Aesth Plast Surg (2013) 37:973–974
DOI 10.1007/s00266-013-0183-4

Device-assisted Transepidermal Delivery of Cosmeceuticals: A New Way to Enhance Aesthetic Procedures?

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Received: 21 June 2013 / Accepted: 21 June 2013 / Published online: 17 July 2013

Level of Evidence V This journal requires that authors assign a level of evidence to each article. For a full description of these Evidence-Based Medicine ratings, please refer to the Table of Contents or the online Instructions to Authors www.springer.com/00266.

The report of the study by Trelles et al. [1] is an informative article describing a novel way to enhance the already efficacious results of fractional carbon dioxide (CO_2) laser resurfacing. The results demonstrate the effectiveness of applying cosmeceuticals intraoperatively after fractional laser procedures using an ultrasound emitter to enhance the penetration of topically applied cosmeceuticals.

After 6 months, combined ultrasound and cosmeceutical treatments scored better than laser treatments alone with respect to reduction of fine lines, wrinkles, and overall facial aging. Overall, exceptional results were displayed not only with the combined treatment but also with the laser treatment alone.

Laser-assisted delivery of topicals relies on the concept of using a fractional laser to create vertical columns of ablated tissue, which can be used to bypass the stratum corneum, which is the rate-limiting step in drug delivery. Furthermore, a study by Bommannan et al. [2] showed that ultrasound can, due to its cavitational effects, temporarily reduce the skin barrier. Because the study by Trelles et al. [1] used both laser and ultrasound, it may be assumed that this allowed for even greater absorption than laser or ultrasound alone.

This article is a valuable addition to our library of beneficial uses for lasers and other devices in their ability to enhance the penetration of substances through the dermis. A number of drugs have been studied using laser assisted delivery systems including topical methyl 5-aminolevulinate (MAL), 5-aminolevulinic acid (ALA), lidocaine, imiquimod, autologous cells, platelet-rich plasma (PRP), ascorbic acid 2-glucoside, and therapeutic antibodies [3].

Recently, Massaki et al. [4] used an erbium-doped 1,550-nm fractionated laser to improve the delivery of topical bimatoprost, retinoic acid, and tacrolimus and found significant improvements in repigmentation of hypopigmented scars. Waibel et al. [5] successfully incorporated the use of a fractional CO_2 laser with topically applied triamcinolone acetonide suspension to treat hypertrophic scars.

Some considerations need to be entertained, particularly the possibility of increased systemic absorption of applied topicals. Many of these drugs have been studied only as topical applications, and unseen side effects could emerge when the absorbed amounts increase and reach the full thickness of the skin [6]. As Oni et al. [7] showed, maximum absorption occurred at a depth of 250 μm. Thus, less invasive lasers, such as low-energy fractional 1,440-nm lasers, would likely be sufficient for this laser-assisted delivery and result in a smaller side effect profile.

Although this study provides an excellent introductory investigation, it used a small sample size, and a larger follow-up study could be greatly beneficial. Furthermore, it would be important to include biophysical measurements in future studies because this study demonstrated only clinical ratings.

Finally, it would be of interest to compare the combined-treatment laser plus ultrasound and cosmeceutical with laser and an applied cosmeceutical alone. This would allow for assessment of the incremental increased efficacy of the ultrasound.

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