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Inhibitory Effects of Laser Irradiation on Peripheral Mammalian Nerves and Relevance to Analgesic Effects: A Systematic Review

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Objective: The objective of this review was to systematically identify experimental studies of non-ablative laser irradiation (LI) on peripheral nerve morphology, physiology, and function. The findings were then evaluated with special reference to the neurophysiology of pain and implications for the analgesic effects of low-level laser therapy (LLLT).

Background: LLLT is used in the treatment of pain, and laser-induced neural inhibition has been proposed as a mechanism. To date, no study has systematically evaluated the effects of LI on peripheral nerve, other than those related to nerve repair, despite the fact that experimental studies of LI on nerves have been conducted over the past 25 years.

Methods: We searched computerized databases and reference lists for studies of LI effects on animal and human nerves using *a priori* inclusion and exclusion criteria.

Results: We identified 44 studies suitable for inclusion. In 13 of 18 human studies, pulsed or continuous wave visible and continuous wave infrared (IR) LI slowed conduction velocity (CV) and/or reduced the amplitude of compound action potentials (CAPs). In 26 animal experiments, IR LI suppressed electrically and noxiously evoked action potentials including pro-inflammatory mediators. Disruption of microtubule arrays and fast axonal flow may underpin neural inhibition.

Conclusions: This review has identified a range of laser-induced inhibitory effects in diverse peripheral nerve models, which may reduce acute pain by direct inhibition of peripheral nociceptors. In chronic pain, spinal cord changes induced by LI may result in long-term depression of pain. Incomplete reporting of parameters limited aggregation of data.

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