

Low-Level Laser Therapy as a Non-Invasive Approach for Body Contouring: A Randomized, Controlled Study

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Background and Objective: Transmission electron microscopic images have demonstrated the formation of transitory pores in adipocyte cell membranes followed by the collapse of adipose cells subsequent to laser irradiation of 635 nm. The objective is to evaluate the application of a 635 nm and 17.5 mW exit power per multiple diode laser for the application of non-invasive body contouring of the waist, hips, and thighs.

Study Design/Patients and Methods: Double-blind, randomized, placebo-controlled trial of a 2-week non-invasive laser treatment conducted from May 2007 to June 2008 across multiple-private practice sites in the United States of America. Sixty-seven volunteers between the ages of 18–65 with a body mass index (BMI) between 25 and 30 kg/m² and who satisfied the set inclusion criteria participated. Eight of the 67 subjects did not have circumference measurements recorded at the 2-week post-procedure measurement point. Participants were randomly assigned to receive low-level laser treatments or a matching sham treatment three times per week for 2 weeks. Reduction in the total combined inches of circumference measurements of the waist, hip and bilateral thighs from baseline to the completion of the 2-week procedure administration phase was assessed.

Results: Participants in the treatment group demonstrated an overall reduction in total circumference across all three sites of –3.51 in. ($P < 0.001$) compared with control subjects who revealed a –0.684 reduction ($P < 0.071745$). Test group participants demonstrated a reduction of –0.98 in. ($P < 0.0001$) across the waist, –1.05 in. ($P < 0.01$) across the hip, and –0.85 in. ($P < 0.01$) and –0.65 in. ($P < 0.01$) across the right and left thighs from baseline to 2 weeks (end of treatment). At 2 weeks post-procedure, test group subjects demonstrated a gain of 0.31 total inches collectively across all three sites.

Conclusion: These data suggest that low-level laser therapy can reduce overall circumference measurements of specifically treated regions. *Lasers Surg. Med.* 41:799–809, 2009. © 2009 Wiley-Liss, Inc.

Key words: adipocyte; adipose panicle; emulsification; photobiomodulation; transitory pore

INTRODUCTION

The emergence of non-invasive modalities targeting subcutaneous fat to achieve a slimming effect continues to gain interest amongst physicians and patients. Numerous delivery mechanisms have been developed to achieve adipocyte destruction including, ultrasound, infrared, and radio frequency [1–5]. The external application of photonic energy at high intensities can generate significant adverse events if not properly utilized; therefore, all parameters must be properly explored in order to identify which delivery mechanism yields the most desirable results while minimizing adverse events.

In recent years, there has been an upsurge in the application of low-level laser therapy (LLLT) across myriad neurologic, dental, ophthalmic, dermatologic disorders, and injuries [6–10]. LLLT has been proven to be a safe and effective therapeutic option in clinical and histological trials; yet, a great deal of skepticism still remains regarding the efficacy of this modality at the clinical level.

Numerous studies have exhibited laser therapy's ability to induce an assortment of cellular reactions in non-photosynthetic cells. Laser therapy has been shown to preserve the membrane and genetic material of cells that are nutritionally starved [11]; regenerate erythrocytes enhancing their oxyphoric function [12]; enhance fertilization potential of spermatozoa [13]; stimulate the differentiation of satellite stem cells [14–16]; reduce the extent of myocardial infarctions and ischemic strokes [17]; and improve wound healing and modulate chronic inflammation [18]. A continually growing body of evidence suggests that laser therapy can alter cell bioenergetics, consequentially influencing the functional biochemical properties intracellularly, culminating in an observable diverse clinical effect.

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