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Post-Traumatic Changes in the Spinal Cord in Rats after Transplantation of Mononuclear Cells from Human Umbilical Blood Modified with the vegf and fgf2 Genes

Shaimardanova G., Mukhamedshina Y., Arkhipova S., Salafutdinov I., Rizvanov A., Chelyshev Y.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

Experiments were carried out using 25 white laboratory rats. A model of dosed contusional trauma to the spinal cord at the T VIII level in rats was used to measure the areas of pathological cavities and the numbers of myelinated fibers in the outer zones of the white matter were counted after single rapid doses of human umbilical blood mononuclear cells transfected with a plasmid carrying the vegf and fgf2 genes into the injured area. Animals of the control group received the same cells in analogous conditions, but transfected with plasmid pEGFP-N2, carrying the gene for enhanced green fluorescent protein (egfp). By postadministration day 30, the total area of pathological cavities in the outer zones of the white matter on transverse sections of the spinal cord 3 mm from the trauma epicenter in the caudal direction was more than two times smaller in animals of the experimental group than in controls. The numbers of myelinated fibers in the same white matter zones at the same distance from the trauma epicenter in the caudal and rostral directions were an average of 20% greater than in controls, while at a distance of 5 mm in the rostral direction the number was 40-70% greater. Administration of the therapeutic genes vegf and fgf2 into the injured area decreased cavitation, restricted the processes of secondary degeneration and maintained the number of myelinated fibers in the damaged spinal cord. © 2012 Springer Science+Business Media New York.

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Keywords

fgf2, spinal cord, umbilical blood cells, vegf