



Neuronal Regeneration Alternatives in the Peripheral Nervous System: preliminary findings of a literature review.

Renato García González¹ , Rodrigo Conrado Cortés Montes De Oca² , Abigail América Chavez Manriquez³ , Jennifer González Delgado⁴ , Irene García Payán⁵ , María Guadalupe Vega García⁶ , María del Carmen Tovany Ramirez⁷ , *Iván Pérez Neri⁸.

1. Evidence Synthesis Unit, National Institute of Rehabilitation Luis Guillermo Ibarra Ibarra, México City, México; Benemérita Universidad Autónoma de Puebla, Puebla, México; Medical Synthesis International School, México City, México. 2. Benemérita Universidad Autónoma de Puebla, Puebla, México; Medical Synthesis International School, México City, México. 3. Universidad Popular del Estado Puebla, Puebla, México; Medical Synthesis International School, México City, México. 4. Benemérita Universidad Autónoma de Puebla, Puebla, México; Medical Synthesis International School, México City, México. 5. Universidad Popular del Estado Puebla, Puebla, México; Medical Synthesis International School, México City, México. 6. Benemérita Universidad Autónoma de Puebla, Puebla, México; Medical Synthesis International School, México City, México. 7. Benemérita Universidad Autónoma de Puebla, Puebla, México; Medical Synthesis International School, México City, México. 8. Evidence Synthesis Unit, National Institute of Rehabilitation Luis Guillermo Ibarra Ibarra, México City, México.

Introduction. In peripheral nervous system (PNS) regeneration, supporting cells —primarily Schwann cells— play a key role by promoting axonal growth through the indirect mediation of neurotrophic factors. Currently, innovative surgical techniques have been developed, such as the use of transplants and scaffolds incorporating cellular components or substitutes (1).

Objective. to evaluate the therapeutic potential of manipulating neuronal regeneration pathways in patients with peripheral nervous system pathologies and/or injuries.

Methodology. A literature review was conducted in PubMed using algorithms based on Medical Subject Headings (MeSH): “Nerve regeneration” and “Peripheral Nervous System Diseases.” Preclinical, clinical, and review studies on neuronal regeneration techniques were included. Excluded were theoretical reviews, studies focused solely on pathophysiological aspects, diagnostic techniques, or treatments unrelated to PNS regeneration.

Results. A total of 57 articles published between 2001 and 2025 were retrieved, identifying the following therapeutic alternatives: transplants, grafts, conduits, implants, pharmacological agents, devices, gene therapy, techniques involving supporting cells, and strategies using neurotrophic factors.

Conclusions. Autologous transplants remain the cornerstone of treatment, though their efficacy improves when combined with scaffolds enriched with stem cells or neurotrophic factors. Mesenchymal and bone marrow-derived stem cells stand out due to their versatility and clinical feasibility, while gene therapy, though promising, still requires vector optimization and long-term safety validation. Neuroprotective drugs and photobiomodulation serve as complementary approaches, enhancing neuronal viability in multimodal strategies. According to the literature, achieving optimal therapeutic outcomes requires the simultaneous application of multiple techniques. Therefore, combining direct approaches — such as transplants— with indirect methods —such as stimulation of support cells— may offer improved efficacy in PNS regeneration.

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References

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