Independent Evaluation of Low-Level Laser Therapy at 635 nm for Non-Invasive Body Contouring of the Waist, Hips, and Thighs

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Introduction: The non-invasive body-contouring segment continues to exhibit uninhibited growth, a trend that has provoked the emergence of numerous body-contouring devices. One particular device, low-level laser therapy at 635 nm (LLLT-635), has exhibited promising clinical results. We performed an independent, physician-led trial to evaluate the utility of LLLT-635 nm for non-invasive body contouring of the waist, hips, and thighs.
Methods: Eighty-six participants were retrospectively assessed at an individual clinic in the United States. A multi-head laser device was administered every-other-day for 2 weeks. Each treatment consisted of 20 minutes of anterior and posterior treatment. Patients received concurrent treatment of the waist, hips, and bilateral thighs. Circumferential measurements were evaluated at baseline and one week following the 2-week treatment administration phase.
Results: Compared with baseline, a statistically significant 2.99 in. (7.59 cm) mean loss was observed at the post-procedure evaluation point ($P < 0.0001$). When analyzed individually, the waist, hips, and thighs each reported a statistically significant reduction of −1.12, −0.769, and −1.17, respectively. Furthermore, linear regression analysis revealed a weak linear dependence ($r = 0.179$) between the reported weight and circumference change.
Conclusion: These data further validate the clinical efficacy and safety of LLLT at 635 nm. Lasers Surg. Med. 45:1–7, 2013. © 2013 Wiley Periodicals, Inc.

Key words: non-invasive body contouring; low-level laser therapy; photochemistry; subcutaneous adipose; adipocyte; photobiomodulation

INTRODUCTION

Current non-invasive body-contouring devices have helped foster the growth of aesthetic medicine's non-invasive segment, as evidenced by a 20% increase in the total number of non-invasive tightening procedures, which includes body-contouring devices, performed from 2010 to 2011 [1]. One technology that has arguably contributed to this growth is low-level laser therapy. To date, the most studied low-level laser treatment for non-invasive body contouring uses a monochromatic 635 nm wavelength with an estimated output dosage of 1.0 J/cm^2 [2–19]. Studies have delineated these specific output parameters—when applied to adipocytes—activate intracellular secondary cascades causing the formation of transitory pores, or transmembrane openings, within the adipocyte membrane [2–9]. Newly formed pores increase membrane permeability and engender the release of stored intracellular lipids—primarily as triglycerides [2–9]. As a result, hypertrophic adipocytes collapse. This basic outcome has fostered the use of LLLT-635 for non-invasive body contouring.

LLLT-635 nm subtle effect on adipocyte structure derives from a photochemical mechanism [12–16]. Photochemistry is a scientific discipline that applies specific patterns of light energy to affect intracellular biochemical cascades in a non-destructive manner [20]. To activate intracellular cascades, photoreceptors, which are chemical structures capable of absorbing monochromatic light, must be present to absorb the applied light energy [21]. An important photoreceptor believed to incite many of the reported clinical outcomes is cytochrome *c* oxidase (CCO) [22–30]. CCO is the terminal enzyme of the respiratory chain responsible for establishing the electrochemical gradient required for adenosine triphosphate (ATP) synthesis [31]. Laser therapy excites CCO, which, in turn, accelerates electron transport upregulating ATP synthesis and affecting the cell's bioenergetics [32]. Upregulating cell bioenergetics initiates the secondary messenger system sending an amplifying signal that diffuses throughout the cell to influence cell activity. The subtle effect laser therapy has on the secondary messenger system shares similarities with agonist drugs. Light energy, like a drug agonist, activates cell signal transduction by, first, stimulating a specific receptor; second, triggering a secondary

Conflict of Interest Disclosures: All authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none were reported.
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