Efficacy of Laser and Light Therapy for the Treatment of Non-Atrophic Scars: A Systematic Review and Meta-Analysis

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Introduction: Scarring is the unavoidable consequence of injury to the skin. Treatment of scars remains a challenge despite the various treatment options available. Within the past decade, laser and light therapy (LLT) has become widely used to treat scars. The purpose of this systematic review and meta-analysis is to evaluate the evidence for the treatment of non-atrophic scars (e.g. linear scars, hypertrophic scars, and keloids) with LLT.

Methods: PubMed/MEDLINE, EMBASE and CENTRAL databases were searched for studies published through March 2016. The methodological quality of controlled clinical trials was evaluated, assigned a corresponding level of evidence and assessed for risk of bias. A meta-analysis of the studies that met the eligibility criteria was performed in order to determine the overall response rate of linear scars, hypertrophic scars (HTS), keloids, and striae distensae following treatment with LLT.

Results: Twenty-eight studies met the eligibility criteria. Most were Level II evidence (n=21), five were Level III and two were Level I. The most common scar type was HTS (n=16), followed by linear (n=9), keloids (n=7), and other or non-specified scar types (n=3). Limited evidence was found for striae distensae (n=1). The overall response rate for LLT was 0.65 (95% C.I. 0.53; 0.75) for linear scars, 0.61 (95% C.I. 0.45; 0.75) for HTS, 0.81 (95% C.I. 0.48-0.95) for keloid scars. Sub-analyses comparing laser modalities for each scar type revealed that fractional 1540/1550-nm Er:Glass and fractional 10,600-nm CO_2 lasers yielded the greatest response rates for linear and HTS, respectively. Of the studies assessing each respective scar characteristic, 100% showed improvement in texture, 83.3% showed improvement in thickness, 76.9% showed improvement in pliability, 44.4% showed improvement in erythema, and 41.7% showed improvement in pigmentation.

Conclusion: This study is the first meta-analysis to confirm the efficacy of LLT in the treatment of non-atrophic scars. Treatment with LLT is most effective for improving scar texture, thickness and pliability and least effective for improving scar color. Despite the numerous studies investigating treatment of non-atrophic with LLT that have been published, poor methodology, insufficient reporting, and lack of universal outcome measures makes determining evidence-based guidelines particularly challenging. This highlights the need for high-quality RCTs with Level 1 evidence and follow-up times of at least 6 months to determine the role of LLT in scar treatment.