

A novel stem cell therapy for spinal cord injury-induced chronic neuropathic pain

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Chronic neuropathic pain is a common and debilitating consequence of spinal cord injury (SCI). In a rat contusion injury model, we observed that chronic neuropathic pain is present on day 7 after SCI and persists for the entire 56-day observation period. However, currently available pain therapies are inadequate for SCI-induced neuropathic pain. In this study, we show that spinal transplantation of mouse embryonic stem cell-derived oligodendrocyte progenitor cells (OPCs) enhances remyelination in the injured spinal cord and reduces SCI-induced chronic neuropathic pain. Moreover, we found that SCI reduces the protein level of neuregulin-1 and ErbB4 in the injured spinal cord and that OPC transplantation enhances the spinal expression of both proteins after SCI. Finally, intrathecal injection of neuregulin-1 siRNA, but not the control non-target RNA, diminishes OPC transplantation-produced remyelination and reverses the antinociceptive effect of OPC transplantation. Our findings suggest that the transplantation of embryonic stem cell-derived OPCs is an appropriate therapeutic intervention for treatment of SCI-induced chronic neuropathic pain and that neuregulin-1/ErbB signaling plays an important role in central remyelination under pathological conditions and contributes to the alleviation of such pain.

Biography

Feng Tao has completed his Ph.D. in 2000 and postdoctoral training in 2005. Currently he is an Assistant Professor in the Department of Anesthesiology and Critical Care Medicine at Johns Hopkins University School of Medicine. He received his RO1 award from NIH in 2012. He has published 30 papers in peer-reviewed professional journals and he is serving as an editorial board member for several professional journals. He also served as an invited reviewer for Johns Hopkins ACCM Seed Grant, NSF-sponsored Pilot Funding at Louisiana State University, and Wings for Life-Spinal Cord Research Foundation in Austria.

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