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Skin-derived precursor cells enhance peripheral nerve regeneration following chronic denervation.

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Abstract

While peripheral nerves demonstrate the capacity for axonal regeneration, outcome following injury remains relatively poor, especially following prolonged denervation. Since axon-deprived Schwann cells (SCs) in the distal nerve progressively lose their ability to support axonal growth, we took the approach of using skin-derived precursor cells (SKPs) as an accessible source of replacement SCs that could be transplanted into chronically denervated peripheral nerve. In this study, we employed a delayed cross-reinnervation paradigm to assess regeneration of common peroneal nerve axons into the chronically denervated rodent tibial nerve following delivery of SKP-derived SC (SKP-SCs). SKP-SC treated animals exhibited superior axonal regeneration to media controls, with significantly higher counts of regenerated motorneurons and histological recovery similar to that of immediately repaired nerve. Improved axonal regeneration correlated with superior muscle reinnervation, as measured by compound muscle action potentials and wet muscle weights. We therefore conclude that SKPs represent an easily accessible, autologous source of stem cell-derived Schwann cells that show promise in improving regeneration through chronically injured nerves