

## Ankle Sprains

J Clin Laser Med Surg. 2004 Apr;22(2):125-8.

### **Low-level laser treatment can reduce edema in second degree ankle sprains.**

**Stergioulas A.**

Faculty of Human Motion, University of Peloponnese, Attica, Greece. [asterg@uop.gr](mailto:asterg@uop.gr)

**OBJECTIVE:** Low-level laser therapy (LLLT) has been used for the last few years to treat sports injuries. The purpose of this study was to compare three therapeutic protocols in treating edema in second degree ankle sprains that did not require immobilization with a splint, under placebo-controlled conditions. **MATERIALS AND METHODS:** Forty-seven soccer players with second degree ankle sprains, selected at random, were divided into the following groups: The first group (n = 16) was treated with the conventional initial treatment (RICE, rest, ice, compression, elevation), the second group (n = 16) was treated with the RICE method plus placebo laser, and the third group (n = 15) was treated with the RICE method plus an 820-nm GaAlAs diode laser with a radiant power output of 40 mW at 16 Hz. Before the treatment, and 24, 48, and 72 h later, the volume of the edema was measured. **RESULTS:** A three by three repeated measures ANOVA with a follow up post hoc test revealed that the group treated with the RICE and an 820-nm GaAlAs diode laser presented a statistically significant reduction in the volume of the edema after 24 h (40.3 +/- 2.4 mL, p < 0.01), 48 h (56.4 +/- 3.1 mL, p < 0.002), and 72 h (65.1 +/- 4.4 mL, p < 0.001). **CONCLUSIONS:** LLLT combined with RICE can reduce edema in second-degree ankle sprains.

Arch Phys Med Rehabil. 1998 Nov;79(11):1415-20.

### **Low-level laser therapy in ankle sprains: a randomized clinical trial. de Bie RA, de Vet HC, Lenssen TF, van den Wildenberg FA, Kootstra G, Knipschild PG.**

Department of Epidemiology, Maastricht University, The Netherlands.

**OBJECTIVE:** To test the efficacy of low-level laser therapy on lateral ankle sprains as an addition to a standardized treatment regimen, a trial was conducted in which high-dose laser (5J/cm<sup>2</sup>), low-dose laser (0.5J/cm<sup>2</sup>), and placebo laser therapy (0J/cm<sup>2</sup>) at skin level were compared. **DESIGN:** Randomized, double-blind, controlled clinical trial with a follow-up of 1 year. Patients, therapists, assessors, and analysts were blinded to the assigned treatment.

SETTING: An ambulatory care setting. PATIENTS: After informed consent and verification of exclusion criteria, 217 patients with acute lateral ankle sprains were randomized to three groups from September 1, 1993, through December 31, 1995. INTERVENTIONS: Twelve treatments of 904nm laser therapy in 4 weeks as an adjunct to a standardized treatment regimen of 4 weeks of brace therapy combined with standardized home exercises and advice. The laser therapy device used was a 904nm Ga-As laser, with 25-watt peak power and 5,000 or 500Hz frequency, a pulse duration of 200nsec, and an irradiated area of 1cm<sup>2</sup>. PRIMARY OUTCOME MEASURES: Pain and function as reported by the patient. RESULTS: Intention-to-treat analysis of the short-term results showed no statistically significant difference on the primary outcome measure, pain ( $p = .41$ ), although the placebo group showed slightly less pain. Function was significantly better in the placebo group at 10 days ( $p = .01$ ) and 14 days ( $p = .03$ ) after randomization. The placebo group also performed significantly better on days of sick leave ( $p = .02$ ) and at some points for hindrance in activities in daily life and pressure pain, as well as subjective recovery ( $p = .05$ ). Intention-to-treat analysis showed that total days of absenteeism from work and sports were remarkably lower in the placebo group than in the laser groups, ranging from 3.7 to 5.3 and 6 to 8 days, respectively. The total number of relapses at 1 year in the low-dose laser group ( $n = 22$ ) was significantly higher ( $p = .04$ ) than in the other two groups (high laser,  $n = 13$ ; placebo,  $n = 13$ ). Subgroup analysis to correct for possible confounders did not alter these findings. CONCLUSIONS: Neither high- nor low-dose laser therapy is effective in the treatment of lateral ankle sprains.

J Clin Laser Med Surg. 2000 Apr;18(2):67-73.

### **Wound healing of animal and human body sport and traffic accident injuries using low-level laser therapy treatment: a randomized clinical study of seventy-four patients with control group.**

**Simunovic Z, Ivankovich AD, Depolo A.**

Department of Anesthesiology, La Carita Medical Center, Laser Center, Locarno, Switzerland. info@lasermedico.ch

BACKGROUND AND OBJECTIVE: The main objective of current animal and clinical studies was to assess the efficacy of low level laser therapy (LLLT) on wound healing in rabbits and humans. STUDY DESIGN/MATERIALS AND METHODS: In the initial part of our research we conducted a randomized controlled animal study, where we evaluated the effects of laser irradiation on the healing of surgical wounds on rabbits. The manner of the application of LLLT on the human body are analogous to those of similar physiologic structure in animal tissue, therefore, this study was continued on humans. Clinical study was performed on 74 patients with injuries to the following anatomic locations: ankle and knee, bilaterally, Achilles tendon; epicondylus; shoulder; wrist; interphalangeal joints of hands, unilaterally. All patients had had surgical procedure prior to LLLT. Two types of laser devices were used: infrared diode laser (GaAlAs) 830 nm continuous wave for treatment of trigger points (TPs) and HeNe 632.8 nm combined with diode laser 904-nm pulsed wave for scanning procedure. Both were applied as monotherapy during current clinical study. The results were observed and measured

according to the following clinical parameters: redness, heat, pain, swelling and loss of function, and finally postponed to statistical analysis via chi2 test. RESULTS: After comparing the healing process between two groups of patients, we obtained the following results: wound healing was significantly accelerated (25%-35%) in the group of patients treated with LLLT. Pain relief and functional recovery of patients treated with LLLT were significantly improved comparing to untreated patients. CONCLUSION: In addition to accelerated wound healing, the main advantages of LLLT for postoperative sport- and traffic-related injuries include prevention of side effects of drugs, significantly accelerated functional recovery, earlier return to work, training and sport competition compared to the control group of patients, and cost benefit.