

1. J Orthop Sports Phys Ther. 2010 Aug;40(8):524-32.

# Effects of low-level laser therapy (LLLT) in the development of exercise-induced skeletal muscle fatigue and changes in biochemical markers related to postexercise recovery.

[Leal Junior EC](#), [Lopes-Martins RA](#), [Frigo L](#), [De Marchi T](#), [Rossi RP](#), [de Godoi V](#), [Tomazoni SS](#), [Silva DP](#), [Basso M](#), [Filho PL](#), [de Valls Corsetti F](#), [Iversen VV](#), [Bjordal JM](#).

## Source

Center for Research and Innovation in Laser, Nove de Julho University (UNINOVE), São Paulo, SP, Brazil. [ernesto.leal.junior@gmail.com](mailto:ernesto.leal.junior@gmail.com)

## Abstract

### STUDY DESIGN:

Randomized crossover double-blinded placebo-controlled trial.

### OBJECTIVE:

To investigate if low-level laser therapy (LLLT) can affect biceps muscle performance, fatigue development, and biochemical markers of postexercise recovery.

### BACKGROUND:

Cell and animal studies have suggested that LLLT can reduce oxidative stress and inflammatory responses in muscle tissue. But it remains uncertain whether these findings can translate into humans in sport and exercise situations.

### METHODS:

Nine healthy male volleyball players participated in the study. They received either active LLLT (cluster probe with 5 laser diodes;  $\lambda = 810$  nm; 200 mW power output; 30 seconds of irradiation, applied in 2 locations over the biceps of the

nondominant arm; 60 J of total energy) or placebo LLLT using an identical cluster probe. The intervention or placebo were applied 3 minutes before the performance of exercise. All subjects performed voluntary elbow flexion repetitions with a workload of 75% of their maximal voluntary contraction force until exhaustion.

### **RESULTS:**

Active LLLT increased the number of repetitions by 14.5% (mean +/- SD, 39.6 +/- 4.3 versus 34.6 +/- 5.6;  $P = .037$ ) and the elapsed time before exhaustion by 8.0% ( $P = .034$ ), when compared to the placebo treatment. The biochemical markers also indicated that recovery may be positively affected by LLLT, as indicated by postexercise blood lactate levels ( $P < .01$ ), creatine kinase activity ( $P = .017$ ), and C-reactive protein levels ( $P = .047$ ), showing a faster recovery with LLLT application prior to the exercise.

### **CONCLUSION:**

We conclude that pre-exercise irradiation of the biceps with an LLLT dose of 6 J per application location, applied in 2 locations, increased endurance for repeated elbow flexion against resistance and decreased postexercise levels of blood lactate, creatine kinase, and C-reactiveprotein.

### **LEVEL OF EVIDENCE:**

Performance enhancement, level 1b.

PMID:

20436237

[PubMed - indexed for MEDLINE]