Washington University in St. Louis
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NEW NERVE CAP ARRESTS AXON GROWTH IN NEUROMA MANAGEMENT

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Background

Neuromas (a.k.a. pinched nerve, or nerve tumor) form on peripheral nerves following trauma and possess exposed sensory axons mixed with fibrotic scar tissue. Symptomatic or painful neuromas have a profound impact on a patient's quality of life and productivity. Pain medication offers some benefit, but management of neuromas remains challenging. Long term solutions rely on removal of the neuroma and surgical therapy to prevent reoccurrence. Scientists from Washington University in St. Louis developed a new approach to neuroma management.

Technology Description

Controlling the aberrant axonal outgrowth from regenerating nerves following injury is considered the most effective surgical practice to prevent neuroma formation. However, neuroma removal and reconstruction of the nerve to its distal nerve stump is often not feasible. Other strategies, including burying the nerve and its regenerating axons into muscle, or the use of autografts or conduits as "caps" to entrap axonal growth and to contain sensory endings, only yielded moderate success. The team of Drs. Wood, MacKinnon, and Moore developed a biocompatible acellular nerve scaffold material not previously recognized for its property to arrest axon growth. The invention includes a process to manufacture the material and a detailed procedure to treat nerve injury by installing the material as a cap to control axon growth. The procedure describes the use of critical cap dimensions to obtain optimal results. The material and procedure have been successfully tested for reproducibility, biocompatibility, and axon growth arrest properties *in vitro*, and *in vivo* in a rodent model of the clinical neuroma formation. The animal studies demonstrated axon growth arrest, biocompatibility, and the absence of material degradation for up to 20 weeks *in vivo*. The technology has demonstrated to be superior to no treatment and the use of other known conduits and thereby offers a promising new solution in neuroma management (e.g. Morton's neuroma) and amputations.

Key Advantages

- New material to arrest aberrant axonal outgrowth from regenerating nerves
- Biocompatible material resistant to *in vivo* degradability
- New material manufacturing process and procedure to cap nerve endings
- Both *in vitro* and *in vivo* data
- Addresses an unmet need in a significant market

Publications

Poppler, L.H. *et al. Tissue Eng. Part A.* 2016, *22*, 949-61: *Axonal Growth Arrests After an Increased*

Accumulation of Schwann Cells Expressing Senescence Markers and Stromal Cells in Acellular Nerve Allografts.

Patents: Pending

Lead Inventors

- Matthew Wood, PhD**,** Assistant Professor of Surgery
- Susan E. Mackinnon, MD, Sydney M. Jr. and Robert H. Shoenberg Professor and chief of the Division of Plastic and Reconstructive Surgery
- Amy Moore, MD, Associate Professor, Surgery, Washington University School of Medicine