

Antinociceptive Effects of Low-Level Laser Therapy at 3 and 8 J/cm² in a Rat Model of Postoperative Pain: Possible Role of Endogenous Opioids

Fabio C. Pereira,¹ Julia R. Parisi,² Caio B. Maglioni,¹ Gabriel B. Machado,¹ Paulino Barragão-Iglesias,³

Josie R. T. Silva,¹ and Marcelo L. Silva¹

¹Department of Physiotherapy, College of Nursing of the Federal University of Alfenas-UNIFAL, Alfenas, Brazil

²Department of Physical Therapy, Federal University of São Carlos-UFSCar, São Carlos, Brazil

³School of Behavioral and Brain Sciences, The University of Texas at Dallas, Dallas

Low-level laser therapy (LLLT) is the direct application of light to stimulate cell responses (photobiomodulation) to promote tissue healing, reduce inflammation, and induce analgesia; the molecular basis for these effects of LLLT remains unclear. The objective of this study was to evaluate the analgesic effect of LLLT in the rat plantar incision model of postoperative pain as well as to investigate some of the possible mechanisms involved in this effect. Wistar rats were submitted to plantar incision and treated with LLLT (830 nm, continuous-mode, 30 mW/cm², 1–12 J/cm²). Postoperative thermal and mechanical hypersensitivity were monitored for 24 hours post-incision. In addition, the animals were pretreated with saline, naloxone (a nonselective opioid receptor antagonist; 20 mg/5 ml) or methysergide (5-HT_{2C}, 5-HT_{2A}, 5-HT₇, 5-HT_{5a}, 5-HT₆, and 5-HT_{1F} receptors antagonist; 30 mg/5 ml). Moreover, 24 hours after incision and treatment, the TNF- α and IL-1 β levels in serum were evaluated. Our results demonstrate, for the first time, that LLLT at 3 or 8 J/cm², but not at 1–2, 4–7, or 9–12 J/cm², induced an analgesic effect on postoperative pain. Naloxone, but not methysergide, blocked the LLLT-induced anti-nociceptive effect. Additionally, IL-1- β and TNF- α production significantly decreased after LLLT at 3 or 8 J/cm². Our results suggest that LLLT at 3 or 8 J/cm² primarily modulates the endogenous opioids system and is not directly mediated by serotonergic receptors. Reduction of IL-1 β and TNF- α may play a role in the antinociceptive action of LLLT. *Lasers Surg. Med.* 49:844–851, 2017. ©2017 Wiley Periodicals, Inc.