Oriented NanoFilament Construct for Nerve Regeneration (#3404)

An oriented NanoFilament construction for nerve regeneration

Georgia Tech inventors have developed 2D and 3D scaffolds with oriented nano-filaments that mimic the strategy used by collagen and other fibrillar structures to guide cell migration or tissue development and promote regeneration in a guided, direction-sensitive manner. In one embodiment, a method of tissue regeneration is provided that includes the step of implanting into a patient an implantable scaffold as described above. In one particular embodiment, the site of implantation is between two nerve stumps in a peripheral nerve. The uniaxially oriented nanofibers of the scaffold promote nerve regeneration by promoting and supporting directional glial and nerve infiltration of the scaffold. Thus, the scaffold can be applied to guide the migration of endogenous or transplanted cells and tissues, including tissues of the peripheral and central nervous system.

Benefits/Advantages

- Provides directional cues for cell and tissue regeneration
- Eliminates donor site morbidity associated by allografts
- Easily manufactured
- Tested for longer gap

Potential Commercial Applications

- Guide endogenous or transplanted cells and tissues to damaged tissues
- Restore cell/ tissue function
- Various tissue engineering applications

Background/Context for This Invention

Every year, several million people suffer serious peripheral nerve injury in the United States alone, with over 200,000 nerve repair procedures done annually. Physicians need products that facilitate the repair and regeneration of the nerve itself, but considerable shortfalls currently exist in available technologies. Allografts are the current standard, but require multiple surgeries and grafts, with low recovery rates. Furthermore, scaffolds for tissue engineering are promising solutions, but are not capable of guiding tissue regeneration.

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FIG. 1

3D construct of hydrogel layer and nanofilaments layer.

For more information about this technology, please visit:
https://licensing.research.gatech.edu/technology/oriented-nanofilament-construct-nerve regeneration