

# Electrical stimulation improves peripheral nerve regeneration in streptozotocin-induced diabetic rats

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## Introduction

Patients with diabetes are susceptible to peripheral nerve injury from acute nerve compression or entrapment. In animal models of nerve injuries, it has been shown that electrical stimulation (ES) method could be a viable tool for promoting axon regeneration and muscle reinnervation. In our previous studies, we also noted that the onset times for ES and its intensity and frequency affected peripheral nerve regeneration.<sup>16–18</sup> We assessed percutaneous electrical stimulation (ES) at 1 mA and 2 Hz after peripheral nerve transection could enhance axonal regeneration and functional recovery in diabetic animals.

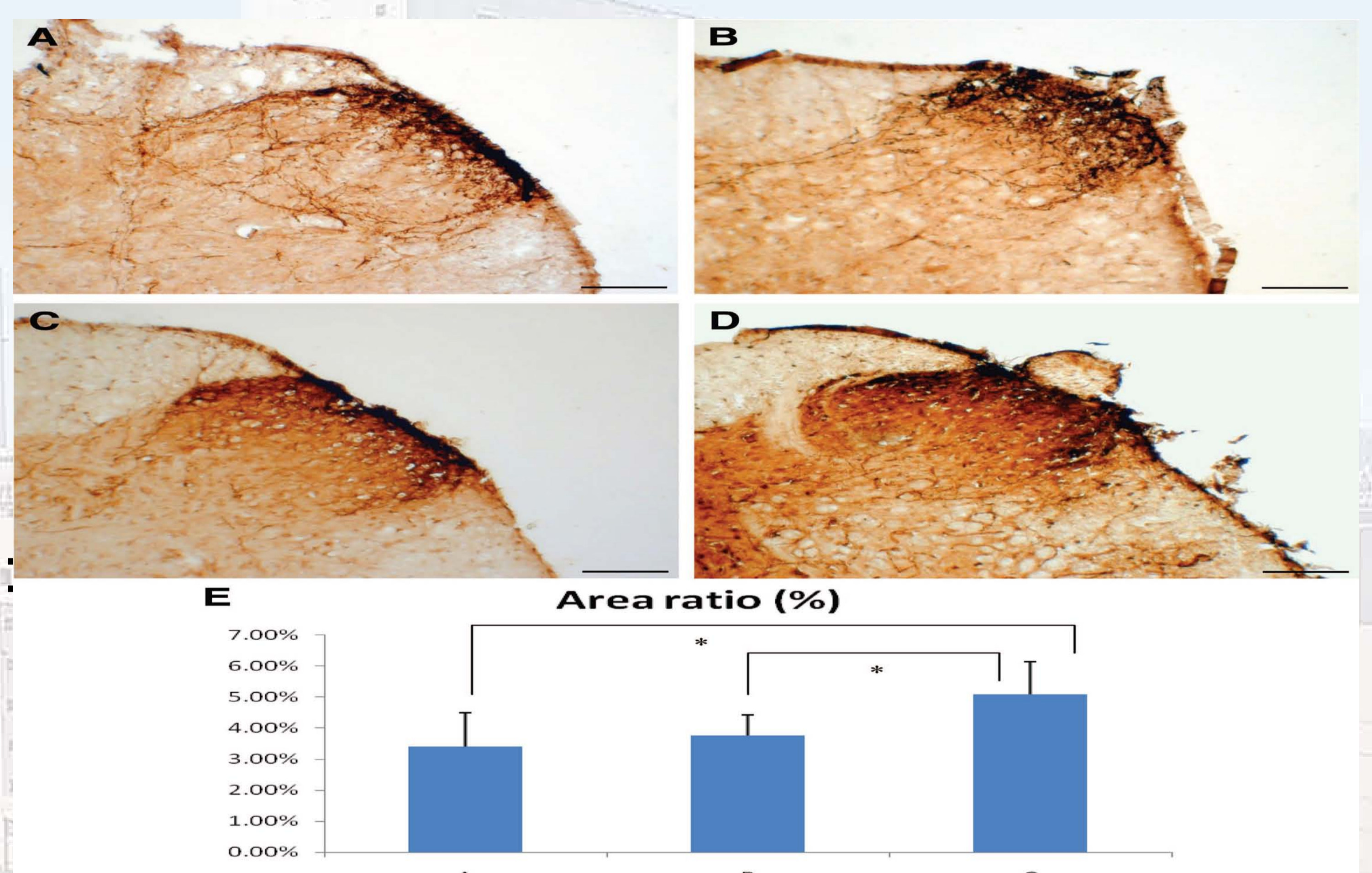
## Material and Method

Four groups of adult rats (group A: normal rats; group B: normal rats with ES; group C: streptozotocin-induced diabetic rats; and group D: streptozotocin-induced diabetic rats with ES) were subjected to sciatic nerve section followed by repair using silicone rubber conduits across a 10-mm gap. Rats in groups B and D received ES for 15 minutes every other day for 3 weeks. The groups A and C received no ES.

## Results

At 4 weeks after surgery in groups B and D, immunohistochemical staining showed that lamina I and II regions in the dorsal horn ipsilateral to the injury were significantly calcitonin gene-related peptide-immunolabeled, and a significantly higher

number of macrophages were recruited in the distal sciatic nerve compared with group C. In groups A, B, and D, electrophysiological results showed higher levels of reinnervation with significantly shorter latencies and faster nerve conductive velocities, and the histologic evaluations showed relatively larger mean values of myelinated axon densities and endoneurial areas compared with group C.



## Discussion

The ES may improve the recovery of a severe peripheral nerve injury in diabetic animals, which could be considered as a supplementary treatment in diabetic neurotrauma.