

**The Role of Cultured Schwann Cell Grafts in the Repair of Gaps
within the Peripheral Nervous System of Primates**

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ABSTRACT

With recent advances in cell culture techniques it is possible to isolate human SCs from adult peripheral nerves, expand and purify their number in cell culture, and construct a cellular prosthesis from the cultured cells. The current study was designed to ascertain whether these techniques could be used to repair non-human primate nerve injuries. In twelve adult female *cynomologous* monkeys, the musculocutaneous (msk) nerve was divided and prevented from regenerating and the brachioradialis nerve (brach) was exposed bilaterally (n=24 nerves), and injured so that a 15 mm gap existed within the nerve. The brach nerves were either repaired with sural nerve autografts (n=6), guidance channels which contained monkey SCs (120×10^6 cells/ml; n=6) or guidance channels without SCs (n=6). The remaining brach nerves (n=6) had either no injury or an injury to the nerve without a repair. Autologous expanded primate SCs were increased in number at least 10 fold over a 2 week period at which time the SC purity exceeded 99.9%. Monkeys in each group, including the control group, regained some degree of elbow flexion after 3 months despite sectioning both the msk nerve and the brach nerve, therefore, we were unable to determine simply on clinical grounds which repair was the most effective in promoting functional recovery. Brach nerves repaired with sural nerve grafts were superior to both the channels which contained SCs and empty channels in regards to the number of myelinated axons proximal, within, and distal to the repair site ($p < 0.05$). Electrophysiologic results closely paralleled the histologic data with evidence of re-innervation of the brachioradialis muscle in both sural nerve graft and monkey SC channel repair groups.