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Mechanisms of Lymphocytes Transmigration Across the Blood Brain Barrier (MELTRA-BBB)

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Many central nervous system (CNS) diseases are affected by strong involvement of the immune system, and are therefore considered inflammatory diseases of the CNS. Multiple sclerosis (MS), Alzheimer's disease (AD) and even stroke are among these diseases. The focus of the MELTRA-BBB consortia is to investigate how cells of the immune system infiltrate the CNS, focusing on a specific structure referred to as the blood-brain barrier (BBB). The BBB is composed of endothelial cells, which together with cells of the CNS form a structure that prohibits the free movement of cells from the blood into the CNS. We will use state-of-the-art microscopy to track how various immune cells enter the CNS in real time. We will use new mouse strains, which will allow us to manipulate important molecules expressed by BBB cells, to understand the role these molecules play in promoting or preventing immune cell CNS infiltration. In addition, we will employ our extensive collection of samples from human CNS inflammatory disease patients to validate our findings in a human setting and to identify new targets for the animal systems. A better understanding of the nature of the mechanisms that lead to the migration of immune cells into the CNS will allow us to more adeptly manipulate this process and provide more effective therapies for inflammatory diseases of the CNS in the future.

