Abstract:

Multiple sclerosis (MS) is a chronic, neuroinflammatory, and demyelinating disease of the central nervous system (CNS). Current treatments offer only limited relief from symptoms, and there is no cure. Mesenchymal stem/ stromal cells (MSCs) have demonstrated therapeutic potential for MS. However, their clinical application faces challenges, including immune rejection and the potential for tumor formation. Recent studies suggest that MSCs exert their effects through extracellular vesicles (EVs) released from the cells, rather than direct cellular engraftment or differentiation. This discovery has sparked interest in the potential of MSC-derived EVs as a cellfree therapy for MS. This review explores the existing literature on the effects of MSC-EVs in animal models of MS. Administration of MSC-EVs from various tissue sources, such as bone marrow, adipose tissue, and umbilical cord, was found to reduce clinical scores and slow down disease progression in experimental autoimmune encephalomyelitis (EAE), the primary mouse model of MS. The mechanisms involved immunomodulation through effects on T cells, cytokines, CNS inflammation, and demyelination. Although the impact on CNS repair markers remained unclear, MSC-EVs exhibited the potential to modulate neuroinflammation and suppress harmful immune responses in EAE. Further studies are still required, but MSC-EVs demonstrate promising therapeutic effects for MS and warrant further exploration as a novel treatment approach.