Hippocampal proliferation in Parkinson's disease; a role for microglia?

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(see also overlap with projects from Van Dam, vdBerg, Swaab)

Besides dopamine-deficiency related motor symptoms, nonmotor symptoms, including cognitive changes occur in Parkinson's disease (PD) patients, that may relate to accumulation of α-synuclein in the hippocampus (HC). This brain region also contains stem cells that can proliferate. This is a well-regulated process that can, for example, be altered by neurodegenerative conditions. In contrast to proliferation in the substantia nigra and subventricular zone, little is known about the HC in PD. In addition, glial cells contribute to neurodegenerative processes and may proliferate in response to PD pathology. In the present study, we questioned whether microglial cells proliferate in the HC of established PD patients versus control subjects or incidental Lewy body disease (iLBD) cases as a prodromal state of PD. To this end, proliferation was assessed using the immunocytochemical marker minichromosome maintenance protein 2 (MCM2). Colocalization with Iba1 was performed to determine microglial proliferation. MCM2-positive cells were present in the HC of controls and were significantly increased in the presymptomatic iLBD cases, but not in established PD patients. Microglia represented the majority of the proliferating cells in the HC. This suggests an early microglial response to developing PD pathology in the HC and further indicates that neuroinflammatory processes play an important role in the development of PD pathology.