Perspective
Volume 8:4, 2021
DOI: 10.37421/ijn.2021.08.399

International
Journal of Neurorehabilitation

ISSN: 2376-0281 Open Access

Nerve Injury/Damage

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The injury to nervous tissue is known as Nerve injury. There is no classification system to describe the several variations of nerve injury. However, nerve injury (peripheral) is classified into five stages, based on damage to the nerve and the surrounding connective tissues. In the central nervous system, neuroregeneration is possible in the peripheral nervous system. The processes that occur in peripheral regeneration are divided into, Wallerian degeneration, axon regeneration/growth, and nerve reinnervation. The events that occur in peripheral nerve regeneration occur with respect to the axis of the nerve injury. The proximal stump refers to the end of the injured neuron that is attached to the cell body of neuron and it is the part that regenerates. The distal stump refers to the end of the injured neuron which is attached to the end of the axon and it is the part of the neuron which degenerates but remains in the area towards of the regenerating axon grows [1].

Changes of Neuron-intrinsic

Following nerve injury, neurons undergo in a huge number of transcriptional changes and proteomic changes which switches the cell from mature, synaptical active neuron to a synaptical silent, growth state. This changes and process is completely dependent on new transcription, as blocking the ability of cells to transcribe new mRNA regeneration. Number of signalling pathways has been shown to be turned on by the axon injuries which help to enable long distance regeneration including BMP, TGFβ, and MAPKs. Likewise, a growing number of transcription factors also boost the capacity of regeneration of peripheral neurons including ASCL1, ATF3, CREB1, HIF1α, JUN, KLF6, KLF7, MYC, SMAD1, SMAD2, SMAD3, SOX11, SRF, STAT3, TP53, and XBP1. Many of these also boost the regenerative capacity of CNS neurons which makes them potential therapeutic targets for treating stroke and spinal cord injury [2].

Therapies of Nerve Regeneration

Electrical stimulation promotes regeneration of nerve. The positive effect of electrical stimulation on regeneration of nerve is due to its molecular influence on the neuron which are damaged and Schwann cells. Electrical stimulation accelerates directly to the expression of cAMP in both neurons and Schwann cells. cAMP is a molecule which stimulates the multiple signalling pathways that are aid to regenerate the nerve by enhancing the expression of several neurotropic factors. Electrical stimulation also results in the influx of calcium ion, which triggers multiple regeneration pathways further [3].

Surgery is done if in case a nerve has cut or if it is divided. Recovery of a nerve after a surgery depends on the age of the individual. Young children recover to normal function of nerve. In contrast, if a patient more than 60 years old with a nerve cut in hand would expect to recover only protective sensation, that is, the ability to distinguish hot/cold or sharp/dull. Several factors also affect the recovery of nerve. The use of autologous nerve grafting procedures also involves in redirection of regenerative donor nerve fibers into the graft conduit has been successful in restoring target muscle function. Localized delivery of soluble neurotrophic factors may help to promote the rate of axon regeneration which is observed within these graft conduits [4].

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How to cite this article: Ohio, Charles. Nerve Injury/Damage. Int J Neurorehabilitation Eng 8 (2021) doi: 10.37421/ijn.2021.8.399

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Received 05 April 2021; **Accepted** 20 April 2021; **Published** 27 April 2021