Acellular matrix

- Effects of 3D-printed exosome-functionalized brain acellular matrix hydrogel on neuroinflammation in rats following cerebral hemorrhage
- Global variability in fetal spina bifida surgery: a survey of neurosurgical strategies
- Pilot study to assess the safety and efficacy of human acellular dermal matrix for Chiari surgery
- Functionalized Periosteum-Derived Microsphere-Hydrogel with Sequential Release of E7 Short Peptide/miR217 for Large Bone Defect Repairing
- Evidence-based approaches to cranial cerebrospinal fluid leaks in low- and middle-income countries: a systematic review of the literature
- Pleomorphic dermal sarcoma of the scalp with intracranial space involvement: management of a rare entity. Illustrative case
- Preliminary study on the preparation of lyophilized acellular nerve scaffold complexes from rabbit sciatic nerves with human umbilical cord mesenchymal stem cells
- A chitosan/acellular matrix-based neural graft carrying mesenchymal stem cells to promote peripheral nerve repair

An acellular matrix is a type of scaffold or structure that is used in various biological and medical applications. It refers to a matrix that has been stripped of its cellular components, leaving behind the extracellular matrix (ECM). The ECM is the non-cellular part of tissues and organs, providing structural and biochemical support to the cells that reside within it.

Acellular matrices are commonly used in tissue engineering, wound healing, and regenerative medicine because they provide a natural, biocompatible environment for cells to grow and regenerate without the risk of immune rejection that might come from using whole tissue. These matrices can be derived from various biological sources, such as animal tissues (e.g., decellularized heart, liver, or skin tissues) or synthetic materials.

In tissue engineering, acellular matrices are often used as a scaffold for cell attachment and growth, where the matrix provides structural support while the cells populate the scaffold and potentially regenerate damaged tissue.

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.