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Synergistic effects of Citicoline and bone marrow mesenchymal stem cells to improving regenerative capacity of acellular nerve allograft

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Acellular nerve graft is an alternative to autograft for the repair of short gaps associated with peripheral nerve injury. It provides a suitable three-dimensional structure that supports and guides axonal regeneration. However, outcomes associated with the use of acellular nerve grafting are often inferior to those achieved with autografts, particularly over long lesion gaps. Therefore, this experimental study was conducted to evaluate the effects of citicoline on the efficacy of acellular nerve allografts seeded with Bone Marrow Stem Cells (BMSCs) to bridge a 15 mm sciatic nerve gap. Seventy (70) rats were randomly allocated into seven groups (n=10 per group), including the healthy control group, sham surgery group, autograft group, acellular nerve scaffold (ANS) group, ANS+BMSCs group, ANS+BMSCs+100 mg/kg citicoline and ANS+BMSCs+200 mg/kg citicoline groups. The two experimental groups were treated daily with citicoline at the doses of 100 or 200 mg/kg for two weeks. After implantation, motor function was assessed and electrophysiological, histomorphometry and molecular tests were performed. Animals treated with citicoline immediately after implantation showed significantly better regeneration and motor function outcome compared with ANS group and ANS+BMSCs group. No significant difference was observed between the citicoline treatment (200 mg/kg) group and the autograft group. These findings suggest that citicoline treatment resulted in improved regenerative properties of cell-seeded nerve allografts, likely via increasing the viability and retention of transplanted BMSCs.

Biography

Arash Abdolmaleki has his expertise in peripheral nerve regeneration. His PhD thesis was about the use of acellular nerve scaffolds enriched by bone marrow mesenchymal stem cells for enhance the regeneration of sciatic nerve after implantation in rats.

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