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Subcutaneous adipose tissue response to a non-invasive hyperthermic treatment using a 1,060 nm laser.

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Author information

Abstract

BACKGROUND: We postulated that a hyperthermic treatment using a 1,060 nm laser can cause a controlled adipocyte injury resulting in non-invasive **fat** reduction. This three-part study identified treatment parameters for a safe and tolerable treatment, demonstrated short- and long-term tissue response, and assessed the potential of this treatment for non-invasive **fat** reduction.

METHODS: In vivo temperature measurements were conducted prior to abdominoplasty via a thermal camera (for surface readings) and thermocouple needle (for subcutaneous readings). Short- and long-term tissue response was evaluated on the abdomen immediately post to 6 months post a 1,060 nm laser treatment. Laser dosage was varied to identify safe and effective parameters for **fat** reduction. Tissue biopsies for hematoxylin/eosin (H&E) staining were taken at weeks 1 and 2, as well as at 1, 2, 3, and 6 months (if applicable). Additionally, six subjects received a hyperthermic laser treatment to the flanks; four patients receiving laser treatment to one flank and cryolipolysis on the other, and two patients receiving laser treatment on one side with the other side as an untreated control. Efficacy measurements included ultrasound measurement of **fat** thickness at baseline, 2, 3, and 6 months; Magnetic Resonance Imaging (MRI) to calculate **fat** volume at baseline, 3 and 6 months; and blinded photograph evaluation at baseline, 1, 2, 3, and 6 months.

RESULTS: In vivo temperature measurements demonstrated that the hyperthermic temperature target (42-47°C) can be achieved and maintained in subcutaneous adipose tissue via a 1,060 nm laser in conjunction with surface cooling. Short- and long-term tissue responses were evaluated by tissue histology up to 6 months following treatment. Histological changes included inflammation, followed by macrophage infiltration starting at approximately 2 weeks, with evacuation of cellular debris completed by approximately 6 months. Clinical results demonstrated average **fat** thickness reduction at 14%, 18%, and 18% at 2, 3, and 6 months, respectively. Average **fat** volume reduction measured by MRI at 3 and 6 months was 24% and 21%, respectively. Blinded photo evaluation showed improvement starting at 1-month post-treatment and was maintained at 6 months. Adverse events were rare and included mild tenderness that resolved by 1-week post-treatment.

CONCLUSION: Parameters were identified that selectively injure and reduce adipocytes in subcutaneous tissue using a 1,060 nm externally applied laser. The treatment had an excellent safety profile and was well tolerated. The clinical study demonstrated that a 1,060 nm hyperthermic laser treatment for non-invasive **fat** reduction can be safe and effective. *Lasers Surg. Med.* 9999:XX-XX, 2016. © 2016 Wiley Periodicals, Inc.

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KEYWORDS: body contouring; laser **fat** reduction; non-invasive body contouring; non-invasive **fat** reduction

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