The 1st International Neuroinflammation Congress
and 1st Student Festival of Neurosience

Shefa Neuroscience Research Center, Tehran, Iran, 11-13 April, 2017

The Neuroscience Journal of Shefaye Khatam

Volume 5, No. 2, Suppl 2

Poster Presentation

Stem Cells as Neuroinflammatory Modulator in TBI: A Narrative Review

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Published: *11 April, 2017*

Abstract

Traumatic brain injury (TBI) is physical damage to the brain structure which has a high global rate of mortality and morbidity. TBI can cause intense inflammatory response due to accumulation of leukocytes in cerebral matrix and activation of microglia. Microglia can differentiate into M1 macrophages or M2 macrophages following the changes in biochemical properties of brain tissue. M1 sub type release cytodestructive substances that are toxic to neurons but M2 cells are anti-inflammatory neuroprotective subtype. As the time passes after TBI, the amount of M1 cells begin to increase and fraction of M1:M2 rises. Results show that use of Stem Cells can modulate inflammatory responses of immune system. Transplantation of stem cells into injury site increases M2/M1 ratio as a result of inducing M1 macrophages apoptosis. Different types of stem cells have different mechanisms for anti-inflammatory responses. Even exosomes derived from stem cell can affect the functional recovery and reduce neuroinflammation after TBI. Human Mesenchymal stem cells (hMSCs) are most used in TBI cases due to their immunomodulatory impact and therapeutic effects on recovery of motor and cognitive function. Although many studies conducted to determine effects of hMSCs on TBI prognosis, further investigations are required to support clinical use of hMSCs. Specific attention should be paid to role of growth factors and motifs in suppressing inflammatory responses. Future studies are needed to determine the efficacy of combined therapy.

Keywords: Neuroinflammation, TBI, Stem Cell, hMSC, Bioactive motif

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