

Tracking Bone Marrow Mesenchymal Stem Cells Transplanted to Experimental Rabbit Model with Brain Trauma by MRI

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Introduction

Brain trauma is one of the most common causes of hospitalization, disability, and mortality of people aged 15 to 74 years in nowadays societies. On the other hand, nowadays, different categories of stem cells are used to treat different kinds of diseases. BM-MSCs, are center of scientific research because of their high differentiation and proliferation ability.

Methods: Stem cells were isolated from animal bone marrow and after cultivation in passage 3, they were labeled with dose of 5 mg/ ml of USPIO (prepared by the Institute of Sharif Teb System), after 36 hours, they were incubated in the cultivation medium. To confirm the iron nanoparticles inside the cells Prussian blue staining was used. A number of 5×10^5 labeled MSC injected in rabbit the through the auricular artery , and the rabbits were imaged in coil wrists at time intervals of 1 week after injury , 1 ,3 ,10 ,16 and 24 days after injection by 1.5-T MRI system . In addition, Immunohistochemistry and RT-PCR studies were used to evaluate cells differentiation into neurons or neuroglia.

Results: 24 hours after injection of MSCs, MRI images showed that almost half of the cells have accumulated in the lungs, however 72 hours later the labeled MSC signals were observed as hypointensive areas in the lesion site on the T2* relaxation time. Results also showed that 1.5 T MRI scanner is capable of tracking of the cells up to 16 days after injection. 8 animals at specified time intervals (up to day 16) were killed .The results of Immunohistochemistry and RT-PCR on day 64 after injection showed that the cells in the lesion site express the proteins, such as GFAP and Beta tubulin III, that are the markers of astrocytes and neurons, respectively.

Conclusion: Furthermore, their differentiation into neuroglia cells or even neurons (without getting into the laboratory environment) could be a promising approach for treating different kinds of brain injuries and other disorders of the nervous system. However, another important issue is the restricting factor of the lung which traps a large number of systemically transplanted cells. Thus, the systemic injection through the artery is suggested.

Keywords: Brain trauma, Cells transplantation, Mesenchymal stem cells (MSCs).

Poster Presentation

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