

# Effects of Laser Irradiation on the Spinal Cord for the Regeneration of Crushed Peripheral Nerve in Rats

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**Background and Objective:** The purpose of the present study was to examine the recovery of the crushed sciatic nerve of rats after low-power laser irradiation applied to the corresponding segments of the spinal cord.

**Study Design/Materials and Methods:** After a crush injury to the sciatic nerve in rats, low-power laser irradiation was applied transcutaneously to corresponding segments of the spinal cord immediately after closing the wound by using 16 mW, 632 nm He-Ne laser. The laser treatment was repeated 30 minutes daily for 21 consecutive days.

**Results:** The electrophysiologic activity of the injured nerves (compound muscle action potentials—CMAPs) was found to be approximately 90% of the normal precrush value and remained so for up to a long period of time. In the control nonirradiated group, electrophysiologic activity dropped to 20% of the normal precrush value at day 21 and showed the first signs of slow recovery 30 days after surgery. The two groups were found to be significantly different during follow-up period ( $P < 0.001$ ).

**Conclusion:** This study suggests that low-power laser irradiation applied directly to the spinal cord can improve recovery of the corresponding injured peripheral nerve. *Lasers Surg. Med.* 28:216–219, 2001.

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**Key words:** peripheral nerve injury; compound muscle action potentials; low-power laser; spinal cord irradiation; rats

## INTRODUCTION

Treatment of injuries to peripheral nerves has always constituted an important medical problem, and, although recovery does eventually occur in most cases, it is a very slow and frequently incomplete process [1]. Peripheral nerves are highly vulnerable to pressure. The amount of damage done depends on the specific nerve involved, the magnitude and type of pressure and the length of time the nerve is compressed. If the amount and duration of com-

pression are slight, most nerves will recover either immediately or shortly after trauma. But if the pressure is intense and/or the duration is long, recovery is prolonged and often partial. One of the causes of nerve compression is the crush injury. The usual results after such an injury are degeneration of the axons and retrograde degeneration of the corresponding neurons of the spinal cord, followed by a very slow regeneration. Understandably, therefore, numerous attempts have been made to enhance and/or accelerate the recovery of injured peripheral nerves. One of the methods studied is the use of low-power laser irradiation to enhance the recovery of peripheral nerve injuries. The use of low-power laser irradiation in the treatment of experimental peripheral nerve injuries was reported by Rochkind in 1978 [2]. More recent publications describe the effect of low-power laser irradiation applied directly or transcutaneously to the crushed peripheral nerve alone [3–7] or to the crushed nerve and the corresponding segments of the spinal cord [8]. The results showed that low-power laser irradiation increases the recovery of the crushed sciatic nerve of rats [3,4,7] and decreases retrograde degeneration of the neurons in the corresponding segments of the spinal cord [6,7]. In this study, the recovery of the crushed sciatic nerve of rats after low-power laser irradiation applied to the corresponding segments in the spinal cord alone was studied.

## MATERIALS AND METHODS

The present study was carried out on 17 Sprague-Dawley rats of uniform age (3 months) each weighing approximately 300 g. The rats were divided into two groups and were anesthetized intraperitoneally with diluted Nembutal 15 mg/kg weight. The right thigh along the sciatic nerve and the dorsolumbar region of the spine were shaved.

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