Chitosan-Based Scaffolds as a Promising Approach for Peripheral Nerve Regeneration

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Peripheral nerve injuries represent a significant clinical challenge, primarily due to the limited regenerative capacity of peripheral nerves and the suboptimal outcomes associated with current treatment approaches. While autografting remains the gold standard technique for addressing severe nerve injuries, it is associated with several limitations, including donor site morbidity, limited graft availability, and potential complications. These challenges have prompted ongoing research into alternative strategies for effective nerve repair.

Nerve guidance conduits (NGCs)—biomaterial-based structures designed to bridge gaps in injured peripheral nerves—have emerged as a promising solution. NGCs act as scaffolds that facilitate the regeneration of damaged nerve tissue, guiding axonal growth, supporting cellular migration, and promoting the recovery of functional nerve pathways. Extensive research has led to the development of NGCs from a variety of biological and synthetic materials. Among these, chitosan—a natural biopolymer valued for its biocompatibility, biodegradability, and ability to support cellular growth—has gained significant attention as a promising material for scaffold-based peripheral nerve repair.

In this talk, I will present the potential of chitosan-based scaffolds in supporting and enhancing peripheral nerve regeneration, by providing a favourable microenvironment that promotes axonal growth, cellular integration, and tissue repair. I will show experimental findings that demonstrate the efficacy of chitosan-based scaffolds in preclinical models of peripheral nerve injuries. These results emphasize the potential of chitosan as a viable and effective strategy for advancing peripheral nerve repair and regeneration.