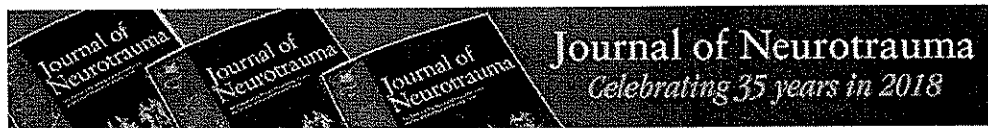




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Effects of Intrathecal Injection of the Conditioned Medium from Bone Marrow Stromal Cells on Spinal Cord Injury in Rats

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ABSTRACT

Bone marrow stromal cells (BMSCs) have been studied for the treatment of spinal cord injury (SCI). In previous studies, we showed that the transplantation of BMSCs, even though they disappeared from the host spinal cord within 1-3 weeks after transplantation, improved locomotor behaviors and promoted axonal regeneration. This result led to the hypothesis that BMSCs might release some neurotrophic factors effective for the treatment of SCI. The present study examined this by injecting the conditioned medium (CM) of BMSCs to treat SCI in rats. The spinal cord was contusion-injured, followed immediately by continuous injection for 2 weeks of the CM of BMSCs through the cerebrospinal fluid via the 4th ventricle using an Alzet osmotic pump. Locomotor behaviors evaluated by the Basso-Beattie-Bresnahan score were markedly improved in the CM-injection group, compared with the control group, at 1 to 4 weeks post-injection. The contusion-injured site of the spinal cord was identified as an astrocyte-devoid area, which

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contained no astrocytes but was filled with collagen matrices and empty cavities of various sizes. Collagen matrices contained type I collagen and laminin. Numerous axons extended through the collagen matrices of the astrocyte-devoid area. Axons were surrounded by Schwann cells, exhibiting the same morphological characteristics as peripheral nerve fibers. The density of axons extending through the astrocyte-devoid area was higher in the CM-injection group, compared with the control group. CM injection had beneficial effects on locomotor improvements and tissue repair, including axonal regeneration, meaning that the BMSC-CM stimulated the intrinsic ability of the spinal cord to regenerate. Activation of the intrinsic ability of the spinal cord to regenerate by the injection of neurotrophic factors such as BMSC-CM is considered to be a safe and preferable method for the clinical treatment of SCI.

- Fukushima Masatoshi
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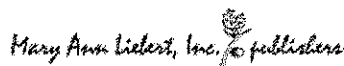
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