Muscle-Derived Stem Cells Are Capable of Transformation into Cells with Schwann Cell-Like Phenotypes

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Purpose: Muscle-derived stem cells (MDSCs) are a distinct population of immature progenitors cells with pronounce pluripotent potential (1). Previous findings from our laboratory have demonstrated that MDSCs have special osteogenic, vascular, and endothelial potential. However, few studies have explored the schwann-cell differentiation potential of MDSCs *in-vitro*. The purpose of this study was to characterize the induction potential of MDSCs to differentiate into cells with schwann-cell phenotypes using two neurogenic induction protocols (2, 3).

Methods: MDSCs were isolated from 4-8 weeks old C57BL/6J mice using a previously described pre-plate technique based on the selective adhesion potential of various cell types to type I collagen coated surfaces (4). Two mesenchymal-stem cell (MSC) neurogenic induction protocols (P1 vs P2) composed of various glial growth factor combinations were used for Schwann cell differentiation of MDSCs. A Schwannoma cell line (S16) was used as a positive control for all experiments (5). Immunocytochemistry and flow cytometry were performed to assess the expression of schwann-cell markers including S-100 and p75 in schwann-cell-induced MDSCs. *In vitro* myelination assays were performed to assess the functional capabilities of these schwann-cell-induced MDSCs.

Results: The two MSC induction protocols showed statistically significant differences in their Schwann cell induction potential ($p = 0.004$). Schwann cell differentiation for twelve days using the P1 protocol led to an upregulation in the fraction of cells expressing S100 compared to the P2 protocol and the untreated MDSCs controls (CTCF 4.9 vs 0.5 vs 0.28, $p = 0.002$). Furthermore, unstimulated and P2 stimulated MDSCs demonstrated no myelination capacity while P1-induced MDSCs showed potential myelination capabilities *in vitro*.

Conclusion: MDSCs can be differentiated into cells with Schwann cells-like properties *in vitro*. These *in vitro* findings suggest that MDSCs may have a potential application to augment nerve regeneration after peripheral nerve injury/trauma.

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