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# Assessment of glial scar, tissue sparing, behavioral recovery and axonal regeneration following acute transplantation of genetically modified human umbilical cord blood cells in a rat model of spinal cord contusion

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## Abstract

©2016 Mukhamedshina et al. This is an open access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.Objective and Methods This study investigated the potential for protective effects of human umbilical cord blood mononuclear cells (UCB-MCs) genetically modified with the VEGF and GNDF genes on contusion spinal cord injury (SCI) in rats. An adenoviral vector was constructed for targeted delivery of VEGF and GDNF to UCB-MCs. Using a rat contusion SCI model we examined the efficacy of the construct on tissue sparing, glial scar severity, the extent of axonal regeneration, recovery of motor function, and analyzed the expression of the recombinant genes VEGF and GNDF in vitro and in vivo. Results Transplantation of UCB-MCs transduced with adenoviral vectors expressing VEGF and GDNF at the site of SCI induced tissue sparing, behavioral recovery and axonal regeneration comparing to the other constructs tested. The adenovirus encoding VEGF and GDNF for transduction of UCB-MCs was shown to be an effective and stable vehicle for these cells in vivo following the transplantation into the contused spinal cord. Conclusion Our results show that a gene delivery using UCB-MCs-expressing VEGF and GNDF genes improved both structural and functional parameters after SCI. Further histological and behavioral studies, especially at later time points, in animals with SCI after transplantation of genetically modified UCB-MCs (overexpressing VEGF and GDNF genes) will provide additional insight into therapeutic potential of such cells.

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