Decellularized nerve graft

- Prevention of nerve growth and evoked pain with a nerve cap graft device
- DON-Apt19S bioactive scaffold transplantation promotes in situ spinal cord repair in rats with transected spinal cord injury by effectively recruiting endogenous neural stem cells and mesenchymal stem cells
- Adipose Decellularized Matrix: A Promising Skeletal Muscle Tissue Engineering Material for Volume Muscle Loss
- Comparison of five preservation methods for fascia allograft
- In Vivo Tracking of Amniotic Fluid Derived Stem Cells on Acellular Nerve Graft
- Preliminary study on preparation of decellularized nerve grafts from GGTA1 gene-edited pigs and their immune rejection in xenotransplantation
- E-jet 3D printed aligned nerve guidance conduits incorporated with decellularized extracellular matrix hydrogel encapsulating extracellular vesicles for peripheral nerve repair
- Preliminary study on the preparation of lyophilized acellular nerve scaffold complexes from rabbit sciatic nerves with human umbilical cord mesenchymal stem cells

A **decellularized nerve graft** refers to a nerve tissue that has undergone a process of decellularization, which involves removing the cellular components while preserving the extracellular matrix (ECM). This process leaves behind the structural framework of the nerve, including collagen, elastin, and other important components that provide the scaffolding necessary for nerve regeneration.

The decellularization process typically involves the use of detergents, enzymes, or other chemical agents to break down the cells without damaging the ECM. Once decellularized, the nerve graft can be used as a biological scaffold for nerve repair or reconstruction in nerve injuries, promoting the regeneration of nerve fibers through the preserved matrix. The idea is to provide a natural, biocompatible environment for regenerating nerves, which can help reduce immune rejection and support the growth of new nerve tissue.

These grafts are being studied and used in both preclinical and clinical settings, particularly for peripheral nerve injuries, and are considered a promising option for nerve repair when autologous nerve grafts (using the patient's nerves) are not available or suitable.

A study explores the efficacy of a neural graft constructed using adipose mesenchymal stem cells (ADSC), acellular microtissues (MTs), and chitosan in the treatment of peripheral nerve defects.

Stem cell therapy with acellular MTs provided a suitable microenvironment for axonal regeneration and compensated for the lack of repair cells in the neural ducts of male 8-week-old Sprague Dawley rats.

In vitro, acellular MTs retained the intrinsic extracellular matrix and improved the narrow microstructure of acellular nerves, thereby enhancing cell functionality. In vivo, neuroelectrophysiological studies, gait analysis, and sciatic nerve histology demonstrated the regenerative effects of active acellular MT. The Chitosan + Acellular-MT + ADSC group exhibited superior myelin sheath quality and improved neurological and motor function recovery.

Active acellular-MTs pre-cellularized with ADSC hold promise as a safe and effective clinical treatment

method for peripheral nerve defects [1].

The study on the chitosan/acellular matrix-based neural graft carrying mesenchymal stem cells presents a promising approach for enhancing peripheral nerve repair. The combination of adipose-derived stem cells (ADSC) and acellular microtissues (MTs) encapsulated in chitosan scaffolds demonstrated positive outcomes in both in vitro and in vivo models, showing improved nerve regeneration, myelin sheath quality, and functional recovery. These results suggest that this innovative graft could provide a potential solution for treating peripheral nerve defects.

However, the study's impact is limited by certain weaknesses, such as the lack of detailed control groups, short-term follow-up, and insufficient mechanistic insights into the regeneration process. Further studies, including long-term evaluations, larger sample sizes, and a more thorough understanding of the cellular mechanisms, are necessary to confirm the clinical applicability and safety of this approach in humans. Despite these limitations, the study lays a promising foundation for future research in regenerative medicine and peripheral nerve repair.

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Zhang Z, Li M, Cheng G, Wang P, Zhou C, Liu Y, Duan X, Wang J, Xie F, Zhu Y, Zhang J. A chitosan/acellular matrix-based neural graft carrying mesenchymal stem cells to promote peripheral nerve repair. Stem Cell Res Ther. 2024 Dec 31;15(1):503. doi: 10.1186/s13287-024-04093-5. PMID: 39736729.