Microglial Cav1.2 Ca^{2+} channel is involved in the pathophysiology of Parkinson's disease

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Parkinson's disease (PD) is the second most common neurodegenerative disorders, which mainly affects the motor system. The cause of PD is suggested to be the gradual degeneration of the dopaminergic neurons in substantia nigra pars compact and microglia, a key player in the innate immune system, have been shown to be involved in the pathophysiology of PD. Voltage-dependent Ca^{2+} channels (VDCCs) are generally known to be active only in excitable cells like neurons and muscle cells, however recently they have been reported to be also functional in non-excitable cells such as microglia. Cav1.2 channels are an L-type VDCC, which is sensitive to the calcium antagonists. In vitro experiments revealed that Cav1.2 channels are expressed in MG6, a microglial cell line derived from mouse, and that an increased neuroinflammatory M1 transition and a decreased neuroprotective M2 transition were induced by treating the MG6 cells with calcium antagonists. Besides, by intoxicating mice with MPTP, a neurotoxin that induces Parkinsonism, we have found an increased degeneration of dopaminergic neurons and the accompanying behavioral deficits in microglia-specific Cav1.2 knockdown mice. These results suggest that microglial Cav1.2 channel may have neuroprotective roles under physiological conditions.