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Reaction of oligoglia to spinal cord injury in rats and transplantation of human olfactory ensheathing cells

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Abstract

In experiments on rats with lateral TVIIIhemisection of the spinal cord and transplantation of ensheating olfactory cells, we studied structural changes at the lesion site and adjacent rostral and dorsal regions of the spinal cord. The state of oligodendrocytes and myelin fibers and motor function in experimental animal were analyzed. Open field testing (BBB test) showed that motor functions steadily increased (by 13% on average) within the interval from day 21 to day 53 after transplantation. Histological examination showed that groups of transplanted cells carrying human nuclear marker (HNu + cells) were still present at the lesion site 30 days after surgery. Some of these cells migrated in the rostral and caudal directions from the injection site to a distance up to 6 mm. At the initial period after hemisection, the number of oligodendrocytes (O4+-cells) in the immediate vicinity to the lesion site decreased 2-fold, but no signifi cant changes in the number of neurons were found in the rostral and dorsal fragments of the spinal cord compared to the corresponding parameter in controls. Sixty days after transplantation, the cross-section area in the rostral part of the spinal cord at a distance of 3 mm from damage site increased by 15.3% compared to the control. The number of O4+- cells at the lesion site and in adjacent rostral and caudal parts of the spinal cord by 22.8% surpassed that in the control group. The number of remyelinated axons also increased. These findings suggest the absence of pronounced structural changes in the rostral and caudal parts of the spinal cord compared to lesion site at early stages after damage and cell transplantation. At the same time, pronounced activation of oligodendrocytes in this region suggests their involvement together with Schwann cells into remyelination of regenerating axons, which can serve as a factor of partial restoration of motor functions after spinal cord injury. © 2010 Springer Science+Business Media, Inc.

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Keywords

cell transplantation, lesion, myelination, oligodendrocytes, spinal cord