Evaluation of locomotor function and microscopic structure of the spinal cord in a mouse model of experimental autoimmune encephalomyelitis following treatment with syngeneic mesenchymal stem cells

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Source: INTERNATIONAL JOURNAL OF CLINICAL AND EXPERIMENTAL PATHOLOGY Volume: 8 Issue: 10 Pages: 12041-12052 Published: 2015

Abstract: Out of the minor myelin proteins, most significant one is myelin oligodendrocyte glycoprotein (MOG). Mesenchymal stem cells (MSCs) have proven immunoregulatory capacity. The objective of this study was to investigate the effects of syngeneic MSCs on mouse model of experimental autoimmune encephalomyelitis (EAE) through observation of locomotion by footprint analysis, histological analysis of spinal cord and estimation IL-17. C57BL/6 mice (10 weeks, n = 16) were immunized with 300 µg of MOG(35-55) and 200 µL of complete Freund's adjuvant (CFA) to produce EAE model. Sham-treated control (n = 8) were injected with CFA. Half of immunized mice were given 100 µL of PBS (n = 8) and next half (n = 8) received 1 x 10^5 MSCs on day 11 through the tail veins. Clinical scoring showed development of EAE (loss of tonicity of tail and weakness of hind limb) on day 10. Following MSC treatment, clinical scores and hindlimb stride length showed significant improvement on day 15 onwards, compared to day 10 (P < 0.05). Under LFB staining, while PBS-treated group of EAE mice showed pale and degenerated axons in anterolateral white column of lumbar spinal cord, MSC-treated group showed numerous normal-looking axons. H&E staining showed normal axons in anterolateral white column and reduction of macrophages in MSC-treated EAE mice group. A lower level of IL-17 was observed in MSC treated EAE mice, compared to PBS-treated EAE mice. Our results suggest that Intravenous MSC has the potential to improve the locomotion and regeneration of axons in spinal cord in MOG-induced EAE model.

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