fractional resurfacing. Further study is required to compare safety and efficacy to IPL and fractional resurfacing.

CLINICAL APPLICATIONS—CUTANEOUS: *SKIN CANCER*

BASAL CELL CARCINOMA TREATED WITH ABLATIVE FRACTIONAL LASER AND INGENOL MEBUTATE—AN EXPLORATORY STUDY MONITORED BY OPTICAL COHERENCE TOMOGRAPHY AND REFLECTANCE CONFOCAL MICROSCOPY

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Background: Ingenol mebutate (IM) has previously been applied to clear superficial BCC. Ablated fractional laser (AFXL) may improve efficacy of IM treatment by increasing drug uptake in the tumor. Using non-invasive optical coherence tomography (OCT) and reflectance confocal microscopy (RCM), our aim was to investigate tumor response and tolerability after combined AFXL-IM treatment of superficial and nodular BCC.
Study Design/Materials and Method: Fifteen patients with histologically verified superficial (n = 5) and nodular (n = 10) BCC were treated with combined AFXL (10,600 nm) and IM 0.015% or 0.05%. Treatment was repeated at day 29 depending on tumor response evaluated by OCT and RCM. Local skin reactions (LSR) were monitored using an LSR scale ranging from 0 to 24 (At day 1, 3 or 4, 8, 15, 29 and at 3 months). At 3 months, treatment efficacy was evaluated by OCT, RCM and histology.
Results: Interim analysis showed partial tumor response in fourteen of fifteen patients at day 29, and all patients received a second treatment. Tumor tissue was identified as dark tumor islands and tumor nests in OCT and RCM images. LSR were restricted to the treated area, and composite LSR score ranged from 2.5 (1.25–3.75) to 8 (8–11.5) peaking on day 3 to 4. Pain was tolerable and limited to maximum 24 hours after treatment. Complete data will be presented at ASLMS 2018.
Conclusion: One treatment of combined AFXL-IM resulted in partial tumor response at day 29 with tolerable LSR. OCT and RCM effectively detected tumor residuals, prompting further image-guided AFXL-IM-treatment.

REAL TIME, NON-INVASIVE, *IN VIVO* SKIN CANCER DIAGNOSTICS BASED ON LASER SPECTROSCOPY AND MACHINE LEARNING ALGORITHMS USING AESTHETIC LASERS

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Background: There have been several *in vivo* skin cancer detection devices based on different types of optical techniques, such as multi-spectral imaging and Raman spectroscopy. However, they implement high-cost lasers or imaging sources and have insufficient diagnostic accuracies for clinical use with sensitivity of 87 ~ 98% and specificity of 9 ~ 38%. This study shows the effectiveness of a real time, non-invasive, *in vivo* skin cancer diagnostic device based on molecular laser induced breakdown spectroscopy and machine learning algorithms utilizing pre-existing short pulsed aesthetic lasers as its excitation sources.
Study Design/Materials and Method: A single-site study was designed to evaluate the effectiveness and safety of the device. The device consists of the light collection module attached to a handpiece and the analysis module mounted on any kind of short pulsed (ps ~ ns) laser system. A Q-switched (QS) 1064 nm laser (Lumenis, Ltd., Yokneam, Israel) was used to induce the micro plasma from the suspicious skin lesion. The analysis module of the device analyzes the plasma light spectrally to extract the elemental and molecular information from the skin lesion. More than total 1000 emission spectra from non-melanoma skin cancer (NMSC), melanoma and benign lesions from patients have been acquired and analyzed.
Results: The spectral analysis algorithm analyzes the acquired spectra and then determines the similarity to the embedded spectral database, implying the probability of malignancy. We validated the algorithms using ten-fold cross-validation with two-class disease partition based on the spectral data labelled with biopsy results. The deep neural network (DNN) algorithm in this study achieved up to sensitivity of 92% and specificity of 86% for the detection of skin malignancy.
Conclusion: A novel skin cancer diagnostic device based on laser spectroscopy and machine learning algorithms demonstrated to be a promising, low-cost tool for the detection of skin cancers with superior diagnostic accuracy compared to other optics-based diagnostic techniques.

CLINICAL APPLICATIONS—CUTANEOUS: *SKIN TIGHTENING*

SAFETY AND EFFICACY OF A NOVEL MICRO-EXCISIONAL DEVICE FOR FACIAL REJUVENATION

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Background: Traditional approaches for facial rejuvenation include ablative and non-ablative lasers and RF devices based on thermal energy effects. A novel micro-excisional device has been designed to perform facial rejuvenation without the use of thermal energy.
Study Design/Materials and Method: This study was designed to treat subjects bi-laterally in the mid to lower face with a 22G coring needle and 5% and 7.5% densities in up to 2 treatments, after administration of local aesthetic. Side effects and adverse events were to be recorded up to 180 days. Biopsies were to be taken pre- and post-treatment at 60 or 90 days. Efficacy would be assessed based on Lemperle (per PI and 3 independent reviewers), GAIS (per PI and subject) and Subject Satisfaction Scales at 90 days.
Results: Twenty three subjects with average age of 64 years (53 to 76 years) and Fitzpatrick skin types II and III were enrolled in the study. No unanticipated adverse events or serious adverse events were recorded. Histology from 3 subjects shows no scarring and excellent healing profile. Average pain during treatment was 0.36 (0–10 scale) and average downtime was 3.8 days and included erythema and swelling. Interim 90 days efficacy data of 15 subjects shows that 87% of 30 cheek areas had 1, 2 or 3 levels of improvement in moderate to severe cheek wrinkles, per Lemperle Scale, based on PI assessment. Both