

# Antioxidant, antiapoptotic and angiogenic properties of BM mesenchymal stem cells are associated with tissue recovery in stroke therapy

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## Abstract

Stem cell transplantation is a promising therapy, which could provide trophic support for survival, migration, and differentiation of endogenous precursor cells. The action of these cells after transplantation is not only to repopulate the injured area, but mainly to secrete neurotrophic and proliferative factors which could induce recovery of tissue. Stroke Prone Spontaneously Hypertensive Rat (SHRSP) exhibits a hippocampal damage, which can fully recovered after transplantation of MSCs. As previous works, such tissue regeneration take place whereas apoptosis, superoxide and lipid peroxidation were reduced to normal levels. The objective of this work is to investigate if transplanted MSCs could be involved in proliferation and maintenance of neural cells by elevation of the levels of nitric oxide (NO), expression of vascular endothelial growth factor (VEGF) and antiapoptotic protein Bcl-2. A comparison of the brain tissue isolated from SHRSP treated or not with MSCs with those from normotensive Wistar Kyoto (WKY) controls were carried out by qPCR, immunohistochemistry and biochemistry assays. MSCs were obtained from the femur and tibiae of 12-week-old WKY rats, labeled with CFSE and injected into cistern magna of 48-week-old SHRSP rats. One month after transplantation, we observed an increase of almost threefold of VEGF expression in the MSC-treated SHRSP group, thereby suggesting that transplanted stem cells have an angiogenic potential. Correlated data were obtained in terms of elevation of generated NO and antiapoptotic Bcl-2 gene expression. Thus, our results suggest that BM mesenchymal stem cells exhibit antioxidant, antiapoptotic and angiogenic properties, which can contribute to the recovery of brain damage when these cells are used in stroke therapy.