TRPM2 channel in microglia as a new player in neuroinflammation associated with a spectrum of central nervous system pathologies

ABSTRACT

Microglial cells in the central nervous system (CNS) are crucial in maintaining a healthy environment for neurons to function properly. However, aberrant microglial cell activation can lead to excessive generation of neurotoxic proinflammatory mediators and neuroinflammation, which represents a contributing factor in a wide spectrum of CNS pathologies, including ischemic stroke, traumatic brain damage, Alzheimer's disease, Parkinson's disease, multiple sclerosis, psychiatric disorders, autism spectrum disorders, and chronic neuropathic pain. Oxidative stress is a salient and common feature of these conditions and has been strongly implicated in microglial cell activation and neuroinflammation. The transient receptor potential melastatin-related 2 (TRPM2) channel, an oxidative stress-sensitive calcium-permeable cationic channel, is highly expressed in microglial cells. In this review, we examine the recent studies that provide evidence to support an important role for the TRPM2 channel, particularly TRPM2-mediated Ca^{2+} signaling, in mediating microglial cell activation, generation of proinflammatory mediators and neuroinflammation, which are of relevance to CNS pathologies. These findings lead to a growing interest in the TRPM2 channel, a new player in neuroinflammation, as a novel therapeutic target for CNS diseases.

Keyword: CNS pathologies; TRPM2 channel; Microglial cell activation;Neuroinflammation; Proinflammatory mediators