Mesenchymal stem cells engrafted in a fibrin scaffold stimulate Schwann cell reactivity and axonal regeneration following sciatic nerve tubulization.

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Abstract:

The present study investigated the effectiveness of mesenchymal stem cells (MSCs) associated with a fibrin scaffold (FS) for the peripheral regenerative process after nerve tubulization. Adult female Lewis rats received a unilateral sciatic nerve transection followed by repair with a polycaprolactone (PCL)-based tubular prosthesis. Sixty days after injury, the regenerated nerves were studied by immunohistochemistry. Anti-p75NTR immunostaining was used to investigate the reactivity of the MSCs. Basal labeling, which was upregulated during the regenerative process, was detected in uninjured nerves and was significantly greater in the MSC-treated group. The presence of GFP-positive MSCs was detected in the nerves, indicating the long term survival of such cells. Moreover, there was co-localization between MSCs and BNDF immunoreactivity, showing a possible mechanism by which MSCs improve the reactivity of SCs. Myelinated axon counting and morphometric analyses showed that MSC engrafting led to a higher degree of fiber compaction combined with a trend of increased myelin sheath thickness, when compared with other groups. The functional result of MSC engrafting was that the animals showed higher motor function recovery at the seventh and eighth week after lesion. The findings herein show that MSC. +. FS therapy improves the nerve regeneration process by positively modulating the reactivity of SCs.