

Cell-free therapy based on extracellular vesicles: a promising therapeutic strategy for peripheral nerve injury

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Abstract

Peripheral nerve injury (PNI) is one of the public health concerns that can result in a loss of sensory or motor function in the areas in which injured and non-injured nerves come together. Up until now, there has been no optimized therapy for complete nerve regeneration after PNI. Exosome-based therapies are an emerging and effective therapeutic strategy for promoting nerve regeneration and functional recovery. Exosomes, as natural extracellular vesicles, contain bioactive molecules for intracellular communications and nervous tissue function, which could overcome the challenges of cell-based therapies. Furthermore, the bioactivity and ability of exosomes to deliver various types of agents, such as proteins and microRNA, have made exosomes a potential approach for neurotherapeutics. However, the type of cell origin, dosage, and targeted delivery of exosomes still pose challenges for the clinical translation of exosome therapeutics. In this review, we have focused on Schwann cell and mesenchymal stem cell (MSC)-derived exosomes in nerve tissue regeneration. Also, we expressed the current understanding of MSC-derived exosomes related to nerve regeneration and provided insights for developing a cell-free MSC therapeutic strategy for nerve injury.

Keywords: Peripheral nerve injury, Nerve regeneration, Cell-free-based treatment, Mesenchymal stromal cells, Extracellular vesicle, Exosomes