

## Abstract

Spinal cord injury (SCI) is complicated injury with serious socioeconomic consequences for the patient and his whole family. Big difficulty cause also extremely high living expenses for the patient with this type of injury. That's why there is a need for therapeutic methods which would help patients after SCI to recover the lost functions and be able at least partially to return to their normal life.

Different therapeutic methods are being used for SCI treatment. In this study we used four various types of stem cells: human bone marrow stem cells (hBM-MSCs), human umbilical cord mesenchymal stem cells (hUC-MSCs), neural precursors derived from induced pluripotent stem cells (iPS-NPs) and neural stem cell line derived from human fetal spinal cord tissue (SPC-01). These cells have been transplanted intrathecally or intraspinally 7 days after induction of the experimental model of SCI in the rat. We studied expressions of genes related to neurogenesis, growth factors and inflammation 10 and 28 days after SCI. Our analysis showed significant changes in gene expression 10 days after SCI. Significant up-regulation in expression of vascular endothelial growth factor (Vegf), ciliary neurotrophic factor (Cntf) and interferon regulatory factor 5 (Irf5) were found after transplantation of hBM-MSCs and hUC-MSCs in comparison to iPS-NPs. Up-regulation in expression of basic fibroblast growth factor (Fgf2) was found for hBM-MSCs in comparison to hUC-MSCs. Down-regulation in gene expression of glial fibrillary acidic protein (GFAP) was then observed in hUC-MSCs in comparison to hBM-MSCs and SPC-01.

In conclusion, significant changes in expression of markers for angiogenesis, of astrogliosis and growth factors were observed after transplantation of hBM-MSCs and hUC-MSCs 10 days after SCI. On the other hand, transplantation of all types of stem cells led to an improvement in locomotor function of experimental rats, while the regenerative potential decreased in order from iPS-NPs, hBM-MSC to SPC-01.