The 2nd International Neuroinflammation Congress and 2nd Student Festival of Neurosience

Shefa Neuroscience Research Center, Tehran, Iran, 17-19 April, 2018

The Neuroscience Journal of Shefaye Khatam

Volume 6, No. 2, Suppl 1

Poster Presentation

Mesenchymal Stem Cells Encapsulated in a Self-Assembling Nanopeptide Scaffold Attenuate Neuroinflammation and Behavioral Function in a Model of Traumatic Brain Injury in Rats

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Published: *17 April, 2018*

Abstract

Traumatic brain injury is one of the major causes of brain function impairments and surgery is involved in the treatment program of many cases although it cannot rescue the brain functions completely and is confined to reduce the second injury .in this study we aimed to investigate the effects of mesenchymal stem cells encapsulated in RADA1- GGS IKVAV, surgically injected into the lesion site. 36 male Wistar rats underwent an acute model of TBI. Subjects were divided into 5 groups, each consisting of 6 to 9 rats: Sham (receiving no treatment), PBS, GSIKVAV, Mesenchymal Stem Cells (MSCs), GSIKVAV+ MSCs. MSCs were stained with BrdU. Flow cytometry was done to characterize MSCs. Several Behavioral tests were conducted: Open Field (OF) and Elevated Plus Maze (EPM) to assess anxiety-like behavior and modified Neurological Severity Score (mNSS) to evaluate the sensory- motor function. Subjects were euthanized at day 30. IHC was carried out to measure MSCs' viability and differentiation. Also, Western blotting was performed to check for inflammatory factors including toll like receptor3, 4, tumor necrosis factor α and glial fibrillary acidic protein. There was a significant decrease ($P < 0.05$) between MSCs and MSCs + GSIKVAV groups in mNSS score. In addition, the number of entries to the open arm in the EPM test and total distance in OF test was significantly higher ($P < 0.05$). Our data suggest that using MSCs in combination with GSIKVAV can rescue cognitive function. These findings suggest that new assembly peptides can be a new and potential therapy for TBI patients.

Keywords: Tissue Engineering, Neuroinflammation, Functional Recovery, Traumatic Brain Injury

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