Title
MIDINFRARED LASER ABLATION OF STRATUM-CORNEUM ENHANCES TOPICAL DELIVERY OF DRUGS

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MID-INFRARED LASER ABLATION OF STRATUM CORNEUM ENHANCES TOPICAL DELIVERY OF DRUGS. J. Stuart Nelson, Jerry L. McCullough, Thomas C. Glenn, Beckman Laser Institute and Departments of Surgery (JSN) and Dermatology, University of California, Irvine, Irvine, California.

The stratum corneum (SC) provides the primary barrier for topical drug penetration. The removal of SC from pig skin by an erbium:YSGG laser (λ 2.79 μm) was assessed histologically and by electrical resistance measurements. The effects of laser treatment and tape stripping on the in vitro penetration of hydrocortisone (HC) and γ-interferon (γIF) were determined.

Excised pig skin was treated with laser (1 J/cm^2; 31 mJ/pulse; 1 Hz; 2 mm spot diameter). For skin penetration studies a total of 12 pulses was delivered to discrete 2 mm areas to ablate up to 50% of a total 3 cm^2 area. Franz in vitro skin penetration chambers were used to measure the cumulative 48 hr penetration of ^{3}H-HC and ^{125}I-γIF in laser treated and tape stripped skin.

Histological studies and electrical resistance measurements demonstrated that 10-14 laser pulses at the above energy density selectively ablated SC and abolished skin resistance. There was increased penetration of HC and γIF proportional to the area of ablation: 50% ablation produced 5x ↑ in HC; and 7x ↑ in γIF versus 1.3↑x with tape stripping.

These studies demonstrate that a mid-infrared laser can selectively and noninvasively destroy the skin barrier, facilitating penetration of large molecules such as γIF that can not penetrate intact skin. This new technique may be useful for both topical and transdermal delivery of therapeutic agents.