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

**Feng Tao**

Johns Hopkins University School of Medicine, USA

Chronic neuropathic pain is a common and debilitating consequence of spinal cord injury (SCI). In a rat contusion injury model, it was 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, it is shown 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 is an Assistant Professor in the Department of Anesthesiology/Critical Care Medicine at The Johns Hopkins University School of Medicine, Baltimore, USA. His research interests focus on the central mechanisms of analgesia and anesthesia. The goal of his work is to understand how the effects of analgesics and anesthetics on their neuronal targets are regulated. Specifically, he is interested in the regulation of central sensitization mediated by glutamate receptors and their interacting proteins. It is through these pathways that pain sensation is modulated in the central nervous system, especially at the spinal cord level. He uses a DNA antisense technique to knock down PSD-95/SAP90, a molecular scaffolding protein that has been identified to attach NMDA receptors to internal signaling molecules at neuronal synapses. He revealed for the first time that the PSD-95/SAP90 antisense oligodeoxynucleotide dose-dependently attenuated nerve injury-induced mechanical and thermal hyperalgesia during both the development and maintenance phases of chronic neuropathic pain. These studies provide novel insights into the mechanisms that underlie the chronic neuropathic pain state and clinical inhalational anesthetic application.

ftao81@jhmi.edu