Electrospinning

Electrospinning is the process by which a scaffold containing micrometer and nanometer diameter fibers are drawn from a polymer solution or melt using a large voltage gradient between a polymer emitting source and a grounded collector. Ramakrishna and colleagues first investigated electrospun fibers for neural applications in 2004. After this initial study, electrospun fibers are increasingly investigated for neural tissue engineering applications. Electrospun fibers robustly support Axon regeneration within in vivo rodent models of spinal cord injury.

These findings suggest the possibility of their eventual use within patients. Indeed, both spinal cord and peripheral nervous system regeneration research over the last several years shows that physical guidance cues induce recovery of limb, respiration, or bladder control in rodent models. Electrospun fibers may be an alternative to the peripheral nerve graft (PNG), because PNG autografts injure the patient and are limited in supply, and allografts risk host rejection. In addition, electrospun fibers can be engineered easily to confront new therapeutic challenges. Fibers can be modified to release therapies locally or can be physically modified to direct neural stem cell differentiation [1].

1)
Schaub NJ, Johnson CD, Cooper B, Gilbert RJ. Electrospun Fibers for Spinal Cord Injury Research and Regeneration. J Neurotrauma. 2016 Aug 1;33(15):1405-15. doi: 10.1089/neu.2015.4165. Epub 2016 Mar 30. PubMed PMID: 26650778.