

Intraspinal implants of fibrin glue containing glial cell line-derived neurotrophic factor promote dorsal root regeneration into spinal cord.

Authors: Iwakawa M., Mizoi K., Tessler A., Itoh Y.

Publication Date: 2001

Abstract:

Objective: The purpose of this study was to determine whether glial cell line-derived neurotrophic factor (GDNF) delivered intraspinally via a fibrin glue (FG) enhanced regeneration of cut dorsal root (DR). **Methods:** FG containing GDNF was inserted into aspiration cavities in the lumbar enlargement of adult rats. The transected L5 DR stump was placed at the bottom of the cavity and sandwiched between the FG and the spinal cord. Regenerated DR axons were labeled with horseradish peroxidase (HRP) or with immunohistochemical methods for calcitonin gene-related peptide (CGRP). **Results:** Primary afferent axons labeled with HRP regenerated into the spinal cord, received GDNF, and made frequent arborization there. Some of these were myelinated axons that established synapses on intraspinal neuronal profiles. CGRP-immunoreactive DR axons extended into the motor neurons and formed prominent varicosities around their cell bodies. Only a few axons regenerated into the spinal cords given FG without GDNF. **Conclusions:** Our results indicate that GDNF enhances regeneration of DR into the adult rat spinal cord and that GDNF may be effectively supplied to the intraspinal injury site via FG. Because the regenerated axons establish synapses on intraspinal neurons, this therapeutic strategy has the potential to help to rebuild spinal reflex circuits interrupted by spinal cord injury.