (LNs). Some studies have suggested that DC colocalization with other cell types may facilitate T cell-DC interaction. Our work previously demonstrated that LNs contain “hotspots”, locations that are visited more frequently than can be explained by chance, and that induce differential T cell motion. However, it was not previously clear what structures or signals contribute to hotspots. Movement of T cells in LNs may be influenced by multiple cells types and structures in the LNs, including DCs, 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 use mutual information as an analysis tool to determine whether T cells are colocalized with DCs, FRCs, or HEVs. We then analyze whether a key motility chemokine receptor, CCR7, affects T cell colocalization 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. We find that CCR7 deficiency has a marginally significant impact on the colocalization 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 modeling can reveal novel insights into determinants that drive T cell motion leading to productive T-DC interactions.