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TRAFFICKING

Tracking immune cells on the lymph node map

Dendritic cells (DCs) scan peripheral tissues and transfer antigens to local lymph nodes through the lymphatic system, whereas T cells use the lymph to travel between lymph nodes. A recent study by Braun *et al.* maps the routes of DCs and T cells that arrive at the lymph nodes through lymphatic vessels.

To study immune cell trafficking, the authors developed a technique of intralymphatic microinjection and combined this with imaging technologies. Labelled DCs or naive T cells were injected in the afferent lymphatic vessel of a popliteal lymph node and subsequently traced in the subcapsular zone of the lymph node.

Imaging studies revealed that DCs exit from the subcapsular sinus (SCS) into the parenchyma of the lymph node cortex. Although exit from the SCS was not driven by CC-chemokine receptor 7 (CCR7), CCR7 signalling was required for the subsequent DC localization to the T cell zone (located in the lymph node paracortex and upper medulla). Two-photon imaging demonstrated that the translocation of DCs to the T cell zone had characteristics of directional migration, including the formation of a leading edge and a long uropod.

Unlike DCs, intralymphatically injected T cells were absent from the SCS, but were traced in the lower lymph node hemisphere, in the peripheral medullary sinuses. From there, a high percentage of T cells exited through the sinus endothelium to reach the medullary parenchyma. Although their movement towards the peripheral medullary sinus system and their exit to the medullary parenchyma was found to be a passive process, further T cell migration from the medulla to the T cell zone was CCR7 dependent.

Moreover, in contrast with DCs, which were largely confined to the first lymph node that they reached (the popliteal lymph node), most naive T cells travelled further through the efferent lymph to downstream lymph nodes. The authors suggest that their initial localization in the medullary sinuses after entering a lymph node may be associated with their sequential trafficking.

Interestingly, the entry of DCs to the lymph node was found to alter the morphology of the SCS floor and, thereby, to divert the homing route of T cells. Following DC entry, T cells moved to the T cell zone through the SCS floor and the intrafollicular areas of the lymph node cortex, and the authors suggest that this diversion may facilitate DC–T cell interactions in the intrafollicular areas. Future research may reveal which homing routes are associated with successful T cell priming or tolerance induction.

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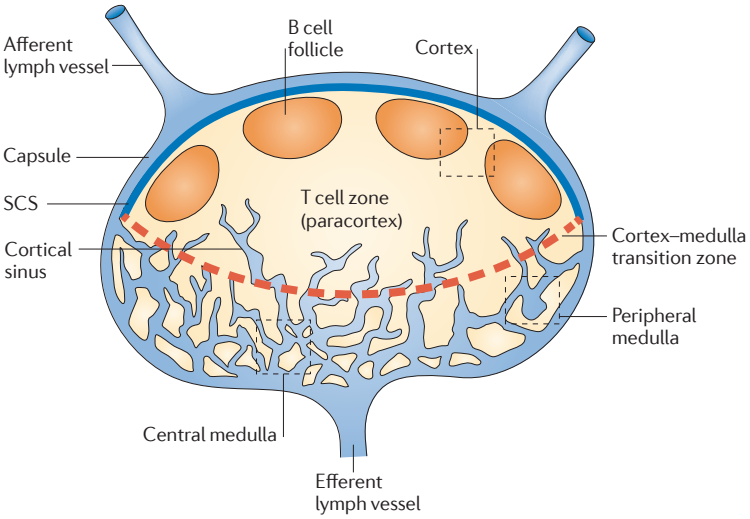

ORIGINAL RESEARCH PAPER Braun, A. *et al.* Afferent lymph-derived T cells and DCs use different chemokine receptor CCR7-dependent routes for entry into the lymph node and intranodal migration. *Nature Immunol.* 14 Aug 2011 (doi:10.1038/ni.2085)