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Rat bone marrow stromal cell transplantation ameliorates complete spinal cord injury induced sensorimotor dysfunctions and associated neurotransmitters

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Traumatic spinal cord injury (SCI) leads to sensorimotor dysfunction with significant impact on the patient and their family's quality of life, social, and economic status. There is no complete restorative treatment so far. Bone marrow stromal cells (BMSCs) have anti-inflammatory and neuroprotective effects and recently emerged as a therapeutic candidate for SCI repair. Here, we examined the role of rat BMSCs transplantation on thoracic (T11) complete SCI induced dysfunctions, namely hyperalgesia, allodynia, locomotion, spinal reflexes, and spinal neurotransmitters in rats. Pre-labelled BMSCs were injected on day 9 after SCI locally. We observed that BMSCs transplantation facilitate locomotor recovery (week 2-8) and attenuated hyperalgesia and allodynia to varying sensory stimuli (week 6-8) after SCI. In addition, spinal reflexes and neurotransmitters were affected significantly by complete SCI, which were partially restored by BMSCs transplantation. Histological analyses also revealed the presence of BMSCs at the injury site and appear to fill the lesion cavities, thereby significantly reducing the lesion volume. Our data shows the beneficial effects of BMSCs transplantation on complete SCI-induced sensorimotor functional deficits in rats.

Keywords: Allodynia, Hyperalgesia, H-reflex, M-response, Nociceptive flexion reflex