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Functional restoration following major peripheral nerve injury (PNI) is challenging, given slow axon growth rates and eventual regenerative pathway degradation in the absence of axons. Smith et al. from the Center for Brain Injury and Repair, Department of Neurosurgery, Perelman School of Medicine, Axonova Medical are developing tissue-engineered nerve grafts (TENGs) to simultaneously "bridge" missing nerve segments and "babysit" regenerative capacity by providing living axons to guide host axons and maintain the distal pathway. TENGs were biofabricated using porcine neurons and "stretch-grown" axon tracts. TENG neurons survived and elicited axon-facilitated axon regeneration to accelerate regrowth across both short (1 cm) and long (5 cm) segmental nerve defects in pigs. TENG axons also closely interacted with host Schwann cells to maintain pro-regenerative capacity. TENGs drove regeneration across 5-cm defects in both motor and mixed motor-sensory nerves, resulting in dense axon regeneration and electrophysiological recovery at levels similar to autograft repairs. This approach of accelerating axon regeneration while maintaining the pathway for long-distance regeneration may achieve recovery after currently unrepairable PNIs [1].

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