

## **LOW POWER LASER IRRADIATION INCREASES SURVIVAL OF AXOTOMIZED MOTONEURONS**

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The authors have previously showed that low power laser irradiation (LPLI) increases the rate of facial nerve regeneration and alters choline acetyltransferase immunoreactivity during regeneration of crushed rat facial nerves and increases mRNA for  $\alpha$ -calcitonin gene related peptide after facial nerve transection. These findings indicate that laser therapy optimizes nerve regeneration. The purpose of this study was to determine quantitatively if LPLI can rescue motoneurons after transection of the facial nerve. The number of motoneurons was determined in axotomized and axotomized/laser irradiated rats after 6 to 9 months' survival to assure loss of dying neurons and regeneration of surviving neurons had occurred. The injured rats were transcutaneously irradiated daily for 14 days. The laser parameters were wavelength 633nm, power, 8.5 mW, duration 90 minutes. At 6-9 months post-injury, the rats were anesthetized and euthanized by intracardiac perfusion of aldehydes. The brainstem, containing the facial motor nucleus (FMN) was sectioned at 40 $\mu$ m and stained with cresyl violet. Images of individual sections were captured and digitized using a Zeiss microscope linked to a CCD-IRIS camera. NIH image software (version 1.57) was utilized to tally neurons in the FMN. Only those neurons containing a nucleolus were conducted in every fourth section through the rostro-caudal extent of lesioned and contralateral non-injured nucleus. The number of neurons in each nucleus of axotomized or axotomized/laser irradiated rats was expressed as a percentage of the number of neurons in the non-injured nucleus. The frequency of facial motoneurons that died after axotomy was decreased significantly ( $P < .0001$ ) from 36.45% (mean; SEM+2.41) to 13.30% (mean; SEM+2.31) when the axotomized facial nerves were treated with LPLI. These results suggest that LPLI is a non-invasive therapy for rescue of axotomized neurons and may afford a promising treatment for devastating spinal cord injuries.

### **Source:**

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### **Information Application:**

- Supports 635nm as the most effective wavelength