

Original Paper

Comparison of the proliferation potential and neurotrophic factors expression in the adherent neural stem cells culture of the Subgranular, Subventricular zone and the central canal of the spinal cord of the adult rats

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Abstract

Background and Objective: Degeneration of neurons in the central nervous system occurs during aging. Transplantation of neural stem cells (NSCs) can be preventing the degeneration of neurons. In addition to neuronal replacement, with the production of neurotrophic factors, increased survival and proliferation of endogenous cells. This study was done to compare the cell proliferation, neurotrophic factors expression and features of NSCs harvested from different areas of the central nervous system in vitro.

Materials and Methods: In this laboratory study NSCs have been harvested from subgranular zone (SGZ), subventricular zone (SVZ) and central canal of spinal cord from adult Wistar rats with mechanical, enzymatical digestion and subsequently was cultured in α -MEM medium supplemented with serum as monolayer or adherent conditions and passaged for 13 times. Immunocytochemistry was used to determine expression of the nestin and GFAP markers. Semi-quantitative RT-PCR was used to confirm genes expression (NGF, CNTF, NT3, NT4/5, GDNF and BDNF).

Results: Morphological features of stem cells extracted from different regions of the central nervous system were similar in the culture. Doubling time NSCs in the SVZ (37.45 hr) is shorter than in the SGZ (44.04 hr) and central canal of spinal cord (57.22 hr). The culture conditions as well as monolayer neural stem cells are capable of producing neurospheres. Also, nestin and GFAP markers, expressed by NSCs. Neurotrophic gene expression pattern profiles were similar to each other in stem cells extracted from the SGZ, SVZ and central canal of spinal cord.

Conclusion: Neurotrophic gene expression in stem cells extracted from different regions of the central nervous system were similar, but proliferation capacity was higher in NSCs, which have been harvested from the SVZ.

Keywords: Neural stem cells, SGZ, SVZ, Central canal of spinal cord, Adherent culture

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