

Randomized Controlled Trial > Lasers Surg Med. 2015 Oct;47(8):634-42.

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## The potential of phototherapy to reduce body fat, insulin resistance and "metabolic inflexibility" related to obesity in women undergoing weight loss treatment

Marcela Sene-Fiorese <sup>1</sup>, Fernanda Oliveira Duarte <sup>2</sup>, Antonio Eduardo de Aquino Junior <sup>1 3</sup>, Raquel Munhoz da Silveira Campos <sup>4</sup>, Deborah Cristina Landi Masquio <sup>4</sup>, Lian Tock <sup>5</sup>, Ana Claudia Garcia de Oliveira Duarte <sup>6</sup>, Ana Raimunda Dâmaso <sup>4</sup>, Nivaldo Antonio Parizotto <sup>2 3</sup>, Vanderlei Salvador Bagnato <sup>1 3</sup>

Affiliations + expand

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### Abstract

**Background and objective:** The metabolic flexibility is often impaired in diseases associated with obesity, and many studies are based on the hypothesis that dysfunction in peripheral tissues such as skeletal muscle, liver and adipose tissue represent the etiology of development of metabolic inflexibility. Experimental evidence shows that the use of phototherapy combined with exercise was effective in controlling the lipid profile, reducing the mass of adipose tissue, suggesting increased metabolic activity and changes in lipid metabolism. However, we found few data in the literature involving the use of phototherapy in association to physical training in the obese population. Thus, our objective was to evaluate the effects of exercise training (aerobic plus resistance exercises) plus phototherapy (laser, 808 nm) on metabolic profile and adiponectinemia in obese women.

**Study design/materials and methods:** Sixty-four obese women (BMI 30-40 kg/m<sup>2</sup>, age between 20 and 40 years old) were randomly assigned in two groups: Exercise Training plus SHAM group (ET-SHAM, n = 32) and Exercise Training plus Phototherapy group (ET-PHOTO, n = 32). The treatment consisted in physical exercise intervention and the individual application of phototherapy immediately after the end of the training session. However, in the ET-SHAM group the device was turned off simulating the phototherapy application (placebo effect). The study protocol lasted for 20 weeks and comprised of three weekly sessions of aerobic plus resistance training and application of phototherapy (when applicable). The body composition and metabolic parameters were assessed (HOMA, adiponectin, insulin, glucose).

**Results:** Comparing the magnitude of effects between groups (ET-PHOTO vs. ET-SHAM), we observed that physical training plus phototherapy was more effective than physical training in reducing the delta of percentage of fat mass (%; -5.60 ± 1.59 vs. -4.33 ± 1.5; P < 0.04); fat mass (kg; -11.26 ± 2.82 vs. -5.80 ± 2.82; P < 0.0002); HOMA-IR index (-38.08 ± 9.23 vs. -20.91 ± 14.42; P < 0.0001). In addition, we observed an increase in delta (%) of total skeletal muscle mass (kg; 0.60 ± 1.09 vs. -1.38 ± 1.70; P < 0.003), adiponectin concentration (ng/ml; 1.08 (0.04-3.62) vs. -0.42 (-3.15 to 2.26); P < 0.03) in the same comparison.

**Conclusion:** Our results demonstrated for the first time that phototherapy enhances the physical exercise effects in obese women undergoing weight loss treatment promoting significant changes in inflexibility metabolic profile.

**Keywords:** adiponectin; insulin resistance; low-level light therapy; metabolic flexibility; obesity; physical exercise.

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