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ASLMS 2021 ABSTRACTS

BASIC SCIENCE - ANIMAL-BASED PRECLINICAL STUDIES

ACTIVATION OF MYOSATELLITE CELLS AND MUSCLE HYPERTROPHY BY A NOVEL TECHNOLOGY UTILIZING SIMULTANEOUS EMISSION OF RADIOFREQUENCY AND HIFEM PROCEDURE: FLUORESCENT MICROSCOPY FACILITATED DETECTION OF NCAM/CD56

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Background: Myosatellite cells may be activated by both heat and mechanical stretch upon which they can differentiate to provide nuclei for existing muscles or to generate new muscle fibres. Current study investigates the effects of simultaneous application of HIFEM contractions and radiofrequency heating on the levels of myosatellite cells, which play a crucial role in muscle growth.
Study Design/Materials and Method: Total of five large White swines received three 30-minute treatments administered over abdomen. Muscle bioptates were acquired at baseline, 4 days, 2 weeks, and 1-month post-treatment. Baseline, 4-day and 2-week specimens were cut into 5–10 mm thick slices, and bound by the specific antibodies, the homeobox protein 7 (Pax7) levels, a marker of activated and differentiated SC, were quantified using immunofluorescence microscopy technique with a UV lamp. Several slices were stained by hematoxylin and eosin to monitor any structural changes.
Results: The analysis showed significant increase in the satellite cell levels by 26.1% at 4 days post-treatment and even by 30.2% at 2 weeks after treatments. Conventional histology images revealed hypertrophic changes demonstrated by increased cross-sectional area of muscle fibres. Slices also showed increased number of small diameter fibres, indicating increased presence of newly formed muscle fibres. No damage to muscle tissue was found as well as no adverse effects related to the treatment.
Conclusion: Finding of this study indicates that the simultaneous application of radiofrequency heating and HIFEM contraction results in activation and differentiation of myosatellite cells to support the hypertrophic changes of existing fibres and even to form new muscle fibres. The observed changes were comparable with 12–16-week long exercise programmes.

COOLING OF VISCERAL ADIPOSE TISSUE FOR SELECTIVE CRYOLIPOLYSIS

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Background: Cryolipolysis is the leading non-surgical fat removal technology for subcutaneous adipose tissue. We have recently developed an injectable ice-slurry, capable of selective subcutaneous adipose tissue removal after a single injection. We hypothesized that ice-slurry injection can also selectively reduce visceral fat and set out to investigate effects of cooling of visceral adipose tissue for treatment of obesity.
Study Design/Materials and Method: We used diet-induced obese mice that are a commonly used model for obesity. Epididymal fat pads in animals in the test and sham treatment groups were exposed to cooling or sham treatment. Body weight was monitored, and tissue samples were collected for histology at different time points.
Results: There was increase in expression of pro-inflammatory genes including IL-1a, IL-1b, IL-6, IL-10, MCP-1, and GM-CSF in adipose tissue at Day 1 post-cooling treatment. TUNEL staining showed increased number of TUNEL+ cells in treated fat pads at Day 1 post-cooling which is a hallmark of apoptosis. Histological analysis of the biopsy samples showed panniculitis at 14 days post-treatment. Body weight in sham group increased significantly at 14 days post-treatment in comparison with the baseline (46.80 ± 7.05 g vs. 45.20 ± 7.76 g; $P = 0.9999$ by two-tailed paired Student's t test).
Conclusion: In this study, we examined effects of cooling of visceral adipose tissue in a mouse model of obesity. We demonstrated that cooling of visceral fat induces inflammation in adipose tissue along with apoptosis in adipocytes that results is fat loss. Visceral fat cooling could potentially serve as a non-surgical treatment for obesity.

THE EFFECTS OF LARGE AREA FRACTIONAL PHOTOTHERYMOLYSIS TREATMENT ON MOUSE METABOLISM

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Background: Fractional photothermolysis is a widely used aesthetic tool with many dermatologic applications. Herein, we developed a mouse model to investigate the metabolic effects of fractional photothermolysis exposure over a large body surface area. The aim of our study is to elucidate the link between the hypermetabolic state induced by large area burns, and the apparent increase in metabolism following a controlled fractional photothermolysis treatment.
Study Design/Materials and Method: In our study, 22-week-old male C57BL/6J mice were used. We performed a laser procedure on the back of each mouse, covering approximately 30% of body surface area, sparing the tail, head, and extremities. Mice were then monitored for 5 days, after which they were euthanized. Mice were weighed before treatment and after euthanasia. Skin samples were dissected and stained with hematoxylin and eosin for histological analysis. Interleukin 6 (IL-6) (a marker of inflammation) and noradrenaline levels were determined in serum and plasma respectively by enzyme-linked immunosorbent assay.
Results: Mice experienced a considerable decrease in body weight after the laser procedure, as well as substantial fat loss in the

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inguinal fat pad area. The treatment also showed a significant increase in IL-6 levels and in noradrenaline levels in the treated mice, compared with the control mice. Additionally, an infiltrate of immune cells, including neutrophils, macrophages, lymphocytes, and some eosinophils were present in the treatment area.
Conclusion: While fractional photothermolysis is primarily an aesthetic dermatologic tool, this study is the first of its kind to show a link between the laser treatment and changes to metabolic rate. Further studies are warranted to analyse other markers of increased metabolism, and to precisely ascertain the underlying mechanism of the increased metabolic rate.

BASIC SCIENCE - IMAGING AND DIAGNOSTICS

EVALUATION OF EX VIVO CONFOCAL LASER SCANNING MICROSCOPY FOR SKIN BIOPSIES USING DIGITAL STAINING

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Background: Ex vivo confocal laser scanning microscopy (EV.CLSM) allows fast examination of native tissue. Recently digital staining (DS) has been integrated (EV.DS.CLSM) to ensure compatibility to hematoxylin and eosin (H&E) stained samples hence it has been proven to provide highly accurate results in normal skin. This study aims on evaluation of usability of EV.DS.CLSM in skin biopsies bearing pathologies.
Study Design/Materials and Method: One hundred and four human skin biopsies were subjected to EV.DS.CLSM (VivaScope 2500M-4G; MAVIG GmbH, Germany) followed by fixation in formalin, paraffin embedding, and H&E staining. Evaluation was performed blindly by a pathologist and a dermatopathologist (H&E) and a dermatopathologist (EV.DS.CLSM).
Results: Read outs of EV.DS.CLSM could be achieved in all cases. In 21 cases (20.2%) diagnosis could not be established by EV.DS.CLSM due to lack of quality (blurred picture, missing contrast, and misalignment). In 35.3% the EV.DS.CLSM derived diagnosis was not in consensus with H&E diagnosis as a result of poor quality.
Conclusion: EV.DS.CLSM facilitates the interpretation CLSM by experienced personnel. Cutaneous and subcutaneous elements provide excellent visualization with only minimal differences from their appearance on H&E slides in high-quality CLSM of larger skin samples. The results of the study demonstrate the importance of quality in small samples like biopsies to establish the correct diagnosis. Further studies are needed to define criteria to improve quality, specifically alignment, contrast, and sharpness.

BASIC SCIENCE - LASER-ASSISTED DRUG DELIVERY

CUTANEOUS PHARMACOKINETICS AND BIODISTRIBUTION OF NIVOLUMAB IN VIVO FOLLOWING TOPICAL LASER-ASSISTED DELIVERY AND INTRADERMAL INJECTION

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Background: A local immunotherapeutic treatment strategy for keratinocyte cancers may attenuate side effects seen with systemic PD-1 inhibitors. Laser-assisted drug delivery has been successfully used to facilitate local application of smaller molecules, but information on delivery of large therapeutic antibodies is limited. This study aims to examine the pharmacokinetics and biodistribution of the anti-PD-1 antibody, nivolumab, delivered locally by ablative fractional laser (AFL) and intradermal injection *in vivo*.
Study Design/Materials and Method: In vivo pig skin was exposed to CO_2 AFL (2×40 mJ/mb) with 5% or 15% density and topical application of nivolumab ($n = 32$, 1 mg/ml, 100 µl/10×10 mm) or intradermal injection of nivolumab ($n = 40$, 100 µl). Cutaneous nivolumab uptake was evaluated at different timepoints (0, 1, 2, 4 hours and 2 days) at two tissue depths (100–800 µm and 900–1600 µm) by ELISA. Biodistribution was visualized in vertical tissue sections using fluorescence microscopy and laser ablation-inductively coupled plasma-mass spectrometry.
Results: Our data demonstrate cutaneous uptake of nivolumab for both AFL-assisted delivery and intradermal injection. AFL-assisted delivery as well as intradermal injection provide uptake at Day 0 (0–4 hours) but at Day 2 the residual nivolumab deposition is substantially lower. Visualization of AFL-assisted nivolumab delivery shows a tendency of nivolumab to accumulate close to the coagulation zones of laser channels and diffuse horizontally into surrounding tissue, whereas a focal deposition of nivolumab is seen with intradermal injection. Additional quantitative data will be presented.
Conclusion: Our results suggest AFL and intradermal injection as potential local delivery techniques of therapeutic antibodies. Nivolumab delivered with AFL diffuses horizontally from the coagulation zones, while intradermal injection showed a focal deposition of nivolumab.

BASIC SCIENCE - LASER-TISSUE INTERACTION

PROVIDER DIRECTED ACTIVE FEEDBACK AND CONTROL OF A 1726 NM LASER FOR THE SAFE AND EFFECTIVE TREATMENT OF ACNE

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Background: Our team has previously presented studies demonstrating the relative selective absorption characteristics of 1726 nm light for sebum. We have developed a multi-pulse strategy to preferentially heat sebaceous glands while cooling the surrounding dermis. Highly controlled air-cooling was selected to permit real-time temperature monitoring with infrared thermography. By collecting temperature data for all our treatments, we were able ascertain the temperatures on the skin surface at the end of each sequence of laser pulses. These readings were correlated to a clinical endpoint of delayed papules in the treatment zones which demonstrated sebaceous gland damage histology. Since there was significant variation from sequential trigger pulls due to subtle changes in the target, cooling

sequences, and timing, we believe that an active feedback and control system would provide a mechanism to achieve and reproduce a very tight temperature endpoint.
Study Design/Materials and Method: Using a 1726 nm fibre laser with highly controlled air cooling and active thermal imaging, we treated areas of the face and back of patients in an IRB approved 10 person safety trial, a 16 person efficacy study, and a 10 patient split face efficacy trial. We studied the temperature profile of over 14,000 trigger pulls over each pulse of a multi-pulse treatment to better understand the dynamics of the temperature change.
Results: These data provided a mathematical relationship to the temperature rise observed with the succession of each pulse in the pulse train. With these data points we were able to design software which adjusted the power of the laser to achieve the provider determined surface temperature endpoint.
Conclusion: We have developed a system that permits safe and efficacious treatment of acne with a 1726 nm laser. The collected data provided a road map to construct a closed-loop control which permitted us to achieve a consistent temperature on the surface of the skin and damage to sebaceous glands without unwanted damage to dermis. This method could be applied to other devices to enhance efficacy and safety.

BASIC SCIENCE - OTHER JET INJECTOR - TISSUE INTERACTION

CLINICAL ENDPOINTS OF NEEDLE-FREE JET INJECTOR TREATMENT: A BETTER UNDERSTANDING OF IMMEDIATE SKIN RESPONSES

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Background: Clinical endpoints are immediate skin responses that guide physicians to choose optimal device settings. Needle-free jet injectors have been used many years for intradermal drug delivery, but, to date, predefined clinical endpoints were lacking. We aimed to assess the clinical endpoint of modern and traditional needle-free jet injector treatments by exploring the immediate skin responses.
Study Design/Materials and Method: Methylene blue solution was injected in *ex vivo* human skin using an electronically controllable pneumatic injector (EPI) with 3–6 bar pressure and 50–130 µl injection volume ($n = 63$), and a traditional spring-loaded jet injector (SLI) with fixed settings ($n = 9$). We measured the immediate skin papule (3D-camera), residual fluid on skin surface (pipette), and dermal distribution by estimating depth and width of the dye staining visible at a vertical skin section at the entry of injection. Needle injection served as comparison ($n = 9$).
Results: The volume of the directly visible skin papule corresponded proportionally to dermal distribution dimensions. The residual fluid corresponded inversely to subcutaneous dye penetration. EPI with 4 bar pressure and 100 µl injection volume resulted in the largest median skin papule volume of 48.7 mm^3 (35.4–62.6 mm^3), largest dermal deposition of 8.0 mm (5.5–9.0 mm) in width and 5.0 mm (4.0–6.0 mm) in depth, residual volume of 15.2 ml (13.2–20.3), and a minimal risk of subcutaneous penetration, comparable with needle injection. SLI showed high inter-injection variance with small to large skin papules, corresponding dermal drug deposition, and high risk of subcutaneous penetration.
Conclusion: Our results suggest that the immediate skin papule and residual fluid on skin surface are relevant clinical endpoints of needle-free jet injector treatments. A large skin papule corresponds to high dermal drug deposition, while little residual fluid with a small papule indicates a substantial risk of subcutaneous penetration.

BASIC SCIENCE - PRECLINICAL THERAPEUTICS

SAFETY EVALUATION AND CLINICAL TESTING OF AN EXTENDED LIFE LENS ARRAY FOR PICOSECOND LASER ON THE ABDOMEN, BACK, AND THIGHS

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Background: Picosecond lasers have become a staple in the laser industry. The most common treatments with the picosecond laser are pigmented lesions, tattoos, and rejuvenation. Rejuvenation is most commonly treated with a specialized lens arrays that allow for energy to be focused into smaller beams which deliver a much higher density of energy. This study evaluates an updated version of the lens which allows it to deliver more pulses without affecting safety and efficacy of the treatment.
Study Design/Materials and Method: Subjects ($N = 14$) were enroled and treated as part of the clinical trial. Before treatments began the lenses were photographed to obtain baseline imaging. Subjects were treated either on the back, abdomen, or thigh. Each of the three lenses being tested as part of this clinical trial were then used in treatment sessions until they reached a total of 80,000 pulses. At that point there were brought back to an engineering lab for imaging and to confirm the lenses were still working as intended. Afterwards they were returned to the clinical site and used until the remaining shots, 112,000 total pulses, were used and final imaging was performed.
Results: Fourteen subjects with skin types I–IV were enroled in the protocol to test the safety. A total of 25 treatment sessions were performed with a total number of 91 different treatment areas split into sections of the back, abdomen, or thigh. Treatments were found to be very comfortable with an average treatment pain score of 2.0/10. The adverse event profile assessed throughout the study was typical of picosecond laser treatments, with edema and erythema being the most common of events. Testing in the lab showed no differences in the lens array performance at any evaluation timepoint.
Conclusion: Extended use of a diffractive lens array showed no changes in the optical output and thus increasing the shot count of the lens from 80,000 pulses to 112,000 pulses did not affect the safety of the lens.

CLINICAL APPLICATIONS

CLINICAL APPLICATIONS - ABLATIVE/NON-ABLATIVE TREATMENTS

A REVIEW OF SERIOUS OCULAR COMPLICATIONS CAUSED BY LASER AND LIGHT-BASED PROCEDURES

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Background: For over 50 years, laser and light-based devices have been used in medicine for diagnostic and therapeutic capacities, including dermatology. Although cutaneous side effects, including pigmentary changes and thermal burns, are often discussed, ocular injuries also occur.
Study Design/Materials and Method: A systematic review using PRISMA guidelines was performed using the Medline database with search terms "laser or light and ocular and complication." All articles written in English describing ocular complications after laser or light-based treatments in dermatology or for cosmetic indications were included. Studies discussing injuries occurring in the military, laboratory or industrial setting, injuries in other medical fields or use of laser or light-based therapies to treat or diagnose ophthalmologic conditions, and articles not written in English without available translation were excluded.
Results: Our search resulted in 36 articles in 94 patients or laser operators discussing ocular complications. The most frequent procedure was carbon dioxide laser resurfacing, and the most common complication was temporary ectropion ($n = 50$). Other ocular complications described were visual abnormalities, photophobia, pain, hyperaemia, and pupil irregularities (including "keyhole deformities"). The left eye was more commonly injured (48.8%), than the right or bilateral eyes. Only 12.8% of cases reported appropriate eye protection during procedures.
Conclusion: Laser and light-based devices are safe when used with appropriate protective measures. Ocular complications from accidental exposure during such procedures can be serious with permanent sequelae. Clinicians should be able to quickly recognize the signs and symptoms of ocular injury to expedite evaluation and treatment. Medical practitioners need to implement appropriate safety protocols with necessary protective equipment for patients and staff, as well as to adequately counsel patients on ocular risks associated with such treatments.

COSMETIC CONSUMER PREFERENCES DURING COVID-19 PANDEMIC: A NEW NORMAL?

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Background: The COVID-19 pandemic has significantly impacted medicine, where many clinics had to close and patient needs have shifted. In order to meet patient demand, physicians have had to pivot their practice.
Study Design/Materials and Method: An online survey was distributed to consumers in the United States in August 2020.
Results: There were 109 respondents. Mean age was 36.4 years, and 70.6% were female. Overall, 10.4% were in the Northeast, 19.8% the Midwest, 44.3% the South, and 25.5% the West. 32.1% had previous cosmetic procedures. Despite COVID-19, 32.1% were interested in cosmetic procedures, while 28.4% were considering them. Physician practices were frequently preferred (60.6%) compared with medical spas, since 88.1% believed them to be safer. More respondents felt comfortable leaving their household for medical appointments (36.7%) than daily activities and elective procedures (31.2% each). The majority were now less likely to visit cosmetic dermatologists (72.5%), plastic surgeons (67.0%), general dermatologists (63.3%), and primary care physicians (55.0%). Of all respondents, 31.2% and 21.1% had interest in laser treatments and body contouring procedures, respectively. This mirrored their perceived safety given the COVID-19 pandemic. Because of COVID-19, a slim majority were now less likely to undergo body contouring or laser treatments (50.5% each). Of those whose daily lives were most impacted, respondents were less likely to undergo any cosmetic procedure (48.3% vs. 68.2%; $P = 0.005$). Given the COVID-19 pandemic, the top 5 factors in decisions to undergo cosmetic procedures were safety of the facility (73.4%), safety of the town/city (56.0%), mask-wearing requirement (55.0%), patient capacity of the facility (48.6%), and cost (34.9%).
Conclusion: The COVID-19 pandemic has significantly shifted how cosmetic physicians interact with patients, especially with laser and device treatments.

ODOR AND SWEAT REDUCTION IN PATIENTS WITH AXILLARY HYPERHIDROSIS TREATED WITH MICROWAVE THERMOLYSIS AT TWO DIFFERENT ENERGY LEVELS

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Background: Microwave thermolysis is a standard treatment for axillary hyperhidrosis that may reduce both sweat and odour. The microwave-device has various standard energy settings, but no prior studies have compared the different energy levels. This study aimed to evaluate axillary sweat and odour in patients treated with microwave thermolysis at two different energy levels.
Study Design/Materials and Method: Twenty adults with axillary hyperhidrosis were included. Sweat and odour were patient-assessed on standardized scales (Hyperhidrosis Disease Severity Scale [HDSS:1–4], Odor Scale [OS:1–10], supplemented by Dermatologic Life Quality Index [DLQI: 0–30]). The microwave-device had standard energy settings 3 to 5. This study was prospective, randomized, patient-blinded and intra-individual, treating one axilla with energy level 3 and the contralateral with energy level 5. Interim 1-month data from 19 patients are presented here. Full 1- and 3-month follow-up data will be shown at ASLMS meeting.
Results: Fourteen (74%) patients were women and five (26%) were men. Median age was 30 years (range: 18–46), median body mass index 25.8 (interquartile range [IQR]: 22.1–28.1). At baseline, patients reported substantial sweat and odour affecting their quality of life (DLQI median 10 [IQR: 8–20], bilateral HDSS median 4 [IQR: 3–4], bilateral OS median 8 [IQR: 7–8]). At 1-month follow-up, patients reported significantly improved quality of life with reduced sweat and odour from both axillae. DLQI was reduced to median 2 (IQR: 1–6, $P = 0.0001$). Bilaterally, HDSS was reduced to median 2 (level 3 IQR: 1.5–2 and level 5 IQR: 1–2, $P = 0.0001$ for both) while OS was reduced to median 3 (IQR: 1–6, $P = 0.0001$). Response to treatment did not differ between energy levels (HDSS, $P = 0.59$; OS, $P = 0.48$).
Conclusion: Microwave thermolysis equally and effectively reduced axillary sweat and odour at one month after treatment with two different energy levels. Correspondingly, patients' quality of life improved significantly.

RADIOFREQUENCY MICRONEEDLING: A COMPREHENSIVE AND SYSTEMATIC REVIEW

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Background: Many studies have evaluated radiofrequency microneedling (RFMN) in various dermatologic conditions. However, the efficacy and safety of RFMN, and how it compares with other energy-based devices in a clinician's armamentarium, remains unclear. We systematically reviewed higher-quality evidence supporting RFMN and the dermatologic conditions which it can be utilized in.

Study Design/Materials and Method: A search was conducted in MEDLINE and EMBASE from inception to May 13, 2020 using the terms: "radiofrequency microneedling" OR "fractional radiofrequency" OR "radiofrequency needling" OR "radiofrequency percutaneous collagen induction". Only randomized, split body or blinded studies with original data on humans were included. Non-English, or non-dermatology-related studies were excluded.

Results: Forty-two higher-quality studies were included after applying the inclusion and exclusion criteria. There were 14 studies for skin rejuvenation, 7 for acne scars, 6 for acne vulgaris, 5 each for striae and axillary hyperhidrosis, 2 for melasma, and 1 each for rosacea, cellulite and androgenetic alopecia.

Conclusion: RFMN is an effective intervention that can be used repeatedly and safely in combination with other treatment modalities and also in individuals with darker skin phototypes. RFMN-induced dermal remodelling and neocollagenesis are slow and progressive but continue to improve even 6 months after treatment.

SYNCHRONOUS ULTRASOUND PARALLEL BEAM TECHNOLOGY FOR EYEBROW AND SUBMENTAL LIFTING

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Background: Ultrasound technology can treat fine lines and wrinkles and lift lax skin. Although early technology was less than optimal, a new-generation device (Sofwave, Yokneam, Israel) can safely target mid-dermis to maximize neocollagenesis and neoelastogenesis, while incorporating feedback-controlled skin cooling and energy deposition. This ultrasound device utilizes synchronous ultrasound parallel beams to deliver seven beams of thermal energy at once to the mid-dermis at 1.5 mm, increasing tissue temperatures to 60–70°C.

Study Design/Materials and Method: A prospective, multicenter, clinical study investigated the utility of this ultrasound device to lift lax skin of eyebrow and submentum. Sixty subjects were enroled to receive single treatment to face and neck, which included darker skin types. Eyebrow and submental lifting were calculated at baseline and 12-week follow-up as post-hoc analysis.

Results: Fifty-eight subjected completed the study. Two blinded reviewers were in agreement in identifying pre- and post-treatment photographs correctly for 78% of subjects. There was improvement of 1–3 Elastosis Score units in 86% using Fitzpatrick Wrinkle and Elastosis Scale for perioral and periorbital regions. Overall, 72% of subjects noted improvement in wrinkle appearance, and majority were satisfied. There were no device-related adverse events and no downtime with all subjects. For the post-hoc analysis of lifting, photographs of 32 and 35 subjects were evaluable for eyebrow and submental measurements, respectively. 94% of subjects had an increase in both the average and the maximal eyebrow heights above the prespecified threshold of 0.5 mm in either right eyebrow, left eyebrow, or both. Mean changes in average and maximal eyebrow height were 1.4 and 1.6 mm, respectively. Eighty-three percent of subjects had a reduction in submental area above the prespecified threshold of 20 mm^2. Average submental lift was 89.2 mm^2.

Conclusion: This ultrasound device was demonstrated to safely provide clinical lifting of lax skin of the eyebrow and submentum after single treatment.

UPDATES IN ONYCHOMYCOSIS LASER MANAGEMENT: A SYSTEMATIC REVIEW

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Background: The use of lasers for the management of onychomycosis has been trending. However, light-based management is not traditionally first-line. We performed a systematic literature review focused on the efficacy of ablative and non-ablative lasers for the management of onychomycosis in adults.

Study Design/Materials and Method: A comprehensive literature search across seven databases was performed 10/2020 (Prospero (CRD42020212958) and utilized the following: PubMed, Medline and Embase via Ovid, Cochrane Library via Wiley, Scopus, Web of Science Core Collection, and ClinicalTrials.gov. Two authors screened all items and one resolved conflicts. Studies that focused on a paediatric population, animals, were non-original, had less than 10 subjects, and lacked mycologic cure were excluded.

Results: The initial database search retrieved 1160 items. Once duplicates were removed, 431 titles and abstracts were screened. Of these items, 286 were excluded with 145 articles remaining. Of these 145 full-text articles, 95 did not meeting inclusion criteria due to the following: incorrect outcome ($n = 60$), duplication ($n = 11$), study design ($n = 9$), publication type ($n = 7$), intervention ($n = 4$), population ($n = 1$), and unavailable ($n = 3$). Studies were grouped into the following categories: the Long and short-pulsed 1064 nm Nd:YAG ($n = 34$), 1320 nm Nd:YAG ($n = 1$), 1064 nm Diode Nd:YAG ($n = 1$), 1064 nm Q-Switched Nd:YAG ($n = 2$), 870 and 930 nm dual-wavelength diode ($n = 2$), 2940 nm Er:YAG ($n = 1$), and 10,600 nm CO_2 ($n = 9$).

Conclusion: Most of the studies focused on the long-pulsed Nd:YAG laser, however, the use of fractional ablative CO_2 laser allowing for nail destruction followed by drug-delivery may be promising.

UV AND CROSS POLARIZED IMAGE EVALUATION OF A NOVEL BIPOLAR AND MONOPOLAR RF MICRONEEDLING DEVICE FOR SKIN TEXTURE

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Background: Delivery of radiofrequency (RF) energy through micro-needle arrays allows treatment targeted to specific depths

without excess damage to surrounding tissue. This study evaluated the use of a novel RF bipolar and monopolar microneedling device for skin textural improvement.
Study Design/Materials and Method: Twenty-five subjects were enroled for laxity, scars, and wrinkles on the face in an IRB approved protocol. Subjects were treated up to five times at 3–4-week intervals with a new RF microneedle device with monopolar and bipolar settings, with follow-up 1- and 3-months post-treatment. Subject images, which includes cross-polarized and UV imaging, were taken at baseline and follow-up, in addition to subject and physician questionnaires. Images were analysed for texture, wrinkles, pigmented spots and pores as well as global improvement. Adverse events were also assessed throughout the study.
Results: Nineteen of the 25 subjects returned for their final follow-up, which was delayed up to 4-months post-treatment due to COVID-19. A majority (89%) of subjects rated that they were satisfied with their treatment results. Physician ratings of global outcome indicated that 17/19 showed some textural improvement compared with baseline. Blinded evaluators were able to correctly identify the post-treatment image with 90% accuracy. Multi-spectral imaging digital analysis showed measurable reduction of visible wrinkles, spots and pores in 16/19 subjects. No unexpected adverse events were recorded. Expected consequences included erythema for up to 24 hours.
Conclusion: Subject self-assessment, digital analysis as well as blinded physician evaluation indicate improvement of skin texture using a novel RF microneedle device which combines two methods of delivery.

CLINICAL APPLICATIONS - BODY CONTOURING/FAT REDUCTION

CLINICAL AND HISTOLOGICAL EVALUATION OF A 60 MM RADIOFREQUENCY HANDPIECE FOR TREATMENT OF LAXITY AND WRINKLES ON THE ABDOMEN

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Background: Abdominal treatments with a radiofrequency (RF) device have been found to improve both the laxity and wrinkles of the abdomen. This study evaluates treatment of the abdomen for laxity and wrinkles with a 60 mm RF device both clinically and histologically.
Study Design/Materials and Method: Twenty subjects were enroled and treated in the study, with four subjects participating in an optional biopsy portion of the study. Biopsies were taken post-final treatment within the treatment region to assess the histological effect. Hemotoxylin and Eosin, Masson, and Verhoeff Van Gieson staining were all completed on the biopsies. Each stain was graded from −3 to 3, indicating a strong decrease to a strong increase in the target protein respectively. All subjects also had photo and adverse event assessment throughout the study.
Results: Hemotoxylin and Eosin stain showed no difference in the pre- and post-treatment biopsies, but structural changes were found in biopsies from all of the subjects with demonstrated flattening of the epidermis and rete ridges. Two of the four subjects demonstrated increase in elastin fibres assessed via Verhoeff Van Gieson staining. The Masson stain demonstrated an increase in collagen fibres in three of the subjects. Biopsy analysis showed close agreement with the expert grading of the photographs in three of four of the subjects, with the fourth subject showing significant improvement in photo grading despite less impressive histological findings. A majority of the subjects were considered improved at the 120-day post-final treatment follow-up by photographic assessment of pre- and post-treatment images by the study physician.
Conclusion: The RF device with larger handpieces demonstrated increase in dermal structural proteins as visualized by histological staining along with corresponding visual improvement in pre- and post-clinical photographs.

CONCURRENT USE OF RADIOFREQUENCY AND TARGETED PRESSURE ENERGY IN SINGLE APPLICATOR FOR TREATMENT OF CELLULITE: 6-MONTH FOLLOW-UP

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Background: Cellulite is a common condition concerning up to 80% of post-pubertal women. A technology based on concurrent delivery of radiofrequency and targeted pressure energy has been proposed as a novel approach targeting all causes of cellulite. Current study aims to evaluate the safety and efficacy of such procedure for the treatment of cellulite.
Study Design/Materials and Method: A total of 30 women (average age 46.8 ± 8.8) affected by cellulite Grade 2 or Grade 3 according to the Nürnberger–Muller Scale were recruited. The treatment procedure included four treatments, each lasting for 15–24 minutes and spaced by 4–7 days. The level of improvement was assessed through evaluation of digital photographs taken at baseline and after the treatments by three independent and blinded evaluators according to the Global Aesthetic Improvement Scale. Furthermore, weight, patients' satisfaction and therapy comfort were assessed.
Results: The blinded evaluators stated that at 1 month 86% subjects showed a significant improvement in the condition seen in the digital photographs. The results peaked at 3 months post-treatment when 91% of the photographs rated score of 1 and higher, corresponding to significant improvement. A total of 87% of the patients reported improvement in the appearance of the treatment area, 80% were satisfied with the treatment results and 90% of the patients would undergo the treatments again. Treatment comfort was high; 2.7 ± 2.0 on a 10-point visual analog scale. No adverse events were reported.
Conclusion: Based on the condition assessment in the digital photographs and patients' satisfaction it can be concluded that the treatments with concurrent use of radiofrequency and targeted pressure energy were efficient in reducing the degree of cellulite and the results can be maintained for up to 6 months.

EVALUATION OF EFFICACY OF ELECTRO-STIMULATION OF THE ABDOMINAL MUSCLE AND MONOPOLAR RF FOR FAT REDUCTION AND NON-INVASIVE BODY SCULPTING

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Background: Localized fat pockets/bulges are among the top concerns expressed by patients in the aesthetic field. Current alternatives to surgery include laser, cryolipolysis, focused

ultrasound, intense pulsed light (IPL), radiofrequency (RF), or a combination of the above. These technologies reduce cellulite and body circumference with minimal recovery time and risks.
RF devices provide a non-invasive, safe and effective means of fat reduction, whereas electro-stimulation can stimulate muscle tissue and increase metabolism. The purpose of this pilot study was to evaluate the efficacy of an electro-stimulation muscle toning device in improving muscle tone and enhancing the results of monopolar RF body contouring.
Study Design/Materials and Method: This was a single-center, pilot study with three arms. In the first arm subjects received up to six consecutive electrostimulation treatments weekly (twice a week). In the second arm subjects received one monopolar RF treatment on the abdomen and flanks. In the third arm subjects received a combination of one monopolar RF treatment and up to six consecutive electro-stimulation treatments weekly (twice a week). Follow-up visits were scheduled 12 weeks after the final treatment. The primary endpoint was safety evaluation of the three different treatments. Secondary assessments included subject satisfaction, subject tolerability evaluation, three-dimensional (3D) photography and ultrasound body measurements to record differences in muscle and fat layer. Additional assessments included Global Aesthetic Improvement Scale (GAIS) measurement by blinded investigator and correct identification of the baseline and final treatment 3D photographs by at least two of three blinded reviewers in 75% of the subjects.
Results: Eight patients (six females and three males) were enroled in the electro-stimulation arm, ten patients in the monopolar RF arm (four males and six females) and ten patients in the combination arm (five males and five females). No serious adverse effects were reported in any of the arms. Erythema was a side effect experienced by two patients in the combination arm and one patient in the monopolar RF only arm, but this resolved within hours after treatment. The majority of patients in all arms were satisfied with the treatment (65% of patients in the monopolar RF arm; 80% of patients in the electro-stimulation arm; 85% of patients in the combination arm). Interim analysis of body measurements post-last treatment demonstrated a 2% fat reduction in the monopolar RF arm, 2% fat reduction in the electro-stimulation arm, and 6% fat reduction in the combination arm. A greater improvement in GAIS as assessed by blinder-investigator was noted in the combination arm compared with the monopolar RF only and electro-stimulation only arms.
Conclusion: Preliminary results of this pilot study demonstrate that treatment of the abdomen/flank area using a combination of monopolar RF and electro-stimulation results is safe and effective in fat reduction, with a high patient satisfaction. Monotherapy with monopolar RF or electrostimulation is also safe and efficacious in body contouring, but to a lesser extent than the combination treatment.

LONG-TERM EFFICACY ASSESSMENT OF NOVEL TECHNOLOGY UTILIZING HIFEM AND RADIOFREQUENCY IN SIMULTANEOUS MANNER FOR ABDOMINAL REMODELLING: MRI EVIDENCE OF SUBCUTANEOUS FAT REDUCTION AND MUSCLE TONING

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Background: Both radiofrequency (RF) and HIFEM are widely used standalone treatments for fat reduction and muscle strengthening respectively. Yet, the technology evolution now enables to deliver both modalities at the same time from a single applicator. Our study investigates the efficacy of such treatments for abdominal fat reduction and muscle strengthening as well as longevity of achieved outcomes.
Study Design/Materials and Method: A total of 41 (average age: 39.7) subjects participated in the study. All subjects underwent three treatments applied to abdomen with a device delivering HIFEM and RF simultaneously. Outcomes were evaluated by measurements of subcutaneous fat thickness, muscle thickness and abdominal separation in magnetic resonance imaging (MRI) images obtained at baseline, 1 month, 3 months and 6 months post-treatment. Also weight, waist circumference, digital photographs, and subject comfort and satisfaction were evaluated. All post-treatment data were compared with baseline using t test.
Results: According to the MRI the results were peaking at 3 months post-treatment, when the fat layer was reduced by 30.8%, muscle thickness was increased by 26.1% and abdominal separation was reduced by 18.8%. Waist circumference was reduced by 5.9 cm, while weight did not change. The treatment was considered as comfortable (score: 2.32 ± 1.79 on a 10-point visual analog scale). 94% of patients reported improvement in abdominal appearance, and 91% were satisfied with treatment results. Six-month data showed that the results were preserved at level of 28.3% for fat layer reduction, 25.3% for muscle thickening and 19.8% for reduction in abdominal separation.
Conclusion: The results showed high efficacy of the simultaneous application of HIFEM and RF for adipose and muscle tissue remodelling. The results appear to be resilient to declines over time as the achieved outcomes were preserved even after 6 months after the treatments.

NATIONAL MARKET ANALYSIS FOR BODY CONTOURING PROVIDERS: MEDICAL SPAS AND PHYSICIAN PRACTICES

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Background: Non-invasive body contouring has recently experienced significant growth. To meet demand, medical spas and non-physician operators have grown. Insights into their practice can provide information on their impact.
Study Design/Materials and Method: Cross-sectional analysis of the non-invasive body contouring market was performed for 30 most populous cities in the United States. Data were collected for body contouring devices (CoolSculpting, Allergan, Pleasanton, CA; Emsculpt, BTL Aesthetics, Marlborough, MA). Providers and facilities were categorized as medical spas or physician-based practices.
Results: Cities with greatest number of body contouring providers were New York (138), Los Angeles (106), Houston (87), Chicago (51), and Austin (47). Population size had significant relationships, while median household income did not. By region, the West had greatest mean number of providers per 100,000 persons followed by the South, Northeast, and Midwest. For number of body contouring providers per 100,000 persons, top five cities were Austin (4.87), Houston (3.74), Las Vegas (3.41), Dallas (3.35), and San Francisco

(3.06). For ratio of providers in medical spas to physician practices, top five cities were Oklahoma City (8.00), Boston (5.50), Memphis (4.00), Phoenix (3.33), and Denver (3.20), with a mean of 1.81. 70.0% of cities had equal or more body contouring providers in medical spas than physician practices. As an overall percentage of medical spas, top five cities with body contouring providers in medical spas were Oklahoma City (41.0%), Detroit (40.0%), Boston (25.0%), Louisville (25.0%), and Dallas (20.3%), with a mean of 14.5%. As an overall percentage of aesthetic physicians, top five cities with body contouring providers in physician practices were Los Angeles (95.5%), Austin (44.8%), Las Vegas (30.4%), Houston (30.4%), and Chicago (30.3%), with a mean of 18.3%.
Conclusion: Across the United States, cities have experienced an unequal distribution of body contouring providers, and many cities have more medical spas than physician-based practices.

NOVEL TECHNOLOGY WITH SIMULTANEOUS EMISSION OF RADIOFREQUENCY AND HIFEM FIELDS FOR ABDOMINAL BODY SHAPING: LONG-TERM MULTI-CENTER SHAM-CONTROLLED RANDOMIZED TRIAL

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Background: The safety and efficacy of HIFEM and radiofrequency devices in body shaping has been proven by multiple studies. Novel technology allows emitting both of these energies at once, yet studies of this application are lacking. We hypothesize that simultaneous heating and muscle stimulation may work in synergy and enhance the outcomes seen with standalone treatments. The goal of this controlled trial is to analyse the safety and efficacy of this application over period of 6 months.
Study Design/Materials and Method: Seventy-two subjects were randomly allocated into active ($N = 48$) and sham ($N = 24$) groups. Both groups received three abdominal treatments delivered once per week with a device simultaneously emitting HIFEM and RF energies. For active group the intensities were set to maximum tolerable levels, while for sham the intensities were set to 5% of maximum output. The efficacy was assessed by ultrasound imaging through measurement of adipose and muscle tissue thickness at images taken at baseline, 1 month, 3 months, and 6 months after the last treatment. Furthermore, digital photographs, satisfaction and comfort were collected.
Results: Active group showed reduction in fat thickness by 20.5% at 1 month and by 28.3% at 3 months post-treatment. Muscle thickness was increased by 21.5% at 1 month and by 24.2% at 3 months post-treatment. The improvements were maintained at 6-month follow-up. Subjects of sham group did not show any significant changes. The treatments were found comfortable by both groups, while only the subjects of active group were satisfied with the treatment outcomes.
Conclusion: The active treatment effectively reduces fat layer while enhances the muscle thickness. The observed results exceed the results of previous research on HIFEM technology, indicating synergies between heat and muscle stimulation exist and thus making the simultaneous application a superior technology in the body contouring by exceptional dual effect on muscle and fat.

SIMULTANEOUS EMISSION OF SYNCHRONIZED RADIOFREQUENCY AND HIFEM ENERGY FOR TREATMENT OF LATERAL THIGHS: INTERIM RESULTS OF THE MRI MULTICENTER STUDY

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Background: Besides the abdomen, excessive fat accumulation notably occurs on the lateral thighs forming so-called saddlebags, most prominently seen in women. Using magnetic resonance imaging (MRI), this multicenter study documents the effect of a novel technology delivering synchronized radiofrequency (RF) and HIFEM energy simultaneously on the lateral thighs.
Study Design/Materials and Method: Thirty subjects (44.57 ± 10.19 years, 24.57 ± 3.50 kg/m^2) were recruited in three different sites. They received four 30-minute bilateral treatments combining RF and HIFEM energies delivered over the lateral thighs once a week. Treatment intensities (0–100%) of both modalities were regulated according to the patients' tolerance. Therapy comfort was also documented after each treatment by 5-point Likert scale and 10-point visual analog scale questionnaires. MRI images obtained at baseline and 1-month post-treatment were used to examine changes in subcutaneous tissue. Hip circumference measurements and satisfaction questionnaires were assessed as well.
Results: Analysis of the MRI scans revealed a significant ($P < 0.001$) reduction of fat thickness in the saddlebag region. The average baseline fat thickness in the studied sample was 6.23 ± 1.42 cm and declined to 4.83 ± 1.15 cm at one month, resulting in a mean difference of 1.40 ± 0.34 cm. There were no non-responders at the 1-month follow-up visit, and no adverse events were noticed. In general, patients were satisfied, and they felt none to mild discomfort throughout the treatment sessions with an average VAS score of 2.45 points. The average hip circumference at baseline was equal to 106.29 cm, and it showed a significant ($P < 0.05$) decrease by 2.98 cm at 1-month post-treatment.
Conclusion: The interim short-term results showed the efficacy of the novel technology combining synchronized RF with HIFEM for fat reduction and toning in lateral thighs. In the future, long-term data will be acquired to investigate the extent of the induced changes over time.

USE OF NEUROMUSCULAR ELECTRICAL STIMULATION FOR ABDOMINAL AND QUADRICEPS MUSCLE STRENGTHENING: A RANDOMIZED CONTROLLED TRIAL

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Background: Preliminary data using a new neuromuscular electrical stimulation (NMES) device has demonstrated an average 30% increase in abdominal muscle mass on ultrasound imaging following a treatment cycle of four to six sessions. The objective of this study was to evaluate if this increased muscle mass translated to improved strength and endurance through isometric and isokinetic muscle testing. This study also sought to determine which treatment protocol elicits a greater functional gain, when peak response is reached, and what is the sustainability of improved physical performance.

Study Design/Materials and Method: A prospective, single-center, randomized open-label controlled study included twenty-six subjects randomized into three groups: two treatment groups, and one control group. Both treatment groups received a total of four NMES treatments over a 2-week period. Group 4TM received four treatments with "Tone Mode," and Group 2TM + 2SM received two NMES treatments with Tone Mode, followed by two treatments on Sculpt Mode. Anthropometric measurements were assessed at baseline at 4 weeks post-treatment. Muscle performance testing was conducted at baseline, 2 weeks, and 4 weeks post-treatment. Study participants completed Subject Satisfaction Surveys and a Personal Experience Assessment.
Results: Of the 24 subjects who completed 4 treatments or were control, 15 completed functional performance testing because of the COVID-19 pandemic and state-mandated lockdown. In these subjects, there was a statistically significant improvement ($P < 0.02$) in abdominal and quadriceps strength and endurance from baseline through 4 weeks post-treatment. A statistically significant decrease ($P < 0.04$) in waist circumference measurement from baseline to the 4-week follow up was also appreciated. Subject satisfaction regarding abdominal and quadriceps strength was reported as "satisfied or very satisfied" in 89% and 92% at 4 and 8 weeks post-treatment, respectively.
Conclusion: Treatment of the abdomen and quadriceps with NMES leads to improvement in muscular strength and endurance without side effects or downtime.

PATIENT SATISFACTION WITH THE IMPROVEMENT IN THE APPEARANCE OF CELLULITE RESULTING FROM A SINGLE NON-INVASIVE TREATMENT WITH A RAPID ACOUSTIC PULSE DEVICE CAUSING ACOUSTIC SUBCISION: INTERIM 52 WEEKS FINDINGS FROM A MULTI-CENTER PIVOTAL TRIAL

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Background: A Rapid Acoustic Pulse (RAP) device with high intensity acoustic shock waves at 50 Hz has demonstrated improved appearance of cellulite through disruption of subcutaneous fibrous structures (i.e. acoustic subcision). In a multi-center IRB approved pivotal trial, previously reported 12-week results demonstrated a greater than 1-point mean reduction ($n = 56$) in the Simplified Cellulite Severity Scale with over 90% of the participants stating that they "agree" or "strongly agree" with the statement "My cellulite appears improved" after viewing the before-and-after photographs.
Study Design/Materials and Method: In this interim evaluation of the long-term (>52 weeks) level of satisfaction, 39 women with grade II cellulite who were initially assessed at 12-weeks following a single 19–33-minute RAP session, were assessed again 1-year after treatment. At this follow-up visit, each participant evaluated side-by-side before-and-after photographs of their treatment area, and then answered questions on their satisfaction with improvement in the appearance of their cellulite. Each also gave an assessment of their memory of RAP procedure tolerability.
Results: The 39 participants were seen 1-year (average: 60 weeks; range: 54–67 weeks) following a single RAP session. 100% of the participants "agree" or "strongly agree" with the statement "My cellulite appears improved" after viewing the before-and-after photographs (up from 12 week 92.8% [$n = 52$] 97.4% [$n = 3$ 9]). Additionally, 97.4% "agree" or "strongly agree" with the statement "I feel there is good improvement." Finally, 76.9% "agree" or "strongly agree" with the statement "The RAP procedure was relatively pain-free." After the RAP treatment, no adverse events were noted during the period leading up to the long-term follow-up visit.
Conclusion: Earlier results demonstrated that a single RAP session can provide non-invasive, nearly painless improvement in the appearance of cellulite with a high level of patient satisfaction. Interim long-term results demonstrate a continued high level of patient satisfaction at least 1-year after a single treatment session.

CLINICAL APPLICATIONS - COMBINATION THERAPIES

COMPARISON OF NARROWBAND UVB FIBRE OPTIC BRUSH AND HYDROXYCHLOROQUINE THERAPY IN LICHEN PLANOPILARIS: A PILOT STUDY

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Background: Lichen planopilaris (LPP) causes cicatricial hair loss if untreated. Hydroxychloroquine (HCQ) is a common LPP treatment with variable side effects. Narrowband UVB (NB-UVB) has been used in the treatment of scalp psoriasis and is well tolerated. In this open-label study, we evaluated the efficacy of NB-UVB and HCQ in the treatment of LPP.
Study Design/Materials and Method: Patients with biopsy-proven LPP and baseline LPP-activity-index (LPPAI) scores above 2.0 were eligible for enrolment. Patients underwent target area (TA) tattooing at the site of greatest scalp inflammation following a treatment washout period. Scalp biopsies and trichoscopy were performed at baseline and at 6 months. Participants were assigned monotherapy treatment, either NB-UVB or HCQ. Those using the NB-UVB device (300–320 nm) treated affected scalp three times weekly for 6 months and followed psoriasis dosing protocols based on Fitzpatrick skin type. Maximum HCQ dose was 5 mg/kg/day. TA erythema, TA perifollicular scale, LPPAI, and NRS itch were the study endpoints.
Results: Twenty-four participants were enroled and completed the study. Sixteen patients used NB-UVB and underwent an average of 56.9 treatment sessions at an average dose of 647.1 mJ/cm. Eight patients took HCQ at an average daily dose of 368.8 mg. A significant reduction in LPPAI score was reported by both those taking HCQ (77.2%, $P = 0.00$) and those using NB-UVB (45%, $P = 0.01$). Both groups had a significant decrease in TA erythema ($P = 0.00$, $P = 0.05$), but only the NB-UVB group had a significant decrease in TA perifollicular scale ($P = 0.03$). There was no significant difference in change in LPPAI or TA score between groups after treatment. No serious adverse events occurred.
Conclusion: Our preliminary findings suggest NB-UVB via fibre optic brush decreases scalp inflammation in patients with LPP. There was no significant difference between NB-UVB and HCQ in the reduction of scalp inflammation, however, further controlled trials are needed.

EVALUATION OF THE EFFICACY AND SAFETY OF A COMBINED SAME-DAY TREATMENT PROTOCOL WITH PICOSECOND PULSED 755 NM ALEXANDRITE LASER AND INJECTABLES AND CHEMICAL PEELING

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Background: Combined treatments with multiple modalities such as light-based technology and injectable or chemical aesthetic treatments are commonly required for different indications. Usually it is not advised for doctors to perform them at the same setting. The purpose of this study is to examine the safety profile and efficacy of the use of injectables and chemical peel with a picosecond pulsed 755 nm alexandrite laser for active acne vulgaris, atrophic acne scars and photo-rejuvenation, at the same setting.

Study Design/Materials and Method: Ten patients were treated using a picosecond pulsed 755 nm alexandrite laser with a diffractive lens followed by injections of skin boosters via a semi-automated precise dose dermal delivery device. Ten patients were treated using a picosecond pulsed 755 nm alexandrite laser with a diffractive lens followed by injections of growth factors manually via a 4 mm needle. Ten patients with active acne and/or open pores and/or unexfoliated poor skin condition were first treated using a chemical peel containing salicylic acid, lactic acid, glycolic acid, retinoic acid for 90 seconds and then immediately followed by a picosecond pulsed 755 nm alexandrite laser with a diffractive lens. Patients were evaluated using high-resolution photographic assessments, blinded grading by the treating physician and a dermatologist, and patient assessment questionnaire.

Results: One hundred percent of the subjects were graded as improved by the treating physician. Blinded graders were able to correctly identify the post-treatment photograph 80% of the time. Eighty percent subjects reported they were satisfied with their treatment results. All subjects well tolerated the treatment with pain scores 3/10. Adverse event evaluation showed that there was no severity of adverse events from combined same-day treatment protocol. Only transient events were recorded.

Conclusion: The combined same-day treatment protocol of a 755 nm picosecond pulsed alexandrite laser with a diffractive lens and injectables and chemical peeling is both a safe and effective method for treatment of active acne, acne scarring and rejuvenation, which improves clinical results and is well tolerated for patients without apparent adverse effects.

PAIRING FACIAL FILLERS WITH 755 NM PICOSECOND LASER WITH DIFFRACTIVE LENS ARRAY: A 5-YEAR SAFETY EVALUATION OF SINGLE-SESSION TREATMENTS

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Background: Limited studies have demonstrated the safety of pairing fillers with laser treatments during the same session. However, there remains concerns about patient safety and filler efficacy.

Study Design/Materials and Method: A retrospective chart review was performed over a 5-year period. Patients had single-session facial treatments with soft-tissue fillers and picosecond 755 nm alexandrite laser with diffractive lens array (DLA) (Cynosure, Westford, MA). Safety was assessed by adverse events within the first 2 weeks.

Results: One hundred and eighty-three patients had 406 single-session treatments. 95.6% were female, and mean age was 56.1 years. For Fitzpatrick skin type, 38.8% were type I, 35.0% were type II, 20.8% were type III, and 5.5% were type IV. Overall, 50.3% had one session, 20.8% had two sessions, 12.0% had three sessions, and 16.9% had four or more sessions. For the laser pulse count, the mean was 3730.2 pulses; however, recorded pulse counts may have included other sites besides the face. For injection site, 84.2% included the cheeks and/or tear troughs, 77.1% the perioral area, 24.1% the lips, 20.0% the temples, 13.5% the nasolabial folds, 9.6% the chin, 8.9% the jawline, 1.2% the nose, and 1.0% the forehead. For fillers, 48.3% used one syringe, 36.5% used two syringes, 11.8% used three syringes, and 3.4% used four syringes. Of the 406 single-session treatments, there were no documented adverse events related to spread of fillers or laser treatment of filled areas, including product migration, unexpected loss of filler volume, vascular occlusion, acute pain, cutaneous necrosis, blindness, and cutaneous burn. There were no hospital or emergency room transfers or admissions and referrals to ENT or ophthalmology for additional work-up.

Conclusion: Of the 406 single-session treatments with fillers and picosecond 755 nm alexandrite laser with DLA, there were no adverse events due to spread of fillers or laser treatment of filled areas.

SAFETY PROFILE OF LASER-ASSISTED DRUG DELIVERY OF VITAMIN C, E, AND FERULIC ACID SERUM FOLLOWING FRACTIONAL ABLATIVE LASER THERAPY: A RETROSPECTIVE CHART REVIEW

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Background: In a landmark paper by Waibel et al. in 2016, the application of topical Vitamin C, E, and Ferulic Acid serum (CE Ferulic Acid) immediately post-fractional ablative laser procedure resulted in more rapid wound healing without any side effects. However, transcutaneous drug delivery of cosmeceuticals that were initially intended for topical application have since been identified to have unintended consequences. Soltani-Arabshahi et al. published three cases of facial granulomas that developed following microneedling after application of a vitamin C containing cosmeceutical. The objective of our study was to add to the limited body of literature on this topic by reporting data from our single academic center experience consisting of patients treated with a topical application of CE Ferulic Acid immediately following fractional ablative laser treatment with a focus on reportable side effects.

Study Design/Materials and Method: A retrospective chart review of all patients at the University of Minnesota M Health Cosmetic Center who had fractional ablative CO_2 (10,600 nm) laser procedure for any diagnosis followed by application of CE Ferulic Acid from January 1, 2015 to December 31, 2018 was performed. Exclusion criteria included paediatric and research opt-out patients. Thirty-three patients met inclusion criteria, with a total of 45 treatment encounters. The complete medical records of these patients were reviewed to identify any reported post-procedure complications due to CE Ferulic Acid application.

Results: None of our 33 patients (encompassing 45 total treatments) reported or were clinically found to have side effects

attributed to application of CE Ferulic Acid following fractional ablative CO_2 laser treatment at follow up appointments. All patients had appropriate resolution of normal post-procedure erythema, mild tenderness, and superficial desquamation without complications.
Conclusion: The application of CE Ferulic Acid serum following fractional ablative laser therapy can shorten post-procedure recovery by enhancing transcutaneous penetration of cosmeceuticals. Our study complements Waibel's findings in demonstrating an excellent safety profile associated with laser-assisted drug delivery of CE Ferulic Acid. Limitations include small sample size, retrospective nature of study, and limited length of follow up. Lastly, our findings may not be generalizable to other formulations of vitamin C cosmeceuticals.

CLINICAL APPLICATIONS - GENITOURINARY HEALTH

HIFEM PROCEDURE FOR IMPROVEMENT OF URINARY INCONTINENCE AND FEMALE SEXUAL FUNCTION: 9-MONTH PERSPECTIVE

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Background: A deconditioning of the pelvic floor muscles (PFM) may result in urinary incontinence (UI) and impairment of sexual function. This study investigates the long-term effectiveness of the HIFEM-induced PFM strengthening for the reduction of UI and improvement in female sexual function.
Study Design/Materials and Method: Thirty-three females (49.2 ± 9.8 years) received a total of six 28-minute HIFEM treatments of pelvic floor scheduled twice a week over a three-week period. Standardized questionnaires examining UI and sexual function (ICIQ-UI SF, FSFI and PISQ-12) were utilized for the evaluation. The long-term observation of study cohort included visits after the last treatment, at 1-, 3-, 6- and 9-month follow-up. Post-treatment scores were statistically analysed ($a = 5\%$) and compared with the baseline.
Results: Baseline ICIQ-UI SF score (11.1±5.1 points) showed moderate UI symptoms. The severity of UI significantly ($P< 0.001$) decreased and subjects achieved improvement of 60% (-6.7 points) at a 1-month follow-up. The results were maintained for 9 months with an average change of -8.1 points relative to baseline. FSFI score was improved from values indicating female sexual dysfunction at baseline (22.3±6.6 points) by 7.1 points at 1-month follow-up visit. Except for a slight decline at 6-month follow-up visit (+6.4 points), this level of improvement was maintained up until the 9 months, reaching a difference of +7.2 points ($P< 0.001$). The most prominent changes were seen in the following subdomains: desire, arousal, lubrication and orgasm response. Lastly, the baseline PISQ-12 score of 32.3±6.8 points was continuously increasing ($P< 0.001$), reaching the highest improvements at 3-month (+7.9 points) and 9-month (+8.2 points) follow-up visit, respectively. Subjects improved most in emotive subdomain, reporting more frequent orgasms, increased desire and sexual excitement.
Conclusion: The results indicate that the HIFEM procedure effectively enhances female sexual function while reducing urinary incontinence. The study outcomes were sustained up to 9-month follow-up visit, and no significant decline in the scores was seen.

RANDOMIZED CONTROLLED TRIAL WITH THE HYBRID FRACTIONAL LASER (1470 AND 2940 NM) FOR VULVOVAGINAL ATROPHY IN BREAST CANCER SURVIVORS AND MENOPAUSAL FEMALES: A PROSPECTIVE PILOT STUDY

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Background: Vulvovaginal atrophy (VVA) affects about 50% of postmenopausal women, particularly those treated for breast cancer. VVA is a progressive condition associated with decreased estrogen in vaginal tissue. This condition is characterized by dryness, irritation, painful intercourse, and decreased quality of life. While hormonal therapy can be used to treat VVA, it has become less favourable for patients due to untoward side effects. Laser therapy has emerged as an alternative treatment for VVA. The objective of this randomized controlled, study is to evaluate the safety and efficacy of hybrid fractional laser treatments executed by a board-certified dermatologist to treat symptoms of VVA in breast cancer survivors.
Study Design/Materials and Method: A randomized controlled, two-arm, trial of 25 post-menopausal breast cancer survivor females (mean age: 57.4 ± 6.9) with at least 2 self-reported symptoms of VVA. Twenty randomly selected subjects were enroled in the treatment arm and five subjects in the control arm. Baseline demographics and pelvic exam data were recorded upon subject enrolment. Vaginal Health Index Scale (VHIS), Female Sexual Function Index (FSFI), and Day-to-day Impact of Vaginal Aging questionnaire (DIVA) scores were collected at baseline, treatment, and follow-up visits by OB/GYN. Subjects received three treatments at 4-week interval (settings: 1470 nm to 200–600 μm [density: 6–15%], 2940 nm to 200–300 μm [density: 7–14%]) by dermatologist. Follow-up visits were conducted at 3 and 6 months following third treatment.
Results: Subjects of the treatment arm showed a significantly improved quality of life by measure of DIVA questionnaire versus the control arm. The VHIS scores of treatment arm indicated increased fluid volume and moisture compared with control arm. FSFI scores were similar across treatment sessions for both groups. All but one FSFI sub-domain were statistically significant ($p<0.05$). Subjects in treatment arm were satisfied with the treatment received. No adverse events reported.
Conclusion: A significant treatment effect of hybrid fractional laser, with simultaneous delivery of 2940 nm Erbium and 1470 nm Diode wavelengths has been demonstrated. Data collected from follow up visits 3- and 6-months post-treatment demonstrates that the hybrid fractional laser is a safe and efficacious treatment for VVA in post-menopausal breast cancer survivor females.

CLINICAL APPLICATIONS - NPS

A FEASIBILITY STUDY OF NON-THERMAL NANO-PULSE STIMULATION (NPS) TECHNOLOGY FOR TREATING COMMON NEVI

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Background: Nano-pulse stimulation (NPS) technology has been shown to be effective for treating several benign lesions such as sebaceous hyperplasia, seborrheic keratosis, and cutaneous warts. This feasibility study further examines the unique mechanism of non-thermal NPS to target cells of common nevi while sparing non-cellular dermis.
Study Design/Materials and Method: In this prospective, non-randomized, multicenter feasibility study, adult subjects with at least two common nevi clinically and dermatoscopically appearing benign, up to 10 mm in size were enroled. Various treatment levels (TL) were used across four treatment tip sizes. Additional NPS procedures were available at 30/60/90 days. Final outcomes were assessed 90 days post-last NPS procedure.
Results: Twenty-five subjects were enroled (72% female, mean age 45, Fitzpatrick skin types I–V), with 106 total nevi lesions treated. Twenty-three subjects with 89 nevi, classified as 53% compound, 23% junctional, 14% intradermal, 10% indeterminate completed all study visits. The majority of nevi (80%) were located on the torso. Overall, 53% clearance was observed across all TLs tested, with higher TLs exhibiting higher rates of efficacy (up to 73%, $n = 30$). Of these, junctional (15/20) and intradermal (9/12) nevi sub-types showed clearance of 75% and compound nevi 38% (18/47). The efficacy tended to increase with a second procedure; 78% of the lesions were retreated (over 90% had a second NPS procedure). Junctional nevi had the highest single-treatment efficacy rate of 50% across all TLs evaluated. Due to the Covid-19 pandemic "stay-at-home measures," 48% of subjects ($n = 11/23$) missed potential opportunities for re-treatments. When considering lesions without missed re-treatment opportunities and treated at higher TLs ($n = 26$), clearance was much higher: overall 74%—junctional had 73% clearance (8/11), compound 100% (4/4) and intradermal 63% (5/8).
Conclusion: All in all, interim results suggest NPS procedure may be effective for treating common nevus lesions. Junctional nevi may have better single-treatment clearance, and compound/intradermal nevi may require an additional NPS session. Expanded studies are required to better understand the single- versus multiple-treatment efficacy rates across nevus sub-types and treatment levels required for desired results.

LOWER ENERGY SETTINGS WITH NANO-PULSE STIMULATION (NPS) PROCEDURE TO TREAT SEBACEOUS HYPERPLASIA YIELD HIGH EFFICACY AND SUPERIOR SKIN RECOVERY (INTERIM RESULTS)

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Background: Published nano-pulse stimulation (NPS) data for treating sebaceous hyperplasia (SH) demonstrated over 99% lesion clearance efficacy (clear/mostly clear), with 91% of lesions treated once. High efficacy suggested that lower settings could maintain results, while reducing rates of transient hyperpigmentation and focal surface irregularities which occur from clearance of the sebaceous gland that resolved as normal dermis filled in the area. Analysis compares results across both NPS studies for most frequently used treatment tip (2.5×2.5 mm).
Study Design/Materials and Method: In this multi-center study, adults with 4–10 facial lesions received 1–2 NPS procedures; 3 tips (1.5×1.5, 2.5×2.5 and 5×5 mm) were available with settings up to 90% lower compared with initial study. Subjects returned for three to four visits at 7/30/60/90 days. At 30 days, lesions rated partially/not clear were considered eligible for second NPS procedure. Efficacy endpoint is determined 60 days post-last NPS procedure using 4-point lesion clearance assessment scale.
Results: Interim subset analysis (2.5×2.5 mm) compared results for three settings (30/60/115 mJ/mm^3, 106 subjects, $n = 340$ lesions) with one setting in initial study (345 mJ/mm^3, 66 subjects, $n = 179$). At 60 days, respective single treatment efficacy rates were 54/70/78% versus 90% (initial study), showing increasing clearance with progressively higher settings. Similar trend was seen for retreated lesions (85/82/93/100%). Transient hyperpigmentation rates decreased with lower settings: single treatments (10/10/36/48%); retreatments (19/18/33/42%), typically mild. Transient focal surface irregularities significantly decreased with lower settings (3/3/10/42%), typically mild. Histological evidence from separate NPS study (treating facial skin, pre-facelift model) suggests that pigmentation changes are likely due to deposition of melanin in the epidermis. Topical methods may prove effective to mitigate this transient pigmentation change.
Conclusion: Interim results validate NPS procedure for treating sebaceous hyperplasia. High efficacy was achieved with greatly reduced energy settings. Single NPS procedure with lowest setting cleared majority of lesions with low rates of transient skin effects. With retreatment, efficacy is 85% and higher.

MULTI-CENTER STUDY OF NANO-PULSE STIMULATION (NPS) TECHNOLOGY FOR THE TREATMENT OF MODERATE-TO-SEVERE ACNE VULGARIS OF THE BACK: A FEASIBILITY STUDY (INTERIM RESULTS)

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Background: The basis for treating moderate-to-severe back acne lesions is the unique mechanism of non-thermal nano-pulse stimulation (NPS) technology to target cells of sebaceous glands while sparing non-cellular dermis. Histologic analysis of NPS treated healthy tissue demonstrated the elimination of sebaceous glands with NPS. This feasibility study demonstrates the reduction of acne lesions using NPS compared with sham and control.
Study Design/Materials and Method: In this multi-center study, adults with moderate-to-severe back acne were required to have comparable numbers of active acne lesions in three 7×7 cm assigned areas on the back. One 7×7 cm area was designated for NPS treatment (range of settings), with remaining areas as sham and control. Follow-up visits occurred at 30/60/90 days post-NPS procedure for investigator assessments and photographs.
Results: Thirteen subjects (69% male, 32 average age, Fitzpatrick I–V) completed the NPS procedure. NPS-treated areas showed average 82% reduction of acne lesions (range: 50–100%) 90 days post-NPS procedure. 54% of subjects ($n = 7$) had

90%+ lesion count reduction in NPS-treated area. Four of 7 subjects had 100% lesion count reduction, observed at both highest NPS energy and lowest NPS energy (45% less) levels. Control and sham areas showed average reduction rates of 62% and 67% respectively. Residual hyperpigmentation observed was mild (39%, $n = 5$), moderate (46%, $n = 6$), and moderate/severe (8%, $n = 1$, at highest energy), compared with 54% hyperpigmentation noted at baseline. Investigators rated acne condition in NPS areas as better for all subjects, while 31%/38% improvement was seen in control/sham. Procedure was well tolerated.
Conclusion: Results demonstrate NPS procedure's ability to treat moderate-to-severe back acne. Findings of high-count reductions observed in control and sham areas raised questions of a potential regional effect, extending beyond NPS-treated areas. An expanded study is needed to validate these promising results in facial areas and explore the use of other treatment tip designs for larger surface areas.

NON-THERMAL NANO-PULSE STIMULATION (NPS) PROCEDURE FOR TREATING CUTANEOUS, NON-GENITAL WARTS SHOWS HIGH CLEARANCE EFFICACY WITH A SINGLE SESSION (INTERIM RESULTS)

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Background: Published studies have shown nano-pulse stimulation (NPS) technology to be effective for treating sebaceous hyperplasia and seborrheic keratosis. This second, larger NPS study for treating cutaneous, non-genital warts further examines NPS's unique, non-thermal cellular mechanism to achieve desired clinical outcomes.
Study Design/Materials and Method: In this prospective, non-randomized, multicenter study, adult subjects with a minimum of two warts smaller than 10×10 mm were eligible, with one designated untreated control. Follow-up evaluations performed at 7/30/60/90/120 days, with additional NPS procedures available at 30/60/90 days. Five treatment tips (energy mJ/mm^3) were available: 1.5×1.5 mm (575), 2.5×2.5 mm (345), 5×5 mm (155), 7.5×7.5 mm (85) and 10×10 mm (85). Final efficacy outcome assessed 60 days post-last NPS procedure using 6-point size reduction scale. Handheld particle counter used to measure potential plume. Warts on the face and foot were excluded.
Results: Forty-two subjects, 64% female, mean age 48. Ninety-four treated warts classified as common (85) and flat (9), and most commonly located on hands (64%) and legs (14%). 40% of warts had history of failed treatment, predominantly OTC and cryotherapy. 81% of NPS-treated warts ($n = 94$) cleared 100% 60 days post-last NPS, compared with 26% of controls (120 days). Sixty-one percent of warts treated once ($n = 94$) cleared 100%; 36% of cleared warts failed previous modalities. Sixty-five percent of warts treated twice ($n = 23$) cleared 100% (46% cleared are recalcitrant), and 100% of warts treated three times ($n = 5$) cleared 100% (80% recalcitrant). Among warts 100% cleared ($n = 76$), 35% had residual hyperpigmentation (mostly mild) and 8% hypopigmentation (all mild). There were no serious adverse events. Plume was not detected compared with baseline.
Conclusion: Interim results suggest applicability of NPS procedure to treat non-genital warts with an overall complete clearance rate of 81%, and a majority (61%) completely cleared with a single session, including recalcitrant warts. For comparison, one report cited cryotherapy cure rates after 3 months (treatments every 2 weeks) of 44% using spray.

CLINICAL APPLICATIONS - ONCOLOGY

FRACTIONAL CARBON DIOXIDE USED TO ACCELERATE WOUND HEALING OF EXPOSED CALVARIUM OF LARGE SCALP DEFECTS FOLLOWING MOHS SURGERY

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Background: Large basal and squamous cell carcinomas on the scalp requiring treatment with Mohs surgery can result in large, deeply penetrating defects with exposed calvarium. In this setting, scalp wounds devoid of periosteum are difficult to repair, as bone lacks a connective tissue covering and vascular supply to support the wound bed and subsequent growth of granulation tissue. It is well reported that skin grafts cannot grow on exposed bone. In cases with large defects with immobile scalp tissue, granulation tissue is imperative to facilitate skin graft placement and survival. To accelerate vascularization of the wound bed and stimulate formation of granulation tissue, a low density, 65 W fractional CO_2 laser with 0.155 mm microbeam spot size was used to penetrate the calvarium, access underlying venous blood, and generate surface pinpoint bleeding.
Study Design/Materials and Method: Ten adult subjects with deep skull defects extending through periosteum to exposed bone were treated with 5% density to an endpoint of pinpoint bleeding. Half of these subjects were subsequently sutured with a porcine-derived xenograft, while the other half were treated with an adherent hydrocolloid occlusive dressing, changed multiple times weekly. Subjects returned for wound checks at 2, 4, and 6 weeks post-initial laser irradiation.
Results: Of the 10 subjects, 9 showed initial formation of granulation tissue at 2 weeks and complete wound bed granulation within 6 weeks. There was no difference noted in the two arms, except that patients preferred the ease of care with the use of an overlying xenograft.
Conclusion: Deeply penetrating, low density fractional CO_2 laser appears to accelerate vascularization of the exposed skull wound bed, facilitating the formation of granulation tissue on the bone. Along with the aid of physical occlusion, this presents a viable repair option to accelerate wound healing of large scalp Mohs micrographic surgery defects devoid of periosteum.

INITIAL REPORT ON CALCIUM ELECTROPORATION OF BASAL CELL CARCINOMAS

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Background: Basal cell carcinoma (BCC) is the most common type of cancer with increasing incidence rates. In electrochemotherapy (ECT) permeabilization of the cell membrane by electric pulses (electroporation) allows chemotherapeutics such as bleomycin to enter the cell increasing the anti-tumour effect. ECT appears to be an effective treatment of BCC. In calcium electroporation (CaEP) chemotherapy is replaced by calcium chloride injection resulting in severe ATP depletion leading to necrosis. CaEP has been shown to be as effective as ECT in the treatment of cutaneous metastases. The aim of the study was to evaluate the effect of CaEP in the treatment of BCC.
Study Design/Materials and Method: Patients with low risk primary BCC were treated in local anaesthesia with injection of calcium chloride (225 mM) directly into the tumour including a safety margin of 5 mm, followed by electroporation (ePORE, Mirai, Ireland) with pulse frequencies of either 250 kHz (high) or 5 kHz (low). The higher frequency was designed to limit muscle contraction during treatment. Histology proven non-complete responders were retreated after 3 months. Tumour demarcation, tumour depth and efficacy were evaluated using optical coherence tomography.
Results: Twenty-one patients were included in interim analysis. Of the 13 patients treated with high frequency 3 had complete response after one treatment, 10 were retreated resulting in further 4 partial responses and 6 with no changes. Of the eight patients treated with low frequency two patients had no response and two patients partial response at 3 months following the first treatment, of these two patients declined re-treatment due to pain during the first treatment.
Conclusion: Using CaEP with a new type of electroporator the previously described effect on BCC could not be reproduced. Low-frequency CaEP were more painful than high frequency. Further studies should be initiated to optimize treatment procedures to obtain efficacy rates as reported for ECT of BCC using bleomycin.

SINGLE ABLATIVE FRACTIONAL RESURFACING LASER FOR FOREARM ACTINIC KERATOSIS AND PREVENTION OF NON-MELANOMA SKIN CANCER

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Background: Actinic keratoses (AK) are common pre-cancerous lesions, which are associated with ultraviolet light exposure and aging. Wounding therapies such as fractionated laser resurfacing (FLR) have been previously demonstrated to effectively treat facial AK. However, the effectiveness of FLR on other sites commonly afflicted with AK has not been studied in detail. Previously, our group has reported that treatment of aged skin with wounding therapies including dermabrasion and ablative fractionated resurfacing results in the removal of senescent fibroblasts and normalizing the pro-carcinogenic acute ultraviolet B radiation responses associated with aged skin. The current studies were designed to test the effectiveness of FLR of the forearm skin of subjects aged 60 and older to remove AKs and prevent non-melanoma skin cancers (NMSC).
Study Design/Materials and Method: Beginning in 2018, 48 subjects were enroled in the study. The treatment of the left or right arm was based on odd or even social security number. Er:YSSG 2790 nm laser with one pass (16% coverage) using 120 mJ of energy per microspot with the largest coverage was used (~1 × 2 cm) to the dorsal forearm (from the elbow) to the dorsal hand that was selected per subject. The number of AKs and NMSCs was recorded on both extremities at baseline, 3, 6, 12, 18, and 24 months in a blinded fashion. Side effects of the FLR were documented.
Results: A single FLR treatment resulted in a statistically significant reduction (60%) in the absolute number of AK in the treated arm at 6 months post-treatment and was sustained 2 years post-treatment ($P < 0.001$). 20 NMSCs were observed on the control (arm) whereas 2 were observed on the FLR-treated arm ($P < 0.001$). The laser treatment was well-tolerated without major complications.
Conclusion: These studies demonstrate that FLR using settings, which have demonstrated to remove senescent fibroblasts and normalize the pro-carcinogenic UVB-response of aged skin is a potentially effective and safe field therapy treatment. Durable response has been observed.

THE USE OF PHOTOBIOMODULATION THERAPY FOR THE PREVENTION OF CHEMOTHERAPY-INDUCED PERIPHERAL NEUROPATHY: PRELIMINARY RESULTS OF A RANDOMIZED, PLACEBO-CONTROLLED TRIAL

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Background: Taxanes are well known to cause chemotherapy-induced peripheral neuropathy (CIPN). To date, there are no evidence-based measures to prevent or minimize CIPN. Photobiomodulation therapy (PBMT) is based on the application of (near)-infrared light on target tissue to stimulate cell repair processes and reduce pain and inflammation. The aim of this trial is to evaluate if PBMT can prevent sensory symptoms associated with CIPN and enhance the patients' quality of life (QoL).
Study Design/Materials and Method: A randomized-control trial with 31 patients with breast cancer that underwent taxane treatment was performed at the Jessa Hospital (Hasselt, Belgium). Patients were randomized to receive PBM or placebo treatments (2×/week) starting at first until the last week of their chemotherapy (CT). The modified Total Neuropathy Score (mTNS) was used to evaluate the severity of CIPN. The patients' QoL was assessed by the Functional Assessment of Cancer Therapy/Gynaecologic Oncology Group NTX scale (FACT/GOG-NTX). A higher score indicates a better QoL. These measures were collected at the first CT session, six weeks after the initiation of CT, and at the final CT session.
Results: Mixed ANOVA revealed a significant difference in the group by time interaction for the FACT/GOG-Ntx total score ($P = 0.031$) with a higher overall score in the PBMT group. Specific questions of the FACT/GOG-Ntx regarding numbness in hands and feet were analysed separately. A significant increase in the severity of numbness in hands and feet over time was observed in the control group ($Ps = 0.000$), whereas it remained constant in the PBMT group ($Ps = 0.072$). However, no significant difference was observed in the mTNS between both groups.
Conclusion: Based on preliminary results, PBMT seems to reduce the development of CIPN resulting in a better QoL. These results must be interpreted with caution because of the limited sample size. Further research in a larger patient population is necessary.

CLINICAL APPLICATIONS - PHOTOBIOMODULATION

ANALYSIS OF THE EFFECTS OF RED LIGHT PHOTOBIOMODULATION THERAPY AT 655 NM ON FEMALE BREAST CANCER PATIENTS WITH CHEMOTHERAPY-INDUCED ALOPECIA

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Background and Objectives: Photobiomodulation therapy (PBMT) promotes hair growth in androgenic alopecia. Results of an randomized controlled trial on the effects of 655 nm PBMT on chemotherapy-induced alopecia (CIA) are reported.

Study Design/Materials and Method: Women (20–60 years old, Fitzpatrick I–IV) with breast cancer completing chemotherapy 1–4 weeks previously were recruited. Following global scalp photography, a scalp site was selected; remaining hair trimmed to 3 mm length; tattooed and photographed. The active group received a bicycle-helmet like apparatus 21, 5 mW lasers (655 ± 5 nm) and 30 LEDS (655 ± 20 nm). Patients self-treated at home QOD × 24 weeks (80 treatments, 67.3 J/cm^2 irradiance/25-minute treatment). Follow up and photography occurred at 12 and 24 weeks. The placebo appeared identical, but contained incandescent red lights. A deidentified masked 2.85 cm^2 photographic area was evaluated.

Results: Twenty-seven patients completed the study (14 placebo, 13 active). Hair counts were 97.6 ± 73.9 versus 85.9 ± 57.5 at baseline, 214.2 ± 89.5 versus 265.8 ± 69.2 at 12 weeks and 231.6 ± 50.9 versus 268.7 ± 55.7 in placebo and active groups, respectively (NS). The 24 week difference from baseline was 134.1 ± 92.3 versus 185.0 ± 96.3, respectively (NS). Hair increase was 456.3 ± 629.4% placebo versus 503.2 ± 562.7% active at 12 weeks and 481.2 ± 683.9% versus 514.1 ± 562.3% at 24 weeks versus baseline, respectively (NS). Hair length was 0.6 ± 0.7 mm versus 0.6 ± 0.4 baseline, 2.2 ± 0.9 versus 2.4 ± 1.0 mm at 12 weeks and 4.9 ± 1.5 versus 5.4 ± 1.5 mm at 24 weeks in placebo and active groups, respectively (NS). The percent change in hair length at 12 and 24 weeks was not significantly different. Individual responses were highly variable.

Conclusion: PMBT at 655 nm failed to accelerate hair recovery in CIA. Larger studies are required to overcome high individual response variability and determine differences attributable to chemotherapy regimens

PHOTOBIOMODULATION THERAPY CAN PREVENT THE DEVELOPMENT OF SEVERE ACUTE RADIODERMATITIS IN HEAD AND NECK CANCER PATIENTS: A MULTICENTRIC, RANDOMIZED CONTROLLED TRIAL

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Background: Nine out of 10 patients with head and neck cancer (HNC) who undergo radiotherapy (RT), will develop some degree of acute radiodermatitis (ARD). ARD is an inflammatory skin condition, which can severely limit the patients' quality of life. To date, no standard treatment for ARD is available. Photobiomodulation therapy (PBMT) could offer a solution for the prevention and management of ARD. The aim of this study was to evaluate the efficacy of PBMT in the prevention of ARD in patients with HNC.

Study Design/Materials and Method: A multicentric, placebo-controlled, randomized controlled trial (RCT) was set up at the RT department of the Limburg Oncology Center located at the Jessa Hospital (Hasselt, Belgium) and Hospital East-Limburg (Genk, Belgium). HNC patients who underwent bilateral RT (total dose: $30–35 \times 2$ Gy) with or without chemotherapy were recruited. All patients received the institutional skin care in combination with two PBMT/sham sessions (2×/week) during the complete RT course. The skin reactions were evaluated by a blinded study nurse using the Radiation Therapy Oncology Group (RTOG) criteria.

Results: In August 2020, data of 49 patients was available for a preliminary analysis. A significantly higher percentage of patients presented a grade 2 or 3 skin reaction in the placebo versus the PBMT group (77.8% vs. 28.6%, resp., $P = 0.001$). Moreover, in the placebo group three patients developed confluent moist desquamation, while in the PBMT group no patient developed this type of skin reaction.

Conclusion: Results of this first, placebo-controlled RCT in HNC patients demonstrate that PBMT can successfully limit the severity of ARD.

THE SAFE USE OF PHOTOBIOMODULATION THERAPY IN AN ONCOLOGIC SETTING

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Background: Acute radiodermatitis (ARD) occurs in up to 90% of the patients undergoing radiotherapy (RT). Photobiomodulation therapy (PBM) is a new and successful treatment option for ARD. However, the safety of PBMT in an oncologic patient population remains a burning question. This retrospective study aims to evaluate the disease-free survival (DFS) and overall survival (OS) of patients with breast cancer treated with PBMT for ARD.

Study Design/Materials and Method: This is a retrospective analysis of the 120 patients with breast cancer that underwent an identical RT regimen (25×2 Gy + 8×2 Gy) between April 2015 and June 2017 at the Limburg Oncology Center (LOC), Jessa Hospital (Hasselt, Belgium). All patients received the institutional standard skincare protocol alongside a twice-weekly PBM (4 J/cm^2, 808–905 nm, 0.168 W/cm^2, 14 sessions) or sham treatment during their complete RT course. During follow-up, patients underwent a complete clinical evaluation every six months and blood analysis and mammography yearly in the first five years after the end of RT. The DFS and OS were estimated.

Results: In August 2020, data from 94 patients was available (sham: $n = 48$, PBM: $n = 46$) for analysis. The log-rank test demonstrated that after a mean follow up of 42.2 months (range: 1–63), the DFS was not significantly different between the sham and PBMT group (93.8% vs. 93.5%, resp., $P = 0.9$). There was also no significant difference in the OS between both groups (95.8% vs. 97.8%, $P = 0.63$).

Conclusion: This retrospective study demonstrates that PBM does not influence locoregional recurrence, the development of metastases, and the overall survival of patients with breast cancer treated with RT. An extended follow-up of at least 5 years is needed to validate these results.

CLINICAL APPLICATIONS - PIGMENT DIAGNOSTICS

USE OF A MELANIN INDEX READER TO DETERMINE OPTIMAL SETTINGS WITH A DUAL-WAVELENGTH LASER.

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Background: A dual-wavelength laser (755 and 1064 nm) is effective for the treatment of benign vascular lesions, benign pigmented lesions, and for permanent hair reduction. The skin type of the patient has been applied as a standard in determining optimal parameters for hair removal, pigment, and vascular applications. However, if the skin is sun exposed, the skin type must be adjusted "up" to ensure safety. For example, a slightly tanned type III patient might require skin type IV settings. It follows that melanin density is preferable to skin typing in choosing optimal laser parameters. This study evaluated the use of a melanin index reader to assign a virtual "skin type" based on melanin skin density.
Study Design/Materials and Method: Subjects were treated with the dual-wavelength laser with a variety of test spots. Spot settings were determined by use of a melanin index reader (Skintel, Cynosure). The reader is a reflectance spectrophotometer that emits three wavelengths to measure melanin density, or a so called melanin index (MI). Subjects with skin types I, III, IV, and VI were tested. Test settings were evaluated with three test spots each.
Results: Eighteen test settings were conducted on patients with skin type III utilizing the 755 nm wavelength. Tested fluences ranged from 7 to 16 J/cm² with pulse widths ranging from 5 to 20 milliseconds and spot sizes from 10 to 24 mm. Brown hair was treated on both the face and body, with hair type either being fine, medium or coarse. Thirty-one test settings were evaluated with the 1064 nm wavelength, with 24 being done on skin type IV or VI. Similar to the 755 nm wavelength, hair type varied from fine to coarse on both the face and the body. Fluences ranged from 10 to 45 J/cm² with pulse widths from 10 to 40 milliseconds and spot sizes from 10 to 24 mm. The melanin index reader was used to confirm skin type and guide the tested parameters at each subject and body location. Skin type I, III, IV, and VI were associated with the following respective ranges of MIs (10–17, 20–25, 27–33, 48–90) Only mild erythema and edema were reported after the test spots.
Conclusion: The melanin index reader can help determine safe parameters for use with the dual-wavelength laser for hair treatments.

CLINICAL APPLICATIONS - PIGMENTED LESIONS/DISORDERS

EFFICACY AND SAFETY OF PICOSECOND ALEXANDRITE LASER THERAPY FOR NEVUS OF OTA: A COMPARISON WITH Q-SWITCHED ALEXANDRITE LASER

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Background: 755 nm picosecond Alexandrite laser has been developed to have better clearance of tattoo. It is also expected to treat dermal melanocytosis such as nevus of Ota more effectively than traditional Q-switched Alexandrite laser. However, there've been few such studies especially on Asian skin. Therefore We conducted a prospective clinical study to evaluate the efficacy and safety of 755 nm picosecond Alexandrite laser in the treatment of nevus of Ota as compared with that of Q-switched Alexandrite Laser.
Study Design/Materials and Method: A randomized, evaluator-blind, split-face clinical trial was conducted to investigate the treatment of Nevus of Ota. Half of the skin lesion was randomly treated with picosecond Alexandrite laser, while the other half with Q-switched Alexandrite laser as control. All the recruited patients underwent three sessions of treatment at 12-week interval. Clinical response was primarily evaluated according to the reduction of skin lesions by three blinded dermatologists at baseline, each subsequent visit and 12 weeks after the 3rd laser treatment. The therapeutic outcome was rated at a 4-point scale: cure (90–100% clearance), effective (60–89% clearance), fair (20–59% clearance) and poor (0–19% clearance). Total effective rate was designated as the rate of over 60% lesion clearance. At the meantime, GAIS, pain degree, self-evaluation and adverse events were also recorded.
Results: Fifty-four patients (male 46.4%, female 53.6%), aged 32.09 ± 9.83 years, underwent three sessions of picosecond Alexandrite laser as well as Q-switched Alexandrite laser therapy. Among them, 19.6% were of Fitzpatrick skin type III and 80.4% skin type IV. The total effective rate of the picosecond Alexandrite laser group and control group was 38.89% and 18.52%, respectively. There was significant statistical difference between the two groups ($P < 0.05$). There were only transient mild edema and crust formation after treatment. Mild hyperpigmentation was observed in 18.5% of picosecond laser treated area and 22.2% in control. Both groups showed similar results in terms of self-evaluation, GAIS and pain degree. There was no case of hypopigmentation or scar formation after treatment in both groups.
Conclusion: The picosecond alexandrite laser is effective and safe in treatment of nevus of Ota. It is at least equal to Q-switched Alexandrite laser in terms of efficacy and safety and sometimes even better.

OUTCOMES REPORTED IN CLINICAL TRIALS OF MELASMA: A SYSTEMATIC REVIEW OF RANDOMIZED CONTROLLED TRIALS

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Background: Though clinical trials of melasma exist, aggregation of data via systematic reviews and meta-analyses is limited by inconsistency in reported outcomes. The objective of the Measurement of Priority Outcome Variables in Dermatologic Surgery (IMPROVED) group is to provide standardization of outcomes through a core outcome set (COS) relevant to clinical trials of melasma. As part of COS development, this systematic review aimed to identify all outcomes previously reported in clinical trials of melasma.

Study Design/Materials and Method: A systematic review of randomized controlled trials of melasma published between 2010 and 2020 was performed. Two reviewers extracted outcomes measured in included articles. These outcomes were subsequently grouped into domains based on broad themes.
Results: This review identified 75 studies to be included. Of these, 19 (25.33%) and 5 (6.67%) evaluated laser or intense pulsed light treatments; 1 study (1.33%) compared both. From these 75 studies, 23 unique outcomes were extracted and grouped into 8 domains: Clinical assessment, treatment effects, patient satisfaction, physiological skin assessment, perception of health, acceptance of care, quality of life, and direct costs. The clinical assessment domain was included in all studies, with global assessment (70 studies, 93%), adverse events (58 studies, 77%), color of affected area (25 studies, 33%), and dyspigmentation (22 studies, 29%) being the most commonly measured outcomes in this domain. The patient-reported outcomes patient satisfaction and quality of life were reported in 22 (29%) and 4 (5%) studies, respectively.
Conclusion: There exists heterogeneity of reported outcomes across clinical trials for melasma treatment. There appears to be a need for a "core outcome set" that would facilitate measurement of a minimum, common set of outcomes across clinical trials in melasma. The outcomes identified here will be utilized during the consensus process in development of a COS, and, later, of a core set of outcome measurement instruments.

REAL-WORLD EXPERIENCE WITH ORAL TRANEXAMIC ACID AND LASERS FOR PIGMENTARY DISORDERS: A 4-YEAR SAFETY REVIEW

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Background: Melasma is a chronic dermatologic condition characterized by facial hyperpigmentation. Common treatment regimens typically involve laser and other energy-based devices in combination with topical therapies. Oral tranexamic acid has become increasingly accepted as an effective therapy for melasma and other pigmentary disorders, yet some physicians remain hesitant due to risks for thromboembolic events given its alternative haemostatic indications with higher dosages.
Study Design/Materials and Method: A retrospective chart review was performed over a 4-year period. Patients were prescribed oral tranexamic acid 650 mg tablet, which is our dosage (650 mg once daily) and formulation of choice. Safety was assessed by adverse events that could be related to oral tranexamic acid medication.
Results: For prescription of oral tranexamic acid, 206 patients had a total of 451 prescriptions. Of all patients, 94.7% were female, and mean age was 45.2 years. Of all patients, 25.1% had one prescription, 10.0% had two prescriptions, 8.2% had three to five prescriptions, 1.6% had six to eight prescriptions, and 0.9% had greater than ten prescriptions. The duration of therapy ranged from 1 to 6 months. Of all prescriptions, the most common associated diagnoses included melasma (63.9%), hyperpigmentation (43.2%), and/or post-inflammatory hyperpigmentation (10.0%). Of all patients, 70.4% had laser procedures, which included low-energy, low-density, fractional non-ablative 1927 nm diode laser (Solta, Pleasanton, CA) (54.9%) and/or low-energy, fractional non-ablative 1927 nm thulium fibre laser (Lutronic, Seoul, South Korea) (28.6%). Of the 451 prescriptions of oral tranexamic acid, there were no documented adverse events related to oral tranexamic acid medication and increased clotting risk, including deep vein thrombosis, pulmonary embolism, myocardial infarction, and stroke.
Conclusion: The use of oral tranexamic acid 650 mg daily, often combined with laser treatments, is safe in real-world practice without thromboembolic events.

TREATMENT OF RADIATION TATTOOS: A REVIEW OF THE TOPIC AND DISCUSSION OF THE AMERICAN SOCIETY FOR LASER MEDICINE AND SURGERY NEW BEGINNINGS PROGRAM

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Background: Prior to radiation treatment patients often receive skin markings with permanent ink. These 1–3 mm markings, known as radiation tattoos, serve as landmarks that help ensure accurate and reproducible alignment of radiation beams during treatment. Patients generally receive multiple tattoos, often in cosmetically sensitive areas, surrounding the area to be irradiated. Some patients accept these marks as symbols of survivorship, but others view them as unwelcomed reminders of a difficult experience. In 2014, in an effort to help remove these unwelcomed reminders, The American Society for Laser Medicine and Surgery (ASLMS) launched the New Beginnings: Radiation Mark Removal Program. This national philanthropic campaign connects cancer survivors with board certified ASLMS members who volunteer their time and devices to remove radiation tattoos free of charge. While the treatment of radiation tattoos might seem trivial which, a growing body of evidence suggests these tattoos hinder the emotional recovery process of many cancer survivors. In an effort to bring attention to this important topic, this study sought to share the experience of physicians in the ASLMS New Beginnings Program, review the available literature on this subject, and discuss our personal approach to the treatment of radiation tattoos.
Study Design/Materials and Method: A three-question survey was sent via email to all 117 active physician members of the ASLMS New Beginnings Program. Survey questions aimed to: (i) determine how many patients have been treated in the New Beginnings Program, (ii) determine the average number of treatment sessions required to adequately remove radiation tattoos, and (iii) determine the most common lasers used for the treatment of radiation tattoos.
Results: About a third of physicians reported treating 10 or more patients since the initiation of the New Beginnings Program. The majority (58%) of respondents stated one to three treatment sessions were needed to adequately remove radiation tattoos. Blue and black pigment specific lasers (755 nm alexandrite and 1064 nm Nd:YAG) in the nanosecond or picosecond domain were most commonly used for the removal of radiation marks.
Conclusion: While some patients accept radiation marks as symbols of survivorship others view them as unwelcomed reminders of a difficult experience and seek their removal. Physicians in the New Beginnings Program have successfully treated numerous radiation tattoos with laser surgery. We urge all laser surgeons to join the ASLMS New Beginnings Radiation Mark Removal Program and increase awareness in their local communities that these "permanent marks" are able to be removed.

CLINICAL APPLICATIONS - SCARS

CLINICAL EFFICACY OF A NOVEL 1726 NM LASER FOR TREATMENT OF MODERATE INFLAMMATORY ACNE VULGARIS

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Background: In 2008, it was demonstrated that lipids can be targeted with selective photothermolysis using a wavelength-tunable superconducting free-electron laser. Lipid absorption bands were near 1700 nm with maximum absorption in sebum at 1726 nm. This led to the investigation of a 1726 nm laser for selective photothermolysis of sebaceous glands, which would clinically improve acne vulgaris.

Study Design/Materials and Method: In two separate IRB-approved trials, the efficacy of a novel 1726 nm laser with integrated highly controlled cooling and real-time temperature monitoring (Accure Acne, Inc., Boulder, CO) was evaluated for the treatment of moderate inflammatory acne vulgaris. This skin cooling system allows for protection of superficial skin from thermal injury and reduction of subject discomfort and inflammation. The trials consisted of 26 subjects, who were to receive up to 4 treatments.

Results: A total of 19 subjects completed the trials. Various ages and Fitzpatrick skin types (I–V) were represented. For treatments, 84.2% ($n = 16$) completed four treatments and 15.8% ($n = 3$) completed two treatments. The median improvement of inflammatory lesion count from baseline was 73%, 81%, and 80% at 4-, 8-, and 12-week follow-up, respectively. For subjects who reported to 39- and 52-week follow-up, 60% either maintained or continued to have improvement of their inflammatory lesion count from previous visit. Responder status had a predetermined threshold of 50% reduction in inflammatory lesion count. The responder rate was 92%, 100%, and 100% at 4 weeks, 100% maintained their responder status from previous visit. There were no cases of permanent damage or scarring.

Conclusion: Treatment with a novel 1726 nm laser with integrated highly controlled cooling and real-time temperature monitoring offered safe and improved clinical outcomes and long-term benefit for acne vulgaris.

EFFECTIVENESS OF COMBINED PULSED-DYE LASER AND NONABLATIVE FRACTIONAL LASER TREATMENT OF POSTSURGICAL SCARS: A RANDOMIZED CONTROLLED TRIAL

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Background: Both pulsed-dye laser (PDL) and nonablative fractional laser (NAFL) have been shown to improve scars. The purpose of this study was to evaluate the effect of combined PDL and NAFL for the treatment of postsurgical scars.

Study Design/Materials and Method: Single-center randomized controlled trial in an urban, university hospital. Enroled were healthy adults, Fitzpatrick skin types I–VI, status post excision with facial linear repair. Participants were randomized to three sessions of combination PDL and NAFL, 4–8 weeks, or no treatment. At baseline and follow-up, Patient and Observer Scar Assessment Scale (POSAS) and Scar Cosmesis Assessment and Rating (SCAR) ratings were completed. The primary outcome was scar improvement, measured by the difference in scores from baseline to follow-up.

Results: Fifty-two patients completed the study. There were no adverse events reported. POSAS scores showed a significantly greater improvement in the PDL and NAFL group as assessed by both patients (mean difference in total score, laser: 12.86; control, 7.25; $P = 0.004$) and observers (18.32; 13.08; $P = 0.044$). Regarding specific scar features, patients noted a significantly greater reduction in thickness and vascularity with laser, and observers noted significantly greater laser-associated improvement in vascularity. Nominally but not significantly greater improvement with laser was noted in live (mean difference in overall score, laser 5.96; control 4.92; $P = 0.272$) and photo-rated (7.18; 6.33; $P = 0.246$) SCAR scores. However, the live SCAR subscore for erythema was more improved with laser (mean difference in erythema score, laser: 1.04; control, 0.42; $P = 0.001$) while dyspigmentation appeared to resolve faster without treatment (0.25; 0.67; $P = 0.002$).

Conclusion: Both patients and observers found a series of combined PDL and NAFL treatments improved post-surgical linear scars more than passive wound management. Vascularity and erythema were lessened, as were stiffness and thickness. Conservative laser settings may avoid the risk of laser-associated hyperpigmentation, particularly in patients with ethnic skin.

NANOSECOND LASERS FOR THE TREATMENT OF HYPERTROPHIC SCARS OCCURING IN DECORATIVE AND POST TRAUMATIC TATTOOS

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Background: Nano- and picosecond lasers are the standard of care for the treatment of tattoos, whether decorative or traumatically induced. When hypertrophic scarring is present in the tattoos, which can occur after attempted tattoo removal treatments, hypersensitivity to the tattoo pigment or traumatic tattooing, the use of more traditional long pulsed or fractional lasers can be challenging in treating these scars due to the foreign embedded material. This study evaluates the effect of nanosecond lasers on associated hypertrophic scars present after trauma to decorative tattoos or externally induced traumatic tattoos.

Study Design/Materials and Method: Eleven patients, ages 8–55 years (mean 31 years), presented for treatment of hypertrophic scars with either residual tattoo pigment or post–trauma embedded material. Skin Types were I–III. Seven of the cases were scars which resulted from attempted tattoo removal with either an IPL or laser. Three presented after motor vehicle accident or a fall resulting in embedded asphalt. One had a hypersensitivity reaction to tattoo material developing into scar formation. All patients were treated with either a Q-switched (QS) 1064 nm Nd:YAG or QS ruby laser. Repeat procedures generally

occurred at an interval of 4 weeks. Scarring severity, pigment reduction and scar improvement were evaluated by two blinded observers using before and after pictures. When grading, the observers were not informed as to which pictures were before or after.
Results: Nine of the patients were treated with the QS Nd:YAG and two with the QS ruby laser. Blinded observers correctly chose the before and after pictures for all the patients. The number of treatment sessions administered was from 3 to 25 (mean: 9.4), with five patients receiving five or less sessions. Using a range of 0–5, with 5 designated as the most severe, the severity of scar presentation was an average of 3.3. After treatments, pigmentation clearance achieved was judged to be at a mean of 79%, with six patients at 85% or greater improvement. Scar improvement was graded at a mean of 85%, with seven having 85% or greater improvement.
Conclusion: Although not traditionally associated with scar reduction, nanosecond laser therapy has been proven to be effective in cases where there is extraneous dermal pigment. It is hypothesized that the treatment of dermal pigment by nanosecond laser results in the additional desired effect of scar reduction.

TREATMENT OF ATROPHIC ACNE SCARS USING COMBINED DERMAPEN AND PLATELET-RICH PLASMA VERSUS FRACTIONAL CO_2 LASER: A COMPARATIVE CLINICAL STUDY

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Background: Acne scarring is a common yet challenging to treat problem. Facial resurfacing with fractional CO_2 Laser is currently accepted to be one of the most effective treatments, yet it is associated with considerable morbidity and downtime interference with the daily activities of the patient in the post-treatment period. Autologous Platelet-rich plasma (PRP) is rich medium of growth factors and cytokines which serve in replenishing the lost collagen and elastic fibres. Microneedling initiates collagen synthesis; this is achieved by causing minute injury to the dermis.
Study Design/Materials and Method: Twenty patients with bilateral atrophic acne scars were enroled. Each patient received 3 sessions with one month interval.The right side was treated with combined microneedling and PRP and the left side was treated with fractional CO_2 laser. Evaluation of response was done by clinical assessment and optical coherence tomography (OCT) imaging at baseline and 3 months after last session
Results: Both therapeutic modalities yielded statistically significant improvement of acne scars and statistically significant decrease in acne scars depth regarding OCT assessment. By comparing both modalities, there was no statistical significance regarding clinical and OCT improvement. Combined microneedling and PRP had less side effects and less down-time than fractional CO_2 laser.
Conclusion: Combined microneedling and PRP represent a potentially effective and safe tool for the treatment of acne scarring. It is comparable to fractional CO_2 laser but has the advantage of being less expensive, with minimal side effects.

CLINICAL APPLICATIONS - VASCULAR

ANALYSIS OF PORT-WINE BIRTHMARK VASCULAR CHARACTERISTICS BY LOCATION: UTILITY OF OPTICAL COHERENCE TOMOGRAPHY MAPPING

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Background: Port-wine birthmarks (PWB) are congenital capillary malformations that can be managed by laser treatment. Treatment parameters may be optimized based on vessel morphology. Dynamic optical coherence tomography (OCT) imaging measures vascular characteristics of PWB.
Study Design/Materials and Method: OCT images were taken of PWB lesions at three clinic sites. The OCT scanner provides
Results: One hundred and eight patients had 204 measurements of PWB lesions. Mean patient age was 32.3 years, and 63.0% were female. Fitzpatrick skin types I–IV were represented. Of all OCT scans, 62.3% were located on the head, 14.2% the upper extremities, 8.3% the lower extremities, 7.8% the trunk, and 7.8% the neck. For superficial vascular plexus depth, lesions on the head were significantly shallower than those on the upper extremities ($215.9 \pm 4.9\,\mu m$ vs. $296.6 \pm 19.9\,\mu m$; $P = 0.001$) and lower extremities ($215.9 \pm 4.9\,\mu m$ vs. $298.4 \pm 13.3\,\mu m$; $P = 0.001$). Compared with lesions on the upper extremities, lesions on the head had significantly larger ($112.6 \pm 5.0\,\mu m$ vs. $80.7 \pm 6.3\,\mu m$; $P = 0.040$) and denser vessels ($20.4 \pm 1.0\%$ vs. $12.7 \pm 2.2\%$; $P = 0.020$) in the superficial vascular plexus. In sub-group analysis, lesions on the proximal and distal extremities were compared. There were no differences in vessel diameter and density. However, depth of the superficial vascular plexus trended deeper for proximal lesions compared with distal ($329.4 \pm 24.5\,\mu m$ vs. $280.1 \pm 15.1\,\mu m$; $P = 0.078$). This reached significance when comparing proximal and distal lesions of only the lower extremities ($332.1 \pm 8.5\,\mu m$ vs. $274.8 \pm 18.7\,\mu m$; $P = 0.029$).
Conclusion: PWB lesions have distinct vascular characteristics, which can be associated with their body location. This includes superficial vascular plexus depth as well as vessel diameter and density. This has the potential to impact PWB treatment.

NOVEL LARGE SPOT SIZE 595 NM, HIGH-ENERGY, PULSED DYE LASER REDUCES NUMBER OF TREATMENTS FOR IMPROVEMENT OF ADULT AND PAEDIATRIC PORT WINE BIRTHMARKS

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Background: Treatment of port wine birthmarks (PWBs) can improve coloration and prevent development of nodularity and hypertrophy. A novel large spot size pulsed dye laser (NPDL) with 50% more energy than its predecessor (PPDL) has shown efficacy and safety in the treatment of rosacea and poikiloderma.

By Monte Carlo calculations, larger spot sizes provide greater depth of penetration and reduced absorption by melanin, thereby minimizing epidermal injury.
Study Design/Materials and Method: A retrospective chart review was performed at 2 clinical sites of 160 patients, who were treated between 2011 and 2020. Photographs were graded by blinded physicians using a 5-point visual analog scale.
Results: Of all patients, 80 were each treated with either NPDL or PPDL. For NPDL, mean age was 17.1 years, and locations included V1 (8%), V2 (15%), V3 (4%), multiple facial dermatomes (35%), trunk/extremities (33%), and face/body (6%). For PPDL, mean age was older at 24.8 years ($P = 0.05$) improvement. No long-term safety events or complications were encountered. Limitations included small sample size and age difference between groups. Several confounders were present, and not all factors that could influence treatment may have been accounted for.
Conclusion: In the largest comparative analysis of a large spot NPDL and PPDL in the treatment of PWB, fewer treatments were needed with the NPDL to achieve clinically comparable outcomes without sacrificing safety.

OUTCOMES REPORTED IN CLINICAL TRIALS OF ROSACEA: A SYSTEMATIC REVIEW OF RANDOMIZED CONTROLLED TRIALS

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Background: It is difficult to adequately compare the various treatment modalities for rosacea due to a lack of uniformity in the outcomes reported in rosacea trials. The Measurement of Priority Outcome Variables in Dermatologic Surgery (IMPROVED) group aims to standardize these outcomes by developing a core outcome set for rosacea clinical trials. The objective of this systematic review was to identify all outcomes that have been utilized in clinical trials of rosacea as part of the development of the core outcome set.
Study Design/Materials and Method: A systematic review was conducted for randomized controlled trials of rosacea interventions published between 2010 and 2020. Outcomes were extracted from selected articles by two reviewers. The extracted outcomes were then categorized into domains based on similar themes.
Results: Fifty-eight studies were included in the systematic review, of which 7 (12%) evaluated laser-based interventions. Fifty-five unique outcomes were identified, encompassing eight domains: Quality of life, treatment effects, patient perception of health, clinical assessment, acceptance of care, laboratory assessment, physiological skin assessment, and patient satisfaction. Of the eight domains, clinical assessment-related outcomes were measured in all studies. Non-transient erythema was most commonly evaluated (43 studies, 78%), followed by inflammatory lesions (36 studies, 65%) and telangiectasia (22 studies, 40%). Treatment effects such as adverse events were measured in 49 of the 55 studies (89%). Patient-reported outcomes were measured in 21 of the 55 studies (38%). Quality of life and patient satisfaction were reported in 18 (33%) and 13 (24%) studies, respectively.
Conclusion: This systematic review confirmed the heterogeneity of outcomes that have been used to evaluate rosacea interventions. The outcomes extracted from this systematic review will be used to inform the consensus process for selection of a core outcome set.

PORT-WINE BIRTHMARKS: HOW EARLY CAN YOU TREAT?

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Background: The current modality of choice for treatment of port wine birthmarks (PWB) is high energy pulsed dye laser (PDL). When performed by a highly trained expert at sufficient frequency, PDL is a safe, effective treatment that is successful in the majority of patients, with earlier treatment yielding maximal clearance. However, optimal timing for the initiation of treatment has yet to be established.
Study Design/Materials and Method: Retrospective chart review of infants with PWB who started treatment with 595-nm PDL at the age of 1 month or younger at a single, high-volume laser center between 2015 and 2020.
Results: Of the 39 infants (14 male [36%]; 25 female [64%]), the mean age at time of first treatment was 18 days (range: 5–29 days). Our youngest patient was born prematurely and presented for first treatment at 20 days before due date. Most (29 [74%]) had facial lesions, with the remaining distributed on the trunk and/or extremities. Mean Fitzpatrick skin type was II (I–V). The initial settings chosen for facial lesions were 10-mm spot size, 4.5–8.5 J/cm^2, and 1.5 milliseconds. For body lesions, the typical initial settings were 12-mm spot size, 6.0 to 8.0 J/cm^2, and 1.5 milliseconds. The mean number of treatments was 15 (2–38; median, 14) over the course of 15.5 months (1–57). Recommended treatment interval was every 2–3 weeks, with longer intervals for patients with darker skin, until the child was 2 years old, at which time the interval was increased to every 3–6 months. Intraocular eye shields were used for all cases with PWB approaching the eyelid. Side effects included only expected short-term erythema, edema, purpura, and mild transient post-inflammatory hyperpigmentation. No cases of atrophy, scarring, infection, or permanent pigmentary change occurred.
Conclusion: Treatment of PWB with PDL can be safely initiated within the first few days after birth as an in-office procedure without any complications. Early intervention allows for treatment without general anaesthesia and maximizes the chance of significant clearance as early in life as possible.

EARLY CAREER CLINICAL AND SCIENTIFIC

CLINICAL EVALUATION OF THE SAFETY AND EFFICACY OF A 1060 NM DIODE LASER FOR NON-INVASIVE FAT REDUCTION OF THE ABDOMEN AND FLANKS

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Background: The popularity of non-surgical treatments for unwanted fat reduction is on the rise. Currently, there are five

leading non-invasive body contouring options indicated for lipolysis: cryolipolysis, radiofrequency (RF), high-intensity focused ultrasound (HIFU), photobiomodulation therapy (PBMT) and hyperthermic laser treatment. The purpose of this study was to evaluate the safety and efficacy of a 1060 nm diode laser for non-invasive fat reduction of the abdomen and flanks.
Study Design/Materials and Method: This multi-center study protocol enroled 60 subjects across two centers. In this abstract, we will discuss the findings from one site, Laser and Skin Surgery Center of Northern California. This center enroled 30 eligible subjects. Each subject received a single study treatment with a 1060 nm diode laser with 1.4 W/m^2 on each diode for 25 minutes. Subjects were followed up at 6 and 12 weeks post-treatment. Photos and ultrasound images were taken at baseline, 6 weeks and 12 weeks. A satisfaction questionnaire was completed at study exit.
Results: Twenty-nine subjects successfully completed the study. One subject was lost to follow up. Three blinded evaluators could correctly identify the pre-treatment image compared with the post-treatment image in an average of 67% of subjects. The ultrasound images compared between baseline and 12 weeks showed an average reduction in the adipose layer of 9% on the abdomen and 7% on the flank. The average pain score was 2.6 out of 10. 75% of subjects stated they were satisfied to very satisfied with the treatment. 79% of subjects stated they would recommend this treatment to a friend. No long-term side effects during the study duration was observed.
Conclusion: The results from this study highlight the safety and efficacy of a single treatment using a 1060 nm (±10 nm) diode laser to improve the appearance of unwanted fat in the abdomen and flanks.

DERMATOLOGIC SCAR ASSESSMENT WITH STEREOSCOPIC IMAGING AND DIGITAL THREE-DIMENSIONAL MODELS: A VALIDATION STUDY

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Background: We evaluated a new handheld stereoscopic imaging system capable of visualizing scars with digital three-dimensional (3D) models and providing automated morphometric estimates. The objective was to validate the repeatability and accuracy of intra- and inter-investigator scan results.
Study Design/Materials and Method: Engineered metal plates with depressed and elevated model scars ($n = 72$) were scanned six times by one investigator. In vivo hypertrophic and atrophic scars ($n = 15$) were scanned once by three investigators. The repeatability of morphometric estimates was assessed using coefficients of variation (CVs) to compare the variation among multiple scan results for both model and *in vivo* scars, with 0% reflecting a perfect match. Scar estimates from digital three-dimensional (3D) reconstructions were compared with the known dimensions of physical model scars and with ruler measurements of *in vivo* scars.
Results: A total of 48 model scars and 12 *in vivo* scars were eligible for automated analyses with the imaging system's proprietary software. Intra-investigator scan results for the model scars were repeatable, with low variance for all parameters: volume, area, length, and depth/height (CV: 1.8–3.1%). By comparison, inter-investigator scans of real *in vivo* scars resulted in slightly higher median CVs (4.4–7.3%; $P < 0.05$). 3D model scar estimates correlated well with the known physical dimensions of model scars for all parameters ($P < 0.001$) and accurately reflected the measurements of *in vivo* scars ($P < 0.001$). The six *in vivo* scars situated on the chest and abdomen showed the highest inter-investigator variation, due to respiratory movement artifacts.
Conclusion: Stereoscopic imaging of scars generates accurate and repeatable measurement estimates that show little intra- and inter-investigator-based assessment variation. The best results are achieved by minimizing subject movement.

EFFICACY OF PHOTOBIOMODULATION THERAPY HELMET DEVICE FOR LICHEN PLANOPILARIS

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Background: Lichen planopilaris (LPP) is a lymphocytic cicatricial alopecia resulting in perifollicular inflammation and potential progression to irreversible follicular scarring. While common LPP therapies include topical steroids and systemic hydroxychloroquine, photobiomodulation therapy (PBMT) is an emerging therapy with potential efficacy in LPP. Herein, we evaluate the efficacy of a focused 678 nm PBMT helmet device in LPP.
Study Design/Materials and Method: Patients with biopsy-proven LPP and baseline LPP activity index (LPPAI) scores above 2.0 were enroled in this IRB-approved prospective interventional study. Following treatment wash-out, a target area (TA) of greatest clinical inflammation was identified per subject. TA scalp biopsies, trichoscopy, and hair counts were performed at baseline and after 6 months of treatment. Patients used PBMT-helmet devices with 80 focused VL680 lasers at a wavelength of 678 (±7) nm and fluence of 1.03 J/cm^2 for 20-minute sessions twice per week.
Results: Fourteen Caucasian patients with LPP participated in this study, 12 women and 2 men with mean age of 62.3 years (ranged from 38 to 72 years). Most (78.6%) had history of topical steroid use and 50% reported prior hydroxychloroquine treatment, 42.9% of whom discontinued due to intolerability. Following 6 months of PBMT-helmet treatment, 92.9% of participants were clinically improved with average LPPAI score reduction of 1.69 (P).
Conclusion: Our preliminary findings support the use of PBMT for LPP, which may be especially useful for patients unable to tolerate systemic therapies or other topical therapies. Further studies are required to evaluate efficacy of long-term PBMT use and of PBMT as an adjunctive LPP treatment.

FAT LOSS IS A HIIT: TRACKING EXERCISE-INDUCED FAT METABOLISM USING DIFFUSE OPTICAL SPECTROSCOPIC IMAGING (DOSI)

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Background: Noninvasive procedures for lipolysis have emerged without reliable ways to study their efficacy. Fat metabolism through lipolysis has been shown to increase through exercise, specifically high-intensity interval training (HIIT).

Real-time, noninvasive imaging can detect and monitor tissue-level changes and provide a positive reference for analysis of additional lipolysis modalities. Diffuse optical spectroscopic imaging (DOSI) is a novel, noninvasive imaging system that uses measurements of tissue lipid and water fractions and haemoglobin concentrations to reliably quantify fat metabolism. This study aims to determine the feasibility of monitoring acute changes in abdominal fat metabolism after HIIT with DOSI.
Study Design/Materials and Method: Active subjects completed a 10-minute HIIT routine that contained 20 core exercises, including crunches, leg lifts, and isometric holds. Lower abdominal DOSI measurements were collected before and immediately after the HIIT routine using a 7×4 grid pattern (12×6 cm). Average values of lipid and water fractions and total haemoglobin concentration across the abdomen before and after exercise were found using MATLAB. Tissue optical index (TOI) was calculated as a measure of fat metabolism using the formula TOI = (Deoxygenated Hb × Water)/Lipid and statistical analysis was performed using paired t tests.
Results: Twenty-five subjects (10 men/15 women, ages 22–31) were recorded to have body mass index 17.6–26.0 and abdominal circumference 66.0–101.6 cm. Total haemoglobin increased significantly by 1.13 ± 2.69 μM ($P = 0.046$), and TOI increased significantly by 0.28 ± 0.60 ($P = 0.03$). Tissue water and lipid fractions did not change significantly after exercise.
Conclusion: This study demonstrates that DOSI can capture acute effects from HIIT-stimulated metabolic activity in abdominal fat. DOSI findings are consistent with a significant increase in total haemoglobin, suggesting increased tissue perfusion. This change results in significantly increased TOI acutely after intervention, suggesting increased fat metabolism. Our findings promote the application of DOSI as a reliable, easy-to-use method to assess fat loss acutely after noninvasive lipolysis procedures.

FRACTIONAL ABLATIVE CO_2 LASER-ASSISTED DELIVERY OF TOPICAL POLY-L-LACTIC ACID: A 2.5-YEAR SAFETY REVIEW

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Background: Laser-assisted drug delivery has recently increased in popularity as an effective therapy. This technique offers increased uptake of topicals, while combining the benefits of both therapies. However, there remains concerns about patient safety, including filler nodules.
Study Design/Materials and Method: A retrospective chart review was performed over a 2.5-year period. Patients had treatment with fractional ablative carbon dioxide (CO_2) laser (Solta Medical, Hayward, CA) immediately followed by topical poly-L-lactic acid (PLLA) (Galderma, Fort Worth, TX) application. Safety was assessed by adverse events within the first 3 months.
Results: Ninety-four patients had 118 combination treatments. 90.4% were female, and mean age was 55.7 years. For Fitzpatrick skin type, 36.2% were type I, 44.7% were type II, 12.8% were type III, 3.2% were type IV, 1.1% were type V, and 2.1% were not known. Overall, 81.9% had one session, 12.8% had two sessions, 4.3% had three sessions, and 1.1% had five sessions. For treatment indication, 33.1% were for photodamage and aging, 22.9% for scar, 18.6% for fine lines and wrinkles, 12.7% for acne scarring, 10.2% for skin laxity, and 2.5% for striae. For treatment site, 31.4% included the upper lip, 16.9% the perioral area, 14.4% the cheeks, 11.9% the full face, 9.3% multiple sites, 4.2% the nose, 3.4% the chin, 2.5% the forehead, 1.7% the glabella, 1.7% the neck, 1.7% the thighs, and 0.8% the abdomen. When recorded, mean total energy for laser treatment was 1.75 kJ and mean volume of PLLA was 2.1cc. Of the 118 combination treatments, there were no documented adverse events recorded related to laser-assisted delivery of topical PLLA, including filler nodules, delayed wound healing, prolonged erythema, and abnormal scarring.
Conclusion: Of the 118 treatments with fractional ablative CO_2 laser immediately followed by topical PLLA application, there were no adverse events due to laser-assisted delivery of PLLA.

LASER EDUCATION IN DERMATOLOGY RESIDENCY: OUTCOMES OF A RESIDENT-REPORTED SURVEY

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Background: All dermatology residents should have adequate, diverse training in medical/cosmetic laser procedures, as these procedures are done safely in the hands of a board certified dermatologist. Litigation risk with laser procedures is higher with non-physician operators, and there are no standardized regulations on delegation, supervision and operation of laser procedures between physicians and non-physicians in numerous states. Only a small fraction of residents acquire formal fellowship training in laser procedures, and it has been previously shown that most residents don't feel prepared to perform laser procedures after graduation. Our study aims to conduct a resident-reported survey assessing residents' educational exposure to lasers during residency, the gaps in current laser education, and how learning can be enhanced.
Study Design/Materials and Method: We distributed an anonymous 18-question survey electronically to ACGME-accredited dermatology residency programmes.
Results: Seventy residents responded. All respondents strongly or somewhat agree lasers are an important tool in cosmetic/medical dermatology; however, 58% felt they need more laser-learning opportunities at their program and 75% felt they would need more training before starting a job. The top four currently used learning modalities include: 18% textbooks, 17% hands on sessions, 24% observing faculty in clinic, 18% lectures given by faculty. However, 18% desire more hands-on training, 19% desire more virtual lectures by expert faculty, and 17% desire more industry-based lectures. Additionally, out of 17 different energy-based devices, residents have the most observed and hands-on practice with the pulsed dye and Nd:YAG lasers. For all other devices, over 50% of respondents voted they need more exposure to that device, including education on settings, treatment endpoints, risks/benefits, and after care. Lastly, 43% of respondents weren't familiar with the ASLMS.
Conclusion: Results highlight gaps in laser education, what residents desire to enhance their laser adeptness, and provide ideas on how the ASLMS can help support laser education for dermatology residents.

LASER TREATMENT OF KAPOSI SARCOMA: CASE SERIES AND LITERATURE REVIEW

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Background: Kaposi sarcoma (KS) is a vascular neoplasm with multiple different subtypes, including HIV-associated KS (HIV-KS) and classic KS (C-KS). For cutaneous-limited disease, KS may be associated with significant morbidity secondary to pain, bleeding, and associated stigma. Laser treatment has been reported to control disfiguring KS in a rapid and safe manner.
Study Design/Materials and Method: Retrospective review of sequential patients presenting to a tertiary care center treated with laser therapy for biopsy-proven KS. Records were reviewed for demographic and clinical data, laser treatment and parameters, concurrent topical or systemic therapy, and documentation of clinical response. Photographs were obtained at each visit and compared with assess for interval improvement.
Results: Three male patients presented with HIV-KS (age 35–48). Three patients had C-KS (two male, one female; age 38–91). Three patients (50%) had involvement of arms and legs, two patients (33%) with legs only, and one patient (17%) with arms only. Three patients were on systemic doxorubicin for extracutaneous or extensive cutaneous disease. Five patients were using concurrent topical therapy including sirolimus, timolol, or imiquimod. One patient was treated with 1064 nm Nd:YAG with two treatments with clinical improvement. Five patients were treated with 595 nm pulse dye laser (PDL) for one to nine treatments typically spaced 8 weeks apart. One patient was treated with 1064 nm Nd:YAG after PDL treatment due to having thicker, papular lesions. All patients had clinical improvement, including fading of color and decreased thickness of papular lesions. Complications included mild edema and transient hyperpigmentation.
Conclusion: Laser treatment for KS is well-tolerated and may be readily accomplished with various vascular lasers, including PDL and Nd:YAG. Further controlled studies are warranted on relative efficacy of each laser and potential combination therapy or laser-assisted drug delivery of commonly employed topical agents to enhance treatment response.

LASER-ASSISTED DELIVERY OF TRANEXAMIC ACID FOR MELASMA USING A NOVEL 1927 NM FRACTIONAL THULIUM FIBRE LASER

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Background: Melasma is associated with psychosocial stress, which can impact quality of life. One theory suggests ultraviolet light increases plasmin activity of keratinocytes, which has led to use of tranexamic acid (TA) due to its anti-plasmin properties. Laser-assisted drug delivery offers increased uptake of topicals, while combining the benefits of both therapies.
Study Design/Materials and Method: A prospective clinical study investigated the utility of combination treatment with topical TA and low-energy, low-density 1927 nm fractional thulium fibre laser (LaseMD, Lutronic, South Korea) for melasma. Ten subjects were enroled to receive five treatments. Immediately following laser treatment, topical TA was applied. Subjects continued to apply it twice daily for 7 days.
Results: Seven subjects completed the study. Mean age was 47.0 years, and 100.0% were female. For Fitzpatrick skin type, 14.3% were Type II, 28.6% were Type III, and 57.1% were Type IV. At baseline, mean MASI score was 10.6, and improvements from baseline score were 1.1, 3.5, and 2.5 at 30, 90, and 180-day follow-up, respectively. At 180 days, 42.9% were experiencing melasma recurrence and worsening MASI score from 90-day follow-up with mean decline of 1.0. For investigator global improvement scores, 71.4%, and 85.7% had improvement from baseline at 30, respectively. For subject global improvement scores, 85.7%, and 100.0% saw improvement at 30, respectively. No subject worsened. When scores differed between investigator and subject, subjects always rated improvement as better. At baseline, mean quality of life score was 44.4. There was significant improvement from baseline at 30-day follow-up, which was 9.6. At 30-day follow-up, 71.4% were satisfied with treatment and would recommend to friends and family with melasma.
Conclusion: Combination of topical TA with low-energy, low-density 1927nm fractional thulium laser improved clinical outcomes and quality of life for patients with melasma.

EMERGING TECHNOLOGIES

EMERGING TECHNOLOGIES – HIFEM

BENEFITS OF HIFEM IN URINARY INCONTINENCE: MY EXPERIENCE

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Background: Urinary incontinence (UI) in women according to the International Continence Society (ICS) refers to an involuntary, uncontrollable, unwitting leakage of urine causing physical discomfort and problems due to maintenance of feminine hygiene. Current treatment options require a combination of pelvic floor muscle exercises, Faradic current stimulation, drug treatment and emerging technologies like HIFEM (High Intensity Focused Electromagnetic Energy). HIFEM leads to supramaximal contractions of pelvic floor muscles. It leads to re-education, strengthening, restoration of neuromuscular control and development of a new motor pattern in Pelvic Floor Muscles. The aim of the treatment is to study the effect of HIFEM on incontinence and neuromuscular re-education of weak Pelvic Floor Muscles.
Study Design/Materials and Method: Twenty-three female subjects (mean age: 60 years) with stress, urge and mixed type of urinary incontinence were treated with six sessions of HIFEM given twice a week. The nine subjects were made to practice Mid Flow Urine Holds during the day while urinating. The subjects practiced the Mid Flow Urine Holds during the study period and continued till three months after the study. KHQ (Kings' Health Questionnaire) was used to assess the subjects' incontinence scores pre, post six sessions and post three months of HIFEM. The Mid Flow Urine Holds were assessed on a 3-Point Subjective Scale. 1—inability to hold urine, 2—moderately hold urine, 3—strongly hold urine. The pre- and post-scores of KHQ and 3-point Subjective Scale were documented and analysed.
Results: Ten percent improvement in KHQ scores were observed from baseline to 3 months follow up. Thirty percent improvement was observed in Mid Flow Urine Holding Score.

Conclusion: HIFEM is a promising technology to improve incontinence by strengthening the pelvic floor muscles. It also helps in improving the neuro-muscular re-education of weak pelvic floor muscles by facilitating the formation of new motor patterns.

EMERGING TECHNOLOGIES - TELEMEDICINE

COMBINING STORE-AND-FORWARD TECHNOLOGY AND VIDEO CONFERENCING TO OPTIMIZE AESTHETIC CONSULTATIONS AND TREATMENTS

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Background: Teledermatology has been used to help provide dermatologic care at a distance for years and has become much more important during the Covid-19 pandemic. There are well established positive and negative points for providing general dermatological consultations via telemedicine. A new arena for telemedicine is that of telaesthetics; this is the consulting and scheduling of cosmetic patients through a combination of Store-and-Forward and video teledermatology.

Study Design/Materials and Method: A Store-and-Forward platform is used to begin a cosmetic interaction, provide information to prospective patients and schedule a pre-treatment consultation. Video interaction is used if the patient and the provider feel a direct live interaction would be advantageous.

Results: Results of patient and provider satisfaction surveys will be discussed.

Conclusion: Telemedicine has incorporated three distinct technologies. This presentation will discuss audio-only, video-only and store-and-forward modalities and how they are utilized in teledermatology. Special emphasis will be on combining video and store-and-forward modalities to maximize an aesthetic interaction. This combination will be shown to improve the patient experience and to improve the aesthetic closure rate of consultation. There are also other pre- and post-procedure benefits with this combination.

EMERGING TECHNOLOGIES-RCM/OCT

THE USE OF COMBINED REFLECTANCE CONFOCAL MICROSCOPY–OPTICAL COHERENCE TOMOGRAPHY DEVICE IN THE DIAGNOSIS AND DEPTH ASSESSMENT OF CUTANEOUS SQUAMOUS CELL CARCINOMA

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Background: Non-invasive imaging devices such as reflectance confocal microscopy (RCM) and optical coherence tomography (OCT) have been used to help in the diagnosis of squamous cell carcinoma (SCC). RCM provides high-resolution images up to 250 μm depth in skin while OCT provides deeper (up to 2000 μm) but lower cellular resolution images of skin. Combined RCM-OCT enables high cellular resolution and deep tissue evaluation. The value of combined RCM-OCT has been shown in the detection and depth assessment of basal cell carcinoma.

Study Design/Materials and Method: Prospective study enroling consecutive patients with SCC, SCC *in-situ* (SCCIS), or actinic keratosis (AK) between September 2020 and December 2020 at a tertiary center. Handheld RCM-OCT imaging was performed at the center of clinically suspected lesions before biopsy and to previously diagnosed lesions before Mohs micrographic surgery (to check for residual tumour). RCM-OCT findings were correlated with histopathology results.

Results: Thirty-six lesions from 30 patients were included in the study. Mean age was 68 years (range: 46–79); 19 (63.3%) were males. Most common RCM-OCT feature for invasive SCC was presence of vertical blood vessels (89% of lesions); for SCCIS/AK was acanthosis and parakeratosis without vertical blood vessels (84% of lesions). RCM-OCT had a sensitivity of 81.8% (95% confidence interval [CI]: 81.1–82.5%) for the detection of invasive SCC and a specificity of 92% (95% CI: 91.6–92.3%). Negative predictive value was 92% (95% CI: 91.6–92.3%) and positive predictive value was 81.8% (95% CI: 81.1–82.5%). RCM-OCT had a sensitivity of 85.7% (95% CI: 85.1–86.3%) for the detection of SCCIS/AK and a specificity of 100%. Negative predictive value was 91.7% (95% CI: 91.3–92%) and positive predictive value was 100%. The OCT depth measurement correlated well with histopathology with an r^2 of 0.9.

Conclusion: Combined RCM-OCT can help in the diagnosis of AK-SCC spectrum in clinically suspected lesions therefore potentially reducing cost and unnecessary biopsies.

EMERGING TECHNOLOGIES - PHOTOMEDICINE

ENZYMATIC COAGULATION ZONE REMOVAL FOLLOWING ABLATIVE FRACTIONAL LASER TREATMENT

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Background: Ablative fractional photothermolysis (aFP) is a technique for generating an array of microscopic treatment zones (MTZ) to promote local skin remodelling. The laser creates a grid of vertical ablative channels extending from the surface of the skin surrounded by a cuff of denatured collagen referred to as the coagulation zone (CZ). The CZ is often seen as an unintended byproduct in the creation of the empty ablation zone (AZ) that contributes to the inflammatory process and limits transcutaneous lipophilic drug delivery. Applying topical papain urea post-aFP chemically debrides the CZ, changing the architecture of the MTZ.

Study Design/Materials and Method: aFP was performed with a 10,600 nm CO_2 laser on *ex vivo* human abdominal skin at 50 mJ/pulse and 1% density. A non-stick bandage was soaked in either a 2:1 buffered solution of papain urea (PU) or phosphate-buffered saline (PBS) and applied under an occlusive dressing. After an hour at 37°C, samples were rinsed with PBS and frozen horizontal sections were cut at 20 micron increments to a depth of 500 microns. Samples were stained with NBTC to differentiate between viable tissue and denatured collagen. Area of the open channels (AZ) and coagulation zones ($n = 5$) were quantified at each level.

Results: The PU group showed a significant increase in ablation zone area and reduction of the coagulation zone compared with PBS at every level ($P < 0.05$). The PU group displayed an almost complete loss of CZ with few discrete patches remaining, allowing for direct communication between the AZ and surrounding tissue. Additionally, the PBS AZ area was only present to a depth of 400um, whereas the PU AZ extended the full 500 microns measured, increasing channel depth by at least 25%.
Conclusion: Enzymatic post-processing with PU is a promising avenue for investigating the functional role of the CZ in skin remodelling and expanding the clinical applications of aFP.

EPOSTER ONLY ABSTRACTS

EPOSTER ONLY - ABLATIVE/NON-ABLATIVE TREATMENTS

CLINICAL EVALUATION OF THE EFFICACY OF FRACTIONAL RADIOFREQUENCY FOR THE TREATMENT AND REDUCTION OF STRETCH MARKS

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Background: Skin resurfacing with ablative fractional radiofrequency treatment results in reepithelization, collagen shrinkage, neocollagenesis and fibroblast stimulation which may be beneficial for the improvement of various skin lesions. This clinical study was conducted to evaluate the efficacy of a new nano-fractional radiofrequency device (n-FRF) for the treatment of striae and the parameters utilized to achieve optimal results.
Study Design/Materials and Method: This single-center study, evaluated by 3D camera measurement, assessed the safety and efficacy of treatment with n-FRF for the revision of stretch marks in 15 subjects consisting in 22 zones. Subjects received four treatment sessions to the striae areas, 4 weeks apart with an ablative fractional radiofrequency device (Venus Concept), at different settings. Three-dimensional (3D) computerized photographs (Miravex) of the treatment area were evaluated for improvement from baseline to follow-up (FU) visits at 12 and 16 weeks post-final treatment. A subject satisfaction questionnaire was completed at each of the FU visits. Global Aesthetic Improvement Scale (GAIS), Subject Satisfaction Scale, Pain Visual Analog Scale and Tolerability Score were calculated.
Results: A total of 15 female subjects (Fitzpatrick skin type I–III, average age 36.6 ± 8.6) received multiple treatments using a variety of parameters and multiple passes over stretch marks on the abdomen, inner thighs and flanks. The average subject satisfaction scale was three, which signified patients were "satisfied" with their treatment. Analysis of 3D photographs of the striae affected zones after completed FU revealed an average reduction in the striae volume of 33.86% and a reduction of 21.36% in the maximum depth of the striae in addition to improvements in the superficial appearance of the striae area. The GAIS improved by 1.7-points when compared with baseline. Treatments were well tolerated with subjects reporting a mean score of 3.8 out of 10 for pain and 3.1 out of 4 for tolerability (indicating the treatment was "tolerable"), with no occurrences of serious adverse events.
Conclusion: 3D Image analysis of the treated zones presented overall reductions in the color and texture of striae after multiple treatments with n-FRF. A combination of ablation and coagulation introduced by n-FRF treatment also resulted in improvement to the appearance of the treated striae.

EFFICACY OF NEW VARIABLE PULSES 2940 NM ER:YAG LASER FOR TREATMENT OF DIFFERENT STAGES OF STRIAE DISTENSAE IN ASIANS

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Background: Striae distensae (SD) is a persistent, atrophic, linear scar-like defect, for which many modalities are used with unsatisfactory outcomes. 2940 nm Er:YAG laser for scar treatment is well-established. Our study aims to assess efficacy and safety of the combination of low-fluence micro-short pulse (MSP) and SMOOTH mode pulse 2940 nm Er:YAG laser treatment to address various defects in different stages of SD.
Study Design/Materials and Method: Patients with SD including striae rubra, striae alba or mixed type received three sessions of Er:YAG 2940nm laser in the combination of sub-ablative SMOOTH followed by MSP modes at 4–6-week intervals. The length and width of SD were measured by a blinded evaluator. Roughness and volume were measured by Antera3D. Dermal thickness was measured by Dermalab skin ultrasound.
Results: Twenty-one Fitzpatrick skin types II–IV patients were enroled. Majority of subjects had striae alba (71.4%, 15/21), others had striae rubra (14.3%, 3/21) and mixed type (14.3%, 3/21). At 16 weeks, overall mean widths and lengths were significantly reduced, −0.81 and −7.75 mm, respectively ($P < 0.001$). Significant reduction of mean surface roughness (-1.57, $p < 0.001$) and volumes (-1.6 mm3, $p < 0.035$) were also demonstrated. Average lesional dermal thickness significantly increased by 171.81μm ($P < 0.001$). Clinical photographic assessment (before VS 16-week) by two blinded-dermatologists showed that majority of patient attained 26-50% global improvement. The common side effects were transient erythema for 1-5 days and post-inflammatory hyperpigmentation.
Conclusion: Combination of SMOOTH and MSP mode Er:YAG laser is one of the safe and effective treatments of various stages of SD in Asian skin type.

FRACTIONAL ABLATIVE AND Q-SWITCHED LASERS AND PERFLUOROCARBONS COMBINATION TECHNIQUE FOR SAFER AND QUICKER COSMETIC TATTOO REMOVAL

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Background: Permanent eyeliners, eyebrows, and lip liners are commonly applied using the process of sparse micro-pigmentation to save time and enhance facial features such as lips, eyelids, eyebrows. Inks used usually contain red, brown, or flesh-like pigments containing iron dioxide or titanium dioxide, that is why they ate difficult to remove. They may turn black after Q-switched (QS) laser treatment. Chemical reduction of ferric to ferrous oxide is thought to be responsible

for such a phenomenon. Such paradoxical darkening has been successfully treated with further QS laser treatments, sometimes requiring up to 20 sessions. In 2012 R20 method protocol was proposed by Koshida, in which up to four passes of laser are allowed, with subsequently 20 minutes waiting between the passes. It was hypothesized that after the subsidence of frosting if we deliver laser, at that point it can enter more profound within the dermis hence focusing on more dermal ink. It can also fragment the ink particle into smaller pieces thus allowing faster clearance of ink by macrophages. It is more effective than the traditional method. The number of sessions required for tattoo removal is greatly reduced thus decreasing the number of visits to the clinic and increasing patient compliance. However high risk of darker phototypes patients scarring was observed. Cosmetic tattoos show many peculiar characteristics, so their removal requires specific considerations. Permanent makeup inks are different from regular tattoo inks as they often contain a higher percentage of inorganic matter and oxides- used for their reflective purposes. Some of the semi-permanent makeup is resistant. As suggested by Cannarozzo, Negosanti, Sannino, et al. (2019), a single passage with fractional ablative Er:Yag laser was used as the first pass, to induce an ink clearing and to reduce the possibility of scar formation. The administration of energy in such a short pulse leads to a rapid thermal expansion of the target, that is, subsequently fragmented by the release of an acoustic wave that leads to destruction and "cutting" tattoo pigment. The disintegration of pigments into smaller granules allows macrophages to phagocyte fragments and to carry them away via the lymphatic system. Phagocytosis is subsequently triggered and the tattoo fragments are packaged for lymphatic drainage and further scavenged by dermal macrophages, fibroblasts, and mast cells, leading to a lightening of the tattoo. The pigment treated this way gradually becomes shallow until it disappears, while no injured trace will be left on the peripheral tissues making the treatment selective and safe. On laser impact, the immediate flash of white light from the tattoo is followed by epidermal whitening and slight edema. Immediate tissue whitening is a sign of rapid, localized heating with steam formation, resulting in dermal and epidermal vacuolization. Some pinpoint bleeding may be observed (most likely represent indirect vascular injury from the photo-acoustic waves. Perfluorocarbons (PFCs) are micron-sized non-toxic, chemically, and biologically inert compounds with unique physical properties that enable their use in a wide range of medical applications. It helps to heal wounds, possesses a bubbling effect. It is a stable, heavy liquid and has no flashpoint. Perfluorocarbons have potential additional benefits including reduced collateral thermal tissue injury due to tissue compression owing to its high specific gravity.

Study Design/Materials and Method: In the proposed combination method R20M™ after the patch test, when all settings are established, the skin is prepared with numbing cream and a Fiflow® mixture of perfluorocarbons. (Perfluorohexane (and) Perfluoroperhydrophenanthrene (and) Perfluorodecalin (and) Perfluorodimethylcyclohexane.) The first pass was performed with fractional Er:Yag Laser Three to five subsequential passes with QS KTP or Nd:Yag was performed PFC is applied immediately after the treatment and when there is a need, also between passes of Q-switched laser. Ten females 25–62 years old took part in this pilot study. Each of them has a cosmetic tattoo removal procedure done as described above.

Results: One treatment was enough for 6 of 10 participants with a visible satisfactory clearance of the ink within 3 months. Two treatments were enough for four of ten participants with a visible satisfactory clearance of the ink within 6 months. No side effects observed.

Conclusion: The proposed R20M method of a cosmetic tattoo laser removal, where fractional ablative lasers and q-switched lasers are used together with PFCs gives quicker and safer results comparing with other methods.

REFRACTORY GRANULOMA ANNULARE TREATED WITH ERBIUM-DOPED NONABLATIVE LASER AND PULSED DYE LASER

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Background: Granuloma annulare (GA), an inflammatory dermatosis of annular lesions, is notoriously difficult to treat. There is a dearth of literature on laser modalities in GA management; however, the few existing case reports/series support the role of pulsed dye laser (PDL) and fractional photothermolysis, albeit to varying degrees. To our knowledge, these two laser modalities have not been used in combination. Herein, we present a case of GA treated with PDL and Fraxel.

Study Design/Materials and Method: This is a case of a 71-year-old gentleman with GA resistant to treatment with calcipotriene and betamethasone, intralesional triamcinolone, dapsone, montelukast, excimer laser, niacinamide, aspirin, and psoralen and ultraviolet A (PUVA). The patient elected to trial laser in place of additional pharmacologic therapy. Comparative treatment was done with PDL 595 nm (7 mm spot size, 7 J/cm^2, pulse duration 1.5 milliseconds) versus erbium-doped nonablative 1550 nm laser (30 mJ, treatment level 7–11, 8 passes) over the dorsal left wrist and bilateral hands for two cycles. One lesion was treated with both devices. Clinical response was assessed through serial history, physical exam, and clinical photographs.

Results: Comparative evaluation after two treatments found improvement with PDL alone, PDL and 1550 nm laser, and 1550 nm laser alone. Objectively, lesions were flatter with 1550 nm laser, and less erythematous with PDL. The combination treatment was the most effective, with approximately 50% improvement per patient and physician. A third treatment has been scheduled.

Conclusion: This case adds to our knowledge on laser treatment of GA and introduces the novel combination of PDL and nonablative laser. Patient satisfaction suggests that this regimen is a promising avenue for refractory GA and a potential alternative to pharmacologic management.

TREATMENT OF INFUNDIBULAR CYSTS WITH ABLATIVE ER:YAG LASER

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Background: Infundibular cysts, also known as epidermoid or epidermal inclusion cysts, occur most commonly on face, neck, periauricular area and upper trunk. These cysts are thought to arrive from ruptured pilosebaceous follicles or implantation of epithelium beneath the skin as a result of trauma. These cysts

are most commonly treated with surgical excision though limited studies have explored the treatment of these cysts with laser therapy. We report a case below of the successful treatment of a 70-year old patient with multiple infundibular cysts with 2940 nm erbium:yttrium aluminum garnet (Er:YAG) laser resulting in notable improvement.
Study Design/Materials and Method: A 70-year-old male presented to Dermatology Surgery clinic with complaints of multiple bumps on his face and neck, present for several years. Of note, he had a history of significant chronic sun exposure during his time living in Mexico. On physical exam, there were numerous 2–3 mm skin-colored firm papules on the nose, cheeks, neck and sun exposed areas of the chest. There were no open comedones. Biopsy was performed of a representative lesion, and histopathology revealed an infundibular cyst. He had no pertinent medical history. Due to the widespread involvement of the face, full-face ablative resurfacing with a 2940 nm Er:YAG laser was selected as the best treatment.
Results: The patient underwent a resurfacing procedure with a 2940 nm fully ablative Er:YAG laser. Two passes were performed to the entire face at a depth of 100 microns per pass and each papule was also individually treated with the single spot hand piece set at a depth of 50 microns. Patient reported significant cosmetic improvement with a single treatment.
Conclusion: While several reports have demonstrated that carbon dioxide (CO_2) fractionally ablative lasers can be effective in the treatment of vellus hair cysts, syringomas, and steatocystomas, there have been limited reports on the use of ablative lasers for epidermal cysts. The first successful treatment of multiple facial epidermal cysts with a CO_2 laser was reported by Reynolds and Kenealy in 2002. Feng et al. recently demonstrated that Er:YAG fenestration can be used as an alternative to surgical treatment of epidermal cysts in a series of 25 patients, with 92% reporting good results. To be the best of our knowledge, this is the first study demonstrating treatment of cysts with fully ablative Er:YAG laser.

EPOSTER ONLY - BODY CONTOURING/FAT REDUCTION

CLINICAL TESTING OF A LARGE FOOTPRINT RADIOFREQUENCY APPLICATOR FOR LIPOLYSIS OF THE FLANKS

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Background: Radiofrequency (RF) treatments have been limited by treating physician experience, technique. The development of a larger RF applicator which is also hands-free alleviates a lot of the concerns involved with non-invasive RF treatments. Previously both invasive and non-invasive lasers have been popular choices for lipolysis, but radiofrequency treatments are largely unexplored. This study evaluates the use of a 60 mm handpiece with RF device for lipolysis of the flanks.
Study Design/Materials and Method: Thirty subjects at three sites were enroled and treated on a single flanks three times, with treatments spaced 1–2 weeks apart. Caliper measurements were taken at baseline before treatments and then immediately after their third treatment. Caliper measurements were taken on both the left and right flanks three times consecutively and then an average of the three measurements was used as main data point. Adverse events were also assessed at all visits.
Results: Twenty-five subjects completed three treatments and had caliper measurements taken post-treatment. Baseline caliper measurements on subjects ranged from 10 to 56 mm (38.2 ± 10.2 mm). Post three treatment caliper measurements ranged from 8 to 54.7 mm (37.1 ± 11.6 mm). Normalized caliper measurements indicate a statistically significant benefit ($P < 0.05$) when comparing treated with control flanks. Overall a majority of subjects showed some improvement in their caliper measurements after only three treatments. Adverse events seen were edema and erythema, both of which are expected for RF treatments. Due to the treatments being so frequent and the sensitivity of caliper measurements, the swelling seen in subjects may partially confound the caliper data.
Conclusion: While a 60 mm RF applicator appears to be safe and effective for the lipolysis of the flanks, further treatments with a longer term follow-up should be conducted to confirm the preliminary data.

COMBINATION TREATMENT FOR BUTTOCK AND ABDOMINAL REMODELLING AND SKIN IMPROVEMENT USING HIFEM PROCEDURE AND SIMULTANEOUS DELIVERY OF RADIOFREQUENCY AND TARGETED PRESSURE ENERGY

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Background: Improving the body contour and skin appearance are the two main pillars of aesthetic medicine. This study aims to evaluate the effect of HIFEM treatment for body sculpting combined with simultaneous delivery of radiofrequency (RF) and targeted pressure energy (TPE) for skin quality enhancement in a single treatment.
Study Design/Materials and Method: Out of 17 recruited subjects, 15 (44.3 ± 14.2 years, 22.3 ± 2.3 kg/m^2) underwent the four weekly treatment sessions. Two subjects were withdrawn due to scheduling conflicts. Subjects were divided into two study groups depending on the treated body area: Abdomen ($N = 7$) and Buttocks ($N = 8$). The scheduled sessions consisted of the HIFEM treatment administered first, immediately followed by RF + TPE simultaneous treatment. Each session took approximately 50 minutes (30 minutes of HIFEM and up to 15–20 minutes of RF + TPE, depending on the treated area). Circumference measurements, satisfaction questionnaires, digital photographs were assessed at Baseline, 1 month, and 3-month follow-up. The subject's comfort was evaluated by a 5-point Likert scale Therapy Comfort Questionnaire after the last treatment.
Results: Overall, combined treatments were safe, and subjects found it comfortable. The baseline circumference was, on average, 80.4 ± 5.3 cm for the abdomen ($N = 7$) and 96.0 ± 5.7 cm for the buttocks ($N = 8$). At 1 month, the abdominal circumference decreased to 76.0 ± 5.4 cm (-4.4 cm; $N = 7$), while the buttocks showed an increase to 97.0 ± 4.1 cm ($+1.0$ cm; $N = 8$). Three-month interim data showed that the circumference results were sustained for the abdomen (-4.1 cm; $N = 5$) and buttocks ($+1.1$; $N = 4$) as well. Digital photographs showed dramatic improvement in the treated area. Satisfaction was high in both groups since all patients "agreed" or "strongly agreed" that the treated area's appearance has been improved, referring to both body sculpting and skin appearance enhancement.

Conclusion: Results showed high patient satisfaction and considerable improvement in body image and skin appearance followed by combined HIFEM and RF + TPE treatment over the buttocks and abdomen. Treatment effect has persisted up to 3 months.

OPEN-LABEL, PROSPECTIVE, SINGLE-CENTER STUDY TO EVALUATE A NOVEL BIO-ELECTRIC CURRENT STIMULATION DEVICE FOR IMPROVEMENT OF MUSCLE TONE

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Background: Direct electrical muscle stimulation (EMS) devices have been used to tone, reshape and maintain muscle definition by stimulating muscle contractions. This study introduces an initial evaluation of a novel bio-electric current stimulation device for the improvement of muscle tone. The primary objective is to quantify the treatment effect on the abdomen, flank and oblique tissues, and to validate a new means for further research in the body sculpting field.

Study Design/Materials and Method: A total of 28 patients were enroled in this open-label, prospective, single-center, pilot study, with all subjects completing study treatments and follow up visits. Subjects received up to received up to six treatments (lasting up to 45 minutes) spaced 1–2 weeks apart, and follow-up assessments were scheduled at 4, 8, and 12 weeks post-treatment. During treatment device electrodes were placed on the abdomen, flanks or obliques in a standardized pattern. Digital photos and ultrasound measurements were obtained at baseline and at each follow-up visit.

Results: There were 17 females and 11 males treated in the study, ranging from 23 to 64 years old. Racial distribution was diverse with nine Caucasian, nine Asian, five African American, and five Latino or American Indian. Ultrasound measurements for fat were available for 19 patients and showed a 4% reduction of subcutaneous adiposity at week 12 compared with baseline. Ultrasound measurements for muscle mass were available for 17 patients and showed a gradual increase from 16% to 17% to 24% at Weeks 4, 8 and 12 respectively. Patients rated treatment discomfort at 2.27 out of 10, and no serious side effects were reported. There were two reports of mild erythema that self-resolved within a week.

Conclusion: This clinical study demonstrates that direct bio-electric stimulation is a novel means of supporting muscle growth and reducing fat in a safe and non-invasive manner.

RADIOFREQUENCY SYNCHRONIZED WITH HIFEM PROCEDURE INDUCE ADIPOCYTES APOPTOSIS IN HUMANS: HISTOLOGICAL STUDY

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Background: Fat tissue reduction is energy-dependent process that radiofrequency (RF) achieves by delivering a controlled heating to initiate adipocytes apoptosis. Similarly, the HIFEM procedure showed to be effective solution for body shaping, although based on the different mechanism. This study aims to investigate the changes in human fat tissue after simultaneous application of RF and HIFEM technologies.

Study Design/Materials and Method: Five patients participated in the study. Four subjects (51.50 ± 6.35 years, 22.59 ± 3.21 kg/m^2) were assigned for active treatments and one subject (57 years, 23.60 kg/m^2) served as a control. Three abdominal therapy sessions, consisted of 30-minute RF and HIFEM combined treatment, were scheduled for each subject. Sham treatments were performed with lowered energy (5% of the device output). Punch biopsies were collected from the abdomen at baseline, 1-week and 1-month follow-up to examine the structure of the fat tissue. In addition, Waist circumference, temperature measurement, digital photographs, satisfaction and therapy comfort were assessed. Adverse events were monitored.

Results: Baseline and control samples revealed healthy unilocular cells of round/polygonal shape and uniform size. On contrary, samples at follow-up showed ruptured membranes of adipocytes and elevated level of apoptosis manifested by pyknotic nuclei that occurred predominantly at 1 week, however, they were still present at 1-month. Adipocytes were also found to be flattened/shrunk and of smaller size at 1 week (−33.5%) and 1 month (−31.7%). Average waist circumference reduction after the active treatments was 2.20 cm. The fat temperature stayed between 43 and 45°C most of the treatment time while the therapy was comfortable with high patient satisfaction. No adverse events were documented.

Conclusion: As documented by histological examination, mutual combination of the synchronized RF and HIFEM procedure is safe and results in noticeable body shaping effect in human patients. Fat loss is achieved primarily by the apoptosis and shrinkage of adipocytes.

THE EFFICACY AND USEFULNESS OF NON-CONTACT RADIOFREQUENCY IN FAT REDUCTION AND BODY CONTOURING IN INDIAN PATIENTS

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Background: There is an increasing interest in a non-invasive method of localized fat reduction. Radiofrequency devices were available in the field of skin tightening and fat reduction for past many years and newer technologies allow us to use a non-contact, selective-field radiofrequency device to selectively induce apoptosis of the subcutaneous fat tissue heating to reduce waist circumference.

Study Design/Materials and Method: Fourteen healthy individuals with no underlying medical problem were treated with eight sessions of non-contact radiofrequency treatment to reduce abdominal subcutaneous fat. Four 20-minute sessions were performed with 1-week intervals. After the first four sessions, a gap of 4 weeks is given and another four sessions are repeated. Before starting the procedure, patient's abdominal circumferences at three points are taken and body weight were measured, and photographs were taken at baseline and each follow-up visit. Repeat photographs are also taken after 4 weeks of the last session. Any adverse events were asked for and assessed during the study period.

Results: A reduction in abdominal circumferences was noted in all participants. Side-effects like mild tenderness and redness were seen in all and no serious adverse effects were reported

Conclusion: Our study shows that the selective-field radiofrequency treatment seems to be safe and efficient for reduction of abdominal subcutaneous fat.

EPOSTER ONLY - GENITOURINARY HEALTH

ACQUIRED CUTANEOUS LYMPHANGIECTASIA OF THE VULVA SUCCESSFULLY TREATED WITH CO_2 LASER

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Background: Cutaneous lymphangiectasia is the dilation of lymphatic vessels in the dermis and subcutaneous tissue. This can be inherited or acquired after disruption of the lymphatic network, most commonly after surgical intervention. We report a case of acquired cutaneous lymphangiectasias of the vulva after radical hysterectomy for cervical cancer with adjuvant radiotherapy and chemotherapy that was successfully treated with CO_2 laser.

Study Design/Materials and Method: A case report of acquired cutaneous lymphangiectasia of the vulva that was treated with 10 sessions of CO_2 laser from 7/2018 to 9/2020. Lidocaine 2.5% and Prilocaine 2.5% cream was used for anaesthesia prior to the procedure. Antiseptic techniques were used to prep the skin before and after the procedure. Protective goggles were for the patient and operators. Deep Fx function of CO_2 laser was used for ablation. Settings were as follows: fluence 15–20 mJ; Density 1; 1 pass. Treatments were 2–4 months apart. There were no adverse effects noted.

Results: The patient is a 63-year-old female, avid runner, with no significant prior medical history other than a stage I-B, grade 3, poorly differentiated adenosquamous carcinoma of the cervix that was treated with radical hysterectomy and adjuvant radiotherapy and chemotherapy in 2008. Soon after her surgery, the patient started developing edema of the vulva, extending to the thighs, that was debilitating to the patient. She has had multiple hospitalizations for recurrent cellulitis. On presentation to our Dermatology clinic in 2018, the patient was noted to have multiple skin-colored papules and nodules with active drainage over the labia majora, as well as significant edema of the vulva extending into the mons pubis and proximal thighs. A shave biopsy of one of the papules in the right labia majora confirmed the diagnosis of lymphangiectasia. A test spot with CO_2 laser was performed on 7/2018 to an actively draining papule on the left labia majora with the following settings: Deep Fx fluence 15 mJ; Density 10; 1 pass. On follow-up 1 month after, there were no adverse events and the patient noticed less fluid drainage from the treated area. She then underwent treatment of the entire vulva with the same settings. She reported significant improvement on her follow-up appointment 2 months after. There were no adverse effects noted. Treatments were continued 2–4 months apart while increasing the fluence by 0.5 mJ each visit with a max fluence of 20 mJ. On her most recent visit on 9/2020, the patient reported an 80% improvement in her lymphangiectasia, both in terms of appearance and drainage. She also had less frequent hospitalizations due to cellulitis. On exam that day, she had minimal edema of the vulva with rare skin-colored papules over the labia majora but with no drainage.

Conclusion: Acquired cutaneous lymphangiectasia of the vulva is a rare complication of cervical cancer surgical treatment whereby the normal lymphatic architecture is disrupted. Other possible causes include bacterial infection and cervical tuberculosis. Malignant transformation of cutaneous lymphangiectasia or development of SCC in the areas involved has been reported in the literature. A close follow-up is usually advised. Treatment options for cutaneous lymphangiectasias are anecdotal and have variable results. They include surgical excision, cryotherapy, sclerotherapy, ablative laser treatment, and electrodesiccation. Moreover, cutaneous lymphangiectasia is well known for its high recurrence rate given involvement of deeper lymphatic vessels. While this is a single case report, we demonstrated the CO_2 laser is an effective and well-tolerated treatment option of acquired cutaneous lymphangiectasia of the vulva with no evidence of recurrence after multiple treatments over the course of 2 years.

CHARACTERIZATION OF SAFETY AND EFFICACY OF HYBRID FRACTIONAL LASER TREATMENT FOR INTERNAL VAGINAL SCARS – A PILOT STUDY

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Background: An estimated 75% of women find sex painful at some point in their life. Dyspareunia or painful sex can be caused due to number of reasons, one such reason is vaginal scarring. Vaginal scarring is a result of injury, damage or tearing caused to the vagina. Childbirth, surgery, and cancer are some of the common causes of vaginal scarring. This pilot study evaluates safety and efficacy of hybrid fractional laser utilizing simultaneous delivery of 2940 nm Erbium and 1470 nm Diode wavelengths to treat internal vaginal scars.

Study Design/Materials and Method: Five female subjects (mean age: 44 ± 16) with symptoms of dyspareunia were enroled in this prospective study. Baseline demographics and pap results were recorded. Primary endpoint included Female Sexual Function Index questionnaire (FSFI) at baseline, treatment and follow-up visits. Day-to-day Impact of Vaginal Aging questionnaire (DIVA) scores, Vaginal Health Index scores (VHIS) and photographs were collected at baseline, treatment and follow-up visits. Subject satisfaction survey was collected at the last visit. Subjects received five treatments at 4-week intervals (settings: 1470 nm—450–700 μm [density: 5–18%], 2940 nm—250–400 μm [density: 7–14%]). Follow-up visits were conducted at 1 and 3 months following final treatment.

Results: Statistically significant improvement ($P = 0.05$ at follow-up. DIVA questionnaire demonstrated significant improvement in sexual function and emotional well-being at 1 and 3 months compared with baseline. VHIS and pH showed improvement. Imaging at 1 and 3 months displayed improvement in the vaginal scar tissue quality. All subjects reported complete satisfaction with results achieved. No adverse events reported.

Conclusion: The data demonstrates that the hybrid fractional laser is safe and effective for treatment of internal vaginal scars. Larger Sham/Control studies are desired.

EPOSTER ONLY - HAIR REMOVAL AND GROWTH

CICATRICIAL ALOPECIA AND FRACTIONAL ABLATIVE LASER THERAPY: A CASE SERIES

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Background: Lichen planopilaris (LPP) and frontal fibrosing alopecia (FFA) are the most common primary cicatricial alopecias causing permanent hair loss. Laser therapy causes thermal injury resulting in hair growth and has been successfully used in the treatment of alopecia areata. However, its efficacy in the treatment of scarring alopecia is unclear.
Study Design/Materials and Method: This case series presents two cases of recalcitrant LPP/FFA treated with fractional ablative laser therapy.
Results: A 71-year-old Caucasian female with chronic LPP/FFA was previously treated with topical and systemic anti-inflammatory treatments. After failed medical therapy, she underwent serial fractional ablative CO_2 laser treatments without complications. An 8×10 cm right crown patch was treated with four sessions over a 6-week interval involving four laser passes of energy level 0.08–0.33 kJ and treatment level 4 (10%)–5 (25%). At 7 weeks, the test area (TA) demonstrated 5–10 short hairs of early regrowth; and at 23 weeks, no significant response was achieved. The second patient was a 40-year-old Caucasian male with chronic LPP/FFA secondary to work-related exposure. He was referred for fractional ablative laser treatment after no improvement on topical and oral therapy. A 4×4 cm left crown patch was treated with a total of four pulses using a fractional ablative erbium laser at 1.5 mm depth, 5.5% density, and spot size 3 without complications. At 6 weeks, there was new hair growth at the left anterior crown, however further laser therapy was deferred due to disease progression outside the TA.
Conclusion: Although significant hair regrowth was not achieved, an early growth response was observed following treatment. These findings suggest that fractional ablative laser may be a safe adjunctive therapy in conjunction with standard LPP/FFA therapies. However, further research is needed to determine therapeutic efficacy.

EPOSTER ONLY - IMAGING AND DIAGNOSTICS

HEMODYNAMICS IN TRAUMATIC BRUISES ASSESSED BY DIFFUSE REFLECTANCE SPECTROSCOPY AND PHOTOTHERMAL RADIOMETRY

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Background: Traumatic bruises (hematomas) occur when a blunt force impact causes rupturing of subsurface blood vessels. The extravasated haemoglobin diffuses towards the skin surface while being biochemically transformed into various byproducts and gradually removed through the lymphatic system. Our aim is to characterize this dynamics by objective assessment of dermal blood and bilirubin contents. To that end we combine diffuse reflectance spectroscopy (DRS) and photothermal radiometric (PPTR) measurements in human volunteers with numerical modelling of light and heat transport in human skin.
Study Design/Materials and Method: The study involved 15 subjects (age 20–30, Fitzpatrick skin types I–III) with bruises induced incidentally at a known time point. DRS in visible part of the spectrum (400–650 nm) were assessed from laterally uniform bruised sites using an integrating sphere. PPTR measurements involved irradiation with millisecond pulses at 532 nm from a medical-grade laser (Fotona, Slovenia) and recording of the subsequent transient change in mid-IR emission with a fast IR camera (FLIR SC7500). The structure and composition of the test site were assessed by simultaneous fitting of the data from both measurements with predictions of a dedicated Monte Carlo simulation using a 4-layer model of skin, aided by similar assessment of a nearby intact site.
Results: All examples analysed thus far show clearly the expected trends. The dermal haemoglobin content increases substantially over the first 1–3 days post-injury and gradually subsides over the following 2 weeks, while the haemoglobin oxygenation level moves in the opposite direction. A delayed rise in bilirubin content (not present in healthy skin) is also evident, as well as the accompanying changes in scattering properties of the dermis.
Conclusion: The applied technique allows assessment of the hemodynamics in traumatic bruises, which might be applied for objective determination of their age in forensic investigations.

REAL-TIME CELLULAR OPTICAL COHERENT IMAGES FOR LASER-INDUCED OPTICAL BREAKDOWN BY 755 NM PICOSECOND LASER WITH DIFFRACTIVE LENS ARRAY IN A PHOTOAGING REVERSAL NUDE MICE MODEL

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Background: Photo-aging is an extrinsic aging, clinical symptoms include dermal collagen breakdown, wrinkles, and skin laxity. The main factor of photoaging contributes to ultraviolet radiation. Recently, Treatments of picosecond lasers in photoaging have been reported safe and effective for facial photodamage. Skin treated with 755 nm picosecond laser with diffractive lens array process laser-induced optical breakdown (LIOB) which helps skin remodelling and rejuvenation. However, the real-time images of skin cellular layers are difficult to observe.
Study Design/Materials and Method: To investigate photoaging reversal process, we utilize high-resolution cellular optical coherence tomography (OCT) on 10-week ultraviolet B-induced nude mice, which were treated with 755 nm picosecond laser with diffractive lens array treatment after the photoaging model set up.
Results: In our results, the epidermis layer of mice dorsal skin proliferates and the dermis layer loosely arranges gradually after ultraviolet B induction. We had observed visible LIOB immediately after laser, following by photodamage skin repairing process.
Conclusion: In conclusion, the present evolution of optical coherence tomography of the skin can achieve cell-level resolution.

It provides a more immediate and sophisticated interpretation of photoaging change patterns and treatment processes.

SUBCUTANEOUS TISSUE HEATING USING A 60 MM HANDPIECE FOR A 300 W RADIOFREQUENCY DEVICE

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Background: Radiofrequency (RF) technology is commonly used for a wide variety of surgical and aesthetic procedures. More specifically, there is a need to effectively treat larger tissue areas while maintaining patient tolerability during a treatment. This study evaluates the temperature at depth in tissue while utilizing a 60 mm handpiece capable of heating larger areas.
Study Design/Materials and Method: Two patients scheduled for an abdominoplasty were evaluated while under general anaesthesia. Fibre-optic probes were inserted along the perimeter of the treatment area to measure temperature *in vivo*. Depth of the temperature probe into the hypodermis was confirmed using ultrasound. The first patient had a microneedle temperature probe inserted at graduated depths into the tissue to collect temperature measurements at specific timepoints during the treatment. Temperature measurements during and post-RF treatment were collected from the second patient. An RF device at 4 MHz was utilized to operate a 60 mm handpiece to deliver the RF treatment on the abdomen. Treatments were performed using a circular movement of the 60 mm handpiece below the navel.
Results: The first subject was a 51-year-old female who had a total of 329 cm^2 covered by the treatment. This subject showed that therapeutic temperatures (>42°C) were reached in the hypodermis and that temperatures at depth continued to increase while modulating the surface skin temperature at 44°C. The second subject was a 65-year-old female who had a total of 157 cm^2 covered by the treatment. Measurements showed a gradual increase in temperature at depths from 5 to 12.5 mm during the treatment with faster cooling seen more superficially.
Conclusion: A 60 mm handpiece for the 300 W RF device can maintain a skin surface temperature of 44°C while heating the hypodermis to therapeutic temperatures.

USING 3D IMAGING TO EVALUATE OUTCOMES IN PAPULOPUSTULAR ROSACEA

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Background: Prior randomized, double-blinded, vehicle-controlled trials have been performed to evaluate the efficacy and tolerability of azelaic acid foam 15%. In the prior trials, photographic evidence of the papulopustular change in subjects was not a primary endpoint. To satisfy the need, a trial with high-resolution images is required. This is a single-site, randomized, double-blind, vehicle-controlled study of azelaic acid foam 15% for the treatment of papulopustular rosacea.
Study Design/Materials and Method: Five adult subjects age 18 or older were enroled in this 12-week open label observational study. Criteria for study inclusion were subjects that had been diagnosed with moderate to severe papulopustular rosacea (IGA score of 3 or 4) and present with a minimum of 12, but no more than 50 inflammatory lesions as well as persistent erythema with or without telangiectasia. Assessments included Investigators Global Assessment (IGA), Erythema, Telangectasias and Facial Skin Color Assessments. Standardized and three-dimensional (3D) topographical photography using PRIMOS imaging was performed.

Results: Reduction in the number of papules and pustules was demonstrated at Week 12. Lower IGA scores were also observed, while telangiectasia remained consistent throughout the trial. Erythema was reduced as well. Most significantly, a clinically observable improvement in appearance was demonstrated using standardized photography and 3D imaging revealed the transformation of many elevated papulopustular lesions to flat by Week 12.
Conclusion: 3D Imaging is an effective and novel method of assessing efficacy of a common treatment for papulopustular rosacea. Future research may find applications of this method to other disease states.

EPOSTER ONLY - INJECTABLES (COMBINED WITH LASER TREATMENTS)

COMBINING INJECTABLES WITH A NOVEL 1927 NM FRACTIONAL THULIUM FIBRE LASER: A 2.5-YEAR SAFETY REVIEW

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Background: Combining lasers with injectables is an effective therapy for facial rejuvenation. However, there remains concerns that inflammation may influence the spread of neurotoxin to undesired areas and lasers may limit filler efficacy.
Study Design/Materials and Method: A retrospective chart review was performed over a 2.5-year period. Patients had single-session facial treatments with low-energy, low-density 1927 nm fractional thulium fibre laser (Lutronic, South Korea) and either botulinum neurotoxin type-A (BoNT-A) or soft-tissue fillers. Safety was assessed by adverse events within the first 4 weeks.
Results: For BoNT-A, 45 patients had 71 single-session treatments. 91.1% were female, and mean age was 47.7 years. For the laser, mean energy was 6.2 mJ and mean power was 4.6 W. Top three injection sites were glabella (85.9%), forehead (78.9%), and periorbital area (64.8%). Mean units of BoNT-A per treatment was 27.4 units. Of the 71 single-session treatments with BoNT-A, there were no documented adverse events related to spread of BoNT-A, including eyelid ptosis, neck weakness or spasms, and impairments in chewing, swallowing, speech, and respiration. There were no prescriptions of apraclonidine eye drops. For fillers, 46 patients had 61 single-session treatments. 91.3% were female, and mean age was 47.5 years. For the laser, mean energy was 6.9 mJ and mean power was 4.6 W. Top three injection sites were cheeks and/or tear troughs (78.7%), perioral area (55.7%), and nasolabial folds (72.1%). Mean volume of fillers per treatment was 1.0cc. Of the 61 single-session treatments with fillers, there were no documented adverse events related to spread of fillers or laser treatment of filled areas, including product migration, unexpected loss of filler volume, vascular occlusion, acute pain, cutaneous necrosis, blindness, and cutaneous burn.
Conclusion: Of all single-session treatments with low-energy, low-density 1927 nm fractional thulium fibre laser and BoNT-A or fillers, there were no adverse events due to combination therapy.

SINGLE-SESSION TREATMENT WITH BOTULINUM TOXIN AND 755 NM PICOSECOND LASER WITH DIFFRACTIVE LENS ARRAY: A 5-YEAR SAFETY REVIEW

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Background: Pairing lasers with injectable neurotoxins is an effective therapy for facial rejuvenation. However, there remains concerns that inflammation may influence the spread of neurotoxin to undesired areas, which can contribute to adverse events.
Study Design/Materials and Method: A retrospective chart review was performed over a 5-year period. Patients had single-session facial treatments with botulinum neurotoxin type-A (BoNT-A) and picosecond 755 nm alexandrite laser with diffractive lens array (DLA) (Cynosure, Westford, MA). Safety was assessed by adverse events within the first 4 weeks.
Results: Two hundred and eight patients had 447 single-session treatments. 92.8% were female, and mean age was 54.4 years. For Fitzpatrick skin type, 36.1% were type I, 36.5% were type II, 21.6% were type III, 5.3% were type IV, and 0.005% were type V. Overall, 52.9% had 1 session, 19.7% had two sessions, 11.5% had three sessions, and 15.9% had four or more sessions. For the laser pulse count, the mean was 3,676.8 pulses; however, recorded pulse counts may have included other sites besides the face. For BoNT-A injection site, 83.4% included the glabella, 71.4% the forehead, 44.5% the periorbital area, 31.8% the neck, 13.6% the jawline and/or masseters, 7.8% the nasalis, 2.7% the chin, and 1.3% the perioral area. The mean units of BoNT-A per treatment were 39.5 units. Of the 447 single-session treatments, there were no documented adverse events related to spread of BoNT-A, including eyelid ptosis, neck weakness or spasms, and impairments in chewing, swallowing, speech, and respiration. There were no prescriptions of apraclonidine eye drops, hospital or emergency room transfers or admissions, or referrals to ENT or ophthalmology for additional work-up.
Conclusion: Of the 447 single-session treatments with BoNT-A and picosecond 755 nm alexandrite laser with DLA, there were no adverse events due to neurotoxin spread.

EPOSTER ONLY - LASER INTERSTITIAL THERMAL THERAPY

NON-ABLATIVE VAGINAL MUCOSAL RESURFACING WITH ERBIUM LASER: A MINIMALLY INVASIVE PROCEDURE FOR VAGINAL EPITHELIUM REGENERATION

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Background and Objectives: The objective of this study was to evaluate the immediate effect of the non-ablative Er:YAG laser using the modality of smooth application of laser pulses (Fotona, Slovenia) in the vaginal epithelium immediately after its application and in the following days. Patients and methods: Forty healthy women, with regular periods, aged between 30 and 49 years were recruited for this study. They were allocated into two study groups, active and control in a 1:1 ratio. The active group underwent a single session of the laser therapy for vaginal relaxation syndrome (Fotona, Slovenia) protocol using digitally-controlled hand-held laser scanning and application device (Fotona, Slovenia). The treatment was performed in the first half of the menstrual cycle, Day 11 average (range: Days 8–13). The control group received no treatment. Cytological samples were obtained from all study participants for evaluation from the upper third of both vaginal walls: prior to the laser treatment for the active group, immediately after, the next day, after 2 and 6 days of the laser session. In control group, samples were taken twice at baseline visit, and then the next day, two days after and after 6 days. No anaesthetic cream was used. Results: Non-ablative Er:YAG laser and its Smooth mode pulse applied to the vaginal mucosa has significantly increased exfoliative effect of superficial cells of the vaginal mucosal epithelium, and effect was more noticeable over the course of the days. No complications were observed in any of the patients. Conclusion: Non-ablative Er:YAG laser and its Smooth mode pulse applied to the vaginal mucosa intensifies the natural exfoliating effect of the mucosal epithelium immediately after the laser application, and this effect is increased in the days following the laser treatment. Changes appear to be a part of the restructuring process the laser therapy for vaginal relaxation syndrome treatment has at the level of the vaginal mucosal epithelium through recruitment of inflammatory cells and release of mediators. The Er:YAG laser wavelength has been used for non-ablative and ablative resurfacing procedures for over 20 years. In contrast to ablative procedures, where epithelium gets ablated, the non-ablative procedures use a thermal approach to induce tissue remodelling without obvious epithelial injury. Controlled thermal injury induces a healing response, and leads to the structural and functional improvement of the tissue, including vaginal, buccal and oral mucosa, and skin. Vaginal treatments using non-ablative technology of smooth application of laser pulses have been introduced into the gynaecological field in the year 2012, with intention to treat symptoms of vaginal relaxation syndrome (VRS), also termed vaginal laxity [14], stress urinary incontinence (SUI), symptoms of vulvovaginal atrophy (VVA) related to genitourinary syndrome of menopause (GSM) and symptoms of pelvic organ prolapse (POP). The clinically observed regenerative effect of non-ablative procedures with the smooth application of laser pulses mode Er:YAG laser has been described as Dual tissue-Remodeling Mechanism (DTR), and is the effect of two combined mechanisms of action involving biochemical processes associated with slow thermal injury to connective tissues (direct regeneration mechanism) and the fast heat shocking of the epithelium (indirect regeneration mechanism). The indirect tissue regeneration mechanism which is complementary to the direct thermal stimulation of fibroblasts, is based on triggering the stimulating signal transduction processes for transcription factor activation, gene expression and fibroblast growth, thus leading to new collagen and extracellular matrix formation. It is not only fibroblasts, but also the superficially located keratinocytes that are involved in the wound-healing process. It is known that keratinocytes recruit, stimulate, and coordinate the actions of multiple cell types involved in healing. The objective of this study was to evaluate the immediate effect of the non-ablative Er:YAG laser using the smooth application of laser pulses modality in the vaginal mucosa of healthy women in reproductive age after its application and in the following 6 days. The effect was compared with processes of the vaginal mucosal tissue of women of

TABLE 1. Baseline characteristics of study participants Control group Active group

No.	Age	Menstrual cycle day	Age	Menstrual cycle day
1	32	12	30	12
2	49	10	37	10
3	40	10	44	9
4	43	12	40	13
5	38	11	41	12
6	39	12	39	13
7	41	10	39	8
8	40	11	38	12
9	36	12	32	13
10	45	12	43	12
11	33	11	49	8
12	44	12	41	10
13	30	11	40	10
14	35	10	38	11
15	42	11	39	13
16	45	11	40	9
17	37	10	45	12
18	39	11	45	12
19	48	10	47	12
20	31	12	40	11
Mean				
(SD)	39.4			
5.5	11			
0.8	40.5			
4.2	11			
1.6				
Range				
32–49	8–13	30–49	8–13	

similar demographic characteristics who received no treatment.

Study Design/Materials and Method: This prospective clinical study was approved by the Ethics Review Board of the Uroclinica and all patients gave written informed consent. Forty healthy women in reproductive age were recruited for this study (Table 1). Participants were allocated into two study groups, active and control, in a 1:1 ratio. Participants in the active group received one session of laser therapy for vaginal relaxation syndrome procedure, while control group received no treatment. Exclusion criteria for participation were menopause, less than 18 years of age, pregnancy, urinary infection, genital infectious pathology, genital bleeding, germicide treatment in the past 3 months, chemotherapy, active genital cancer, ongoing pelvic radiotherapy, any other genital or extragenital pathology that may impede the treatment, restrictions in performing a follow up to this study and psychiatric disorders that may be difficult to treat. All participants were asked to abstain from sexual intercourse throughout the duration of the study. Participants allocated to the active group received a single session of laser therapy for mild-to-moderate stress urinary incontinence procedure using a digitally-controlled hand-held laser scanning and application device. The procedure was performed according to manufacturer's instructions and pre-sets. Patients underwent laser treatment in the first half of their menstrual cycle. The laser therapy for vaginal relaxation syndrome protocol using a digitally-controlled hand-held laser scanning and application device consists of two steps. First the whole vaginal canal is irradiated using ContFull/GRA-FG adapter (7 mm, 3.5 J/cm^2, 4 pulses, 3.3 Hz, three passes). During the second step, the vestibulum and introitus are irradiated with Direct Pixel adapter/GRD-PR (7 mm, 10 J/cm^2, 2 pulses, 1.6 Hz, 10% overlapping, three passes). No anaesthetic cream was used. Vaginal smears (saline wet mounts) were prepared with vaginal fluid taken from the posterior vaginal vault (with a wooden Ayre's spatula), and spread on a glass slide, and added a droplet of saline solution. The glass slide was covered with a glass coverslip for immediate microscopic evaluation. For each specimen, histopathologist counted 10 random microscopic fields (×100 magnification). Cytological samples of the participants from the active group were taken prior to the laser treatment, immediately after, the next day, after 2 and 6 days after the laser session. Participants from the control group underwent two samplings at the baseline, after 2 days and after 6 days. The results are reported as the average number of parabasal, intermediate and superficial cells counted in 10 microscopic fields. The specimens were screened for presence of polymorphonuclear (PMN) white cells. Their presence was rated in Grades 1–5. The outcome measures were compared between the active and control group with ANCOVA with baseline value as a covariate (? = 0.05). Independent-samples Mann–Whitney *U* test was used to compare the grade of PMN cells' presence. Statistical package IBM SPSS Statistics v. 23 was used for statistical analysis and Prism 8 statistical software (GraphPad, v. 8.4.3) was used for visualization of the results.

Results: Results Demographic characteristics of the participants from active and control group are presented in Table 1. Results of cell counts in vaginal smears are presented in Figure 1. No adverse effects were observed or reported and there was no pathology observed on the following gynaecological examination. Following the laser procedure, the average intermediate cell count in vaginal smears increased from 72 ($SD = 13$) at baseline to 113 ($SD = 16$) 6 days after laser procedure. Similar steady increase has been observed with superficial cells, with average count of 98 ($SD = 14$) at baseline to 142 ($SD = 13$) after 6 days. Parabasal cells have not been observed in vaginal smears, except in a patient, who had these cells present in the cytological specimen taken before the initiation of the study. Polymorphonuclear leucocytes (PMN cells) have been infrequently observed and considered as scattered in baseline assessments. Immediately after laser treatment their presence in the specimens significantly increased. After 6 days their number was still significantly higher than at baseline, but their presence was much less pronounced than second day post-laser treatment. More importantly, there was no significant difference between PMN presence between active and control group after 6 days (Figure 1). Analyses of the specimens from the control group revealed an increase of intermediate and superficial cell counts during the course of the trial. Average intermediate cell counts increased from 75 ($SD = 13$) at baseline to 101 ($SD = 8.2$), whereas average counts of superficial cells increased from 90 ($SD = 8.6$) to 103 ($SD = 5.7$) after 6 days. As in active group, parabasal cells have generally not been observed in the specimens. Comparison of active and control group revealed no statistically significant difference between counts of parabasal and intermediate cells (Figure 1) throughout the course of the study. There was however difference in baseline values of superficial cells between control and active group, and all subsequent follow ups. There was also statistically significant difference in grades of PMN cells presence on the first and second day after the initiation of the study, respectively. Figure 1: Cell counts in vaginal wet mount during the course of the study

(B–before, A–immediately after (laser) procedure, 1d–1 day after, 2d–2 days after, 6d–6 days after laser procedure). Data are presented as box plots with whiskers, presenting 5 and 95 percentiles. a parabasal cell counts, b intermediate cell counts, c superficial cell counts and d polymorphonuclear leucocytes (PMN cells). * denotes statistically significant difference in cell counts between control and active group (ANCOVA, $P< 0.0005$ for epidermal cells; and Independent-samples Mann-Whitney U test, $P< 0.006$ for PMN cells); ns denotes "non-significant" difference.
Conclusion: Discussion The effects of non-ablative Er:YAG laser treatment on mucosal tissue have been extensively studied, and the effects have been histologically and clinically validated, but there is still a lack of information about its immediate effects occurring in the treated tissue. With our study, we aimed to assess the effects that non-ablative laser treatment has at the level of vaginal epithelium. After using a standardized, clinically validated protocol for treatment of vaginal laxity, we have observed that the laser treatment in reproductive aged women induces an increased exfoliation of vaginal squamous epithelial cells, specifically superficial cells (Figure 1). Exfoliation of the vaginal squamous epithelial cells is a natural process, and we have observed the numbers of these cells steadily and significantly increasing throughout the course of our study (Figure 1), which is consistent with a normal process driven by changes in estrogen levels characteristic for a transition from ovulatory phase to luteal phase of the menstrual cycle [30], but there was a significant difference between active and control group (Figure 1). The smear background is generally free of PMN cells in this phase of the cycle30, as also observed in our control group (Figure 1). On the other hand, an increased presence of PMN cells in the specimens of the active group immediately after laser procedure and their peak count on the second day following the procedure (Figure 1), together with observed controlled tissue debridement and exfoliation, evident as increased counts of superficial cells observed in the specimens taken from the participants from the active group (Figure 1), is probably a result of thermal injuring of the vaginal epithelium, induced with the Er:YAG smooth application of laser pulses treatment that causes reactive inflammatory response28 and induction of inflammatory phase of tissue healing [31]. This phase is followed by a proliferation phase, and a remodelling phase. An important observation of our trial is that the inflammatory response appears to be transient and self-limiting (Figure 1d), and our results are consistent with previous observations of processes occurring in skin, where neutrophil infiltration from the dermis to epidermis has been observed, but it declined between Days 3 and 7 [32]. Edema, a common effect [3,33] observed after the Er:YAG smooth application of laser pulses treatment is a clinical manifestation of this process and therefore anticipated tissue response. Parabasal cells were generally not observed in the cytological specimens. The absence of basal and parabasal cells in the specimens of the majority of our patients, clearly indicates that smooth application of laser pulses laser procedure does not cause tissue ablation and/or destruction of basal membrane, which is the active proliferative compartment of any epithelium. Our study design did not include histological assessment of proliferative activity of vaginal epithelium during the study. However, it is commonly recognized that the proliferative phase follows and overlaps with inflammatory phase. Previous study has shown a complete regeneration of the epidermis 7 days following the smooth application of laser pulses treatment of the eyelid skin [11]. The same study has observed an increased presence of active fibroblasts, which are known to secrete bioactive factors known to regulate keratinocyte proliferation and differentiation processes, 21 days following the treatment. Increased activity has been shown also 1.5–2 months following the smooth application of laser pulses intravaginal laser treatments [4], which resulted in structural reorganization of the vaginal mucosa, increased thickness of epithelium, increased number of profiles of blood capillaries and their volume density [2,3]. Besides serving the natural phase in the process of tissue turnover, exfoliation or desquamation inside the vagina also serves as an effective way to eliminate pathogens that have attached to the vaginal surface or that bind to sloughed "decoy" cells [30]. In addition, the exfoliated cells disintegrate and release their contents into the vaginal lumen; glycogen released from exfoliated cells can serve as a substrate for the resident lactobacilli that produce lactic acid and maintain an acidic pH30. This could potentially be proven beneficial in the conditions of decreased natural turnover of vaginal epithelial tissue (e.g., vaginal atrophy resulting from decreased estrogen availability). In summary, the results of the present study indicate that the processes resulting in tissue regeneration and increased turnover are taking place immediately after laser treatment with non-ablative Er:YAG.

EPOSTER ONLY - LASER-ASSISTED DRUG DELIVERY

EVALUATION OF DEVICE-BASED CUTANEOUS CHANNELS USING OPTICAL COHERENCE TOMOGRAPHY: IMPACT FOR LASER-ASSISTED DRUG DELIVERY

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Background: Device-assisted drug delivery revolves around the creation of microchannels on the skin surface that can increase uptake of topical medications, which can increase local drug absorption and bioavailability while reducing the undesirable effects associated with systemic absorption. Channel properties can differ between modalities, which can affect topical drug delivery.
Study Design/Materials and Method: Optical coherence tomography (OCT) is a high-resolution, non-invasive imaging technology. OCT was used to examine real-time, *in-vivo* cutaneous changes in response to various devices used to improve topical drug delivery. Treatment was performed with eight medical devices, including mechanical destruction, lasers, and other energy-based modalities.
Results: Using OCT, microneedling and radiofrequency microneedling demonstrated no cutaneous channels. Low-energy, low-density, fractional non-ablative 1927 nm thulium fibre laser and 1927 nm diode laser produced transient channels (widths: 0.078, 0.178 μm, respectively), which closed within 30 minutes and 5 hours, respectively. The fractional non-ablative 1927 nm thulium fibre and 1550 nm erbium fibre lasers created channels (widths: 0.216, 0.274 μm, respectively) with epidermal debris within, which were still closing at 24 hours. Epidermal debris was observed until 7 hours for the former laser and 3 hours for the latter. Fractional thermomechanical ablative device and fractional ablative CO_2 laser produced channels (widths: 0.236, 0.198 μm, respectively) that were still open at 24 hours. The CO_2 laser produced channels that had thick rims of surrounding coagulated tissue, which remained more open for much longer.

Conclusion: OCT can accurately examine real-time, *in-vivo* cutaneous changes in response to various devices used to improve topical drug delivery. Demonstrable differences amongst the devices were seen, and only some can produce observable channels, the characteristics of which vary with each technology. Unique channel characteristics included presence, width, depth, duration, surrounding coagulation, internal debris, and ablative versus non-ablative. OCT imaging should impact how physicians approach device-assisted drug delivery.

EPOSTER ONLY - LASER-TISSUE INTERACTION

IDENTIFICATION OF THE FATE AND REGENERATIVE MECHANISM OF MELANOCYTE PROGENITOR CELLS AND MELANOCYTES AFTER LASER ABLATION

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Background: Lasers are known to be the most effective treatment modality for pigmentary skin diseases. However, melanocytes and melanin pigment disappear and often recur or leave post-inflammatory hyperpigmentation after the laser procedure. Studies have reported on the role of progenitor cells in pigment cell regeneration, which can be constantly replenished through mitosis. However, the response of unpigmented melanocyte progenitor cells to laser treatment is poorly understood. In this study, we used adult zebrafish skin as the melanocyte regenerative system and examined the response of melanocyte progenitor cells to laser photothermolysis.

Study Design/Materials and Method: The two groups of adult zebrafish were irradiated with 1064 nm wavelength laser system of Q-switched neodymium: yttrium-aluminum-garnet (Nd:YAG) laser with 0.3 J or 0.7 J/cm^2. Three repetitive laser ablations were also held to test the post-inflammatory hyperpigmentation. We compared the regeneration of pigment at different energy levels by measuring new melanocyte counts and pigment area. We traced and quantitatively compared the melanocyte lineage cells by immunohistochemical staining using specific markers such as sox10, mitfa, and dct during the regeneration process.

Results: After the laser ablation of melanocytes, the majority of the new melanocytes appeared between Days 5 and 10. It was observed that hyperpigmentation did not appear after the repeated procedure, and the pigment remained reduced even after 2 months in high-energy irradiation of 0.7 J/cm^2, the unpigmented mitfa-expressing cells showed significant decrease ($P< 0.05$) and showed delay in the delay in the differentiation process of melanocyte lineage cells.

Conclusion: We suggest that laser treatment overcoming the recurrence should be planned based on the adequate energy level targeting the melanocyte progenitor cells. High-energy irradiation may induce apoptosis of progenitor cells and delay their process of differentiation. Short-term repetitive sessions of laser therapy can reduce the pigmentation in the long-term observation.

EPOSTER ONLY - CARDIOLOGY

AN IN-SILICO MODELLING STUDY TO OPTIMIZE THE SAFETY OF THE TREATMENT OF CARDIAC ARRHYTHMIAS BY ELECTROPORATION

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Background: Cardiovascular diseases, including cardiac arrhythmias, are the leading cause of death in the world and account for 31% of all death worldwide (WHO). Although radiofrequency cardiac ablation is the most commonly used treatment for cardiac arrhythmias, clinical complications can occur due to excessive tissue heating. Therefore, non-thermal cardiac ablation treatments based on pulsed electric fields (known as electroporation) could be an optimum alternative to treat cardiac arrhythmias. Our aim is to develop computational models to support and optimize the safety of a novel treatment of cardiac arrhythmias by electroporation to selective damage the neuronal cells placed on the epicardial fat without damaging the myocardium.

Study Design/Materials and Method: A three-dimensional (3D) computational models based on the heart anatomy including epicardial fat, cardiac tissue and blood were built. The electrical conductivity of fat, cardiac tissue and blood was modelled as a function dependent on the electric field magnitude. The ablation catheter is an irrigated probe composed of four metal electrodes. Simulations were performed with a pulse of 1000 V for 100 microseconds under different ablation configuration modes (i.e., switching modes of applying the energy). Electric field strength and distribution across the different tissues were assessed.

Results: The models showed that the electric field was significantly distinct in the epicardial fat compared with the underlying cardiac tissue. This increases the likelihood that neuronal cells located in the epicardial fat can be selective ablated compared with the myocardial tissue.

Conclusion: Our findings are useful to find the most optimum ablation configuration to achieve a superior electric field range on the epicardial fat where the neuronal cells to be ablated are located.

EPOSTER ONLY - COSMETIC PROCEDURE REPORTS

RISE IN MALE COSMETIC PROCEDURES IN DERMATOLOGY: A 4.5-YEAR CLINICAL EVALUATION

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Background: Men have been increasingly seeking minimally and non-invasive cosmetic procedures. Due to hormonal and anatomic differences, the pathophysiology of cutaneous aging differs between sexes, and treatments must be tailored accord-

ingly. More information on current trends can offer additional insights.
Study Design/Materials and Method: A review of electronic medical records was performed over a 4.5-year period. Database queries were used to search for frequency of procedures and which month they were performed.
Results: Overall, there were 10,640 of the queried procedures performed on men during this 4.5-year period. The overall mean age was 48.3 years. The mean age for procedures was 37.5 years for laser tattoo removal, 38.5 years for laser hair removal, 46.0 years for vascular laser, 50.6 years for non-invasive body contouring, 51.4 years for ablative resurfacing, and 55.1 years for non-ablative resurfacing. Of all procedures, there were 28.1% ($n = 2991$) vascular laser, 20.2% ($n = 2148$) injectable neurotoxin, 16.9% ($n = 1793$) non-ablative resurfacing, 11.8% ($n = 1259$) laser tattoo removal, 9.7% ($n = 1029$) injectable soft-tissue filler, 5.6% ($n = 598$) laser hair removal, 3.9% ($n = 418$) ablative resurfacing, 3.1% ($n = 334$) non-invasive body contouring, and 0.7% ($n = 70$) sclerotherapy procedures. The total monthly numbers of all procedures combined performed on men were calculated, which showed significant positive growth. The annual trends for each procedure were also calculated, which showed positive trends for vascular laser, non-ablative resurfacing, laser hair removal, and ablative resurfacing. Only body contouring and laser tattoo removal had negative trends. The most common laser procedures performed on men were vascular laser, and laser tattoo removal. The least performed procedures were ablative resurfacing and body contouring.
Conclusion: Men represent a growing subset of cosmetic patients, especially for laser treatments. Physicians should be knowledgeable about these trends and ensure they can meet growing demand.

EPOSTER ONLY - PEDIATRICS

SUCCESSFUL TREATMENT OF MEYERSON PHENOMENON OCCURRING IN A PORT WINE STAIN USING PULSED DYE LASER

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Background: Port Wine Stains (PWS) are a relatively common congenital vascular malformation, estimated to affect between 0.3% and 0.5% of newborns. Dermatitis occurring as a focus within a PWS has been described infrequently in the literature. The eczema can either be isolated to the PWS or may serve as the most severe manifestation of more widespread disease. When a focus of eczematous dermatitis is isolated exclusively to a PWS, this has been described as Meyerson phenomenon occurring within PWS, a term more commonly employed in association with congenital or acquired nevi. Controversy exists with regards to the use of pulsed dye laser (PDL) in Meyerson phenomenon occurring within PWS. The authors who initially described this phenomenon noted rapid and complete resolution with the use of PDL to treat Meyerson Phenomenon within PWS. However, later publications and case reports documented induction or exacerbation of eczematous dermatitis in PWS following treatment with either PDL or other devices targeting the hemoglobin chromophore.
Study Design/Materials and Method: We report a case of Meyerson phenomenon occurring within a PWS effectively treated with PDL. The patient is a 31-year-old gentlemen, Fitzpatrick Type 3, who presented with lifelong history of PWS affecting the left forehead and hemicranium and extending to his occipital scalp and posterior neck. He reported a 10-year history of a focus of pruritus and scaling occurring focally within this vascular malformation. The dermatitis was limited to a single, round approximately 5×5 cm area at the border of the malformation adjacent to the hairline. He treated this area with high-potency topical corticosteroids recurrently over several years with only temporary benefit. Shortly after discontinuing the steroid the focus of dermatitis would recur.
Results: He underwent five treatments in total with PDL (595 nm) to the focus of dermatitis and to the surrounding PWS. The spot or treatment sizes employed included 7, 10, or 3×10 mm square. Fluence ranged from 9 to 14 J/cm^2, pulse width was 1.5 milliseconds. After his initial treatment, he reported the pruritus was markedly improved and he was able to discontinue use of topical corticosteroid. At the conclusion of the five treatments, the focus of lichenification was resolved and the patient reported minimal to no residual itch and no need for ongoing use of topical corticosteroid.
Conclusion: We report a case of successful treatment of Meyerson phenomenon affecting a congenital PWS with the use of PDL. Our patient remains free of symptoms of pruritus at five months following treatment. This report contrasts with previously described cases of exacerbation or induction of eczematous dermatitis within a PWS following treatment with vascular lasers but agrees with the initially published reports of improvement of dermatitis within these types of vascular malformations when treated with laser targeting vascular structures. More work is needed to determine what role vascular lasers may play in this condition.

EPOSTER ONLY - PHOTODYNAMIC THERAPY

MICRONEEDLE LESION PREPARATION PRIOR TO AMINOLEVULINIC ACID PHOTODYNAMIC THERAPY FOR ACTINIC KERATOSIS ON THE FACE

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Background: Photodynamic therapy (PDT) with aminolevulinic acid (ALA) solution and blue light is approved for treatment of actinic keratosis (AK) on the face, scalp, and upper extremities. In a previous study, PDT with microneedle (MN) pretreatment and ALA incubation improved AK clearance (Petukhova et al., 2017).
Study Design/Materials and Method: This Phase 2, multicenter, randomized, parallel-group, evaluator-blinded, vehicle-controlled US-based study in patients with facial AK lesions evaluated MN lesion preparation prior to field exposure with differing ALA incubation periods and intensities and duration of blue light. Participants with MN pretreatment to the entire left or right AK field were randomized to ALA (25 minutes; ALA25)/PDT (16 minutes, 10 mW/cm^2; PDT16-10), ALA25/PDT (8 minutes, 20 mW/cm^2; PDT8-20), ALA (60 minutes; ALA60)/PDT16-10, ALA60/PDT8-20, or vehicle (60 minutes; VEH60)/PDT16-10. Efficacy analyses included complete clearance rate (CCR) within each AK field, baseline AK clearance rate (AKCR), and mean

percent change from baseline in total AK lesion count at Week (W) 12. Safety endpoints included tolerability assessments and PDT response.
Results: Of 137 enroled participants, 95.6% completed the study. All participants had four to eight lesions per field at baseline. At W12, CCRs for ALA treatment ranged from 37% (MN; ALA25/PDT8-20) to 78% (with or without MN; ALA60/PDT8-20) versus 14% (VEH60/PDT16-10). Mean baseline AKCR at W12 ranged from approximately 82–96% for ALA-treated versus 41–43% for vehicle-treated fields, respectively; mean percent change from baseline was 80–96% versus 19–26%. MN lesion preparation did not affect any efficacy or safety parameters. No clinically significant adverse events were reported; PDT effects were consistent with prior studies.
Conclusion: ALA-PDT using broad area application with incubation for 25–60 minutes appeared to benefit patients with AK treated with two ALA-PDT treatments while maintaining tolerable safety; MN pretreatment was well tolerated, but did not enhance AK clearance.

EPOSTER ONLY - PIGMENTED LESIONS/ DISORDERS

EFFECTS OF 1064 NM Q-SWITCHED ND:YAG LASER WITH MEDIUM-FLUENCE MEDIUM SPOT SIZE SETTING ON RECALCITRANT POST-INFLAMMATORY HYPERPIGMENTATION: A CASE SERIES OF 8 PATIENTS

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Background: Post-inflammatory hyperpigmentation (PIH) is a common chronic pigmentation disorder with a variety of damage causes. There exist many modalities currently can alleviate or cure it, but few effective treatments had been reported for recalcitrant PIH, whose disease course is more than 2 years and shows little improvement after multiple treatments. 1064 nm Q-switched Nd: YAG laser is widely used in treating pigmentation disorder, but the commonly used low-energy large spot size low fluence mode is ineffective for Intractable PIH while high fluence would inevitably increase the possibility of aggravation, especially for those with darker skin. We have innovatively used the medium-fluence medium-spot size setting of 1064 nm Q-switched Nd: YAG laser to successfully treat eight patients with recalcitrant PIH.

Study Design/Materials and Method: Eight patients of Fitzpatrick skin type IV, treated with the medium-fluence medium-spot size 1064 nm Q-switched laser (4.0–4.5 J/cm^2, 4 mm spot size, 10 Hz, 2–5 passes).

Results: After 4–12 sessions of treatment, 4 patients achieved complete remission, 2 showed significant improvement and 2 reported marked improvement. The treatment effective rate reached 100%. No recurrence was observed within 6 months after the last session.

Conclusion: The medium-fluence medium-spot size setting of 1064 nm Q-switched Nd: YAG laser can effectively treat recalcitrant PIH and well tolerated.

INVESTIGATION OF THE INCIDENCE OF PIH AND ITS FACTORS WHEN PICOSECOND ALEXANDRITE LASER IS USED TO REMOVE BENIGN PIGMENTED LESIONS IN SKIN TYPE III-IV

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Background: Although the main aim of laser treatment in Asia is to remove benign pigmented lesions and its efficacy has been widely reported, the high incidence of post-inflammatory hyperpigmentation (PIH) after the treatment is a characteristic problem in skin type III-IV. There are studies that have shown the incidence of PIH with Q-switched lasers is in the range of 30–45%; however, few studies have been examined for the incidence of PIH in the treatment of benign pigmented lesions with picosecond lasers, and there are no studies which examine the factors related to PIH incidence with abundant data.
Study Design/Materials and Method: The number of PIH occurrences and factors associated with PIH development in 1203 cases who underwent benign pigment removal with picosecond alexandrite laser (PSAL) at a single institution during a 50-month period from July 2016 to August 2020 was retrospectively analysed. A combined irradiation technique was used at following parameters; a 2.3- to 3.5-mm spot (550 picoseconds; 1.71–3.97 J/cm^2) irradiation with zoom hand piece on the local pigment and a 6- to 10-mm spot (550 picoseconds; 0.21 to 0.5 J/cm^2) irradiation with diffractive lens array on full face.
Results: The mean age of the cases was 47.0 years, the male to female ratio was 60:1143. The primary diseases were solar lentigen (1073/1203), seborrheic keratosis (501/1203), dermal melanocytosis (Hori's nevus) (55/1203), Nevus of Ota (12/1203), Freckles (108/1203) and melasma (427/1203). All patients had multiple concomitant pigmented lesions. The number of PIH occurrences seen in 4 weeks after the treatment was 31 cases (2.57%). Statistically significant differences between the PIH group and the non-PIH group were found in mean age, the complication of melasma, and the intensity of IWP (immediate whitening phenomenon). The mean age was 4.17 years higher in the PIH group than the one in the non-PIH group, and the complication of melasma was 13.23% higher in the PIH group. Strong IWP was also observed in the PIH group.
Conclusion: PSAL significantly reduces the incidence of PIH compared with Q-switched laser in the removal of benign pigmented lesions in skin type III–IV, when properly diagnosed for complication of melasma and irradiated with the appropriate fluence.

STATISTICAL ANALYSIS OF RISK FACTORS OF POST-INFLAMMATORY HYPER-PIGMENTATION AFTER PICOSECOND ALEXADRITE LASER IRRADIATION

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Background: Post-inflammatory hyper-pigmentation (PIH) is common side effect of laser treatment for skin type III–IV, and is one of the major factor to reduce patient satisfaction when the laser is used for pigment removal. It is necessary to identify the factor which increases the risk of PIH incidence. Although there is a report of the incidence rate in each therapy, there is no report of statistical investigation to analyse risk factors.
Study Design/Materials and Method: Four hundred and twenty-nine cases that received pigment removal with picosecond

alexandrite laser (PSAL) more than two times during a 50-month period between July 2016 and August 2020 in a single facility were selected to analyse number of PIH incidence, age, gender, number of treatment, degree of immediate whitening phenomenon (IWP) after irradiation and disease type(solar lentigo, freckles, melasma, seborrheic keratosis, nevus cell nevus, Hori's nevus and nevus of Ota). PSAL was used at following parameters: 550 picoseconds, 1.71–3.97 J/cm^2 shots on pigment and 0.2–0.57 J/cm^2 full face irradiation with diffractive lens array. Logistic regression analysis was performed with the incidence of PIH as the dependent variable and patient age, number of treatments, disease type and IWP (3-point scale of 0.1.2) as the independent variables. Univariate analysis was performed for each independent variable individually, then multivariate analysis was performed using independent variables that showed significant differences (P).
Results: Independent variables with significant differences in univariate analysis were IWP and seborrheic keratosis (SK). Multivariate analysis showed that PIH occurred significantly ($P<$ 0.05) in IWP*SK*Tx (when multiple treatment sessions with IWP were performed for SK.
Conclusion: The risk factors for PIH after PSAL for patients with skin type III–IV were (i) strong IWP at the end of irradiation, (ii) seborrheic keratosis as the therapeutic target, and (iii) three or more IWP-generating treatments for seborrheic keratosis. These data indicate that the risk was determined by the quality of the irradiation technique.

EPOSTER ONLY - REJUVENATION

A PROSPECTIVE, SINGLE-CENTER, COMPARATIVE AND OBSERVATIONAL, CLINICAL STUDY EVALUATING THE SAFETY AND EFFICACY OF CO_2 LIFT CARBOXYTHERAPY GEL MASK AS A POST-MICRONEEDLING RADIOFREQUENCY TREATMENT FOR IMPROVEMENT OF FACIAL SKIN QUALITY IN HEALTHY FEMALE

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Background: Nanofractional radiofrequency allows the heat energy to be delivered through pins to the deep epidermis and dermis, facilitating increased rejuvenation with reduced pain, downtime, and side effects. Albeit the reduced side effect profile compared with traditional ablative lasers, erythema, edema, crusting, and exudation has been reported post-treatment. The objective of this study is to evaluate the efficacy and patient satisfaction of a novel carboxytherapy gel mask compared with petroleum-based lanolin-containing ointment to accelerate wound healing post-nanofractional radiofrequency in the face.
Study Design/Materials and Method: This was a prospective, randomized, single-blind study. Ten patients were randomized into two arms. One arm received one microneedling radiofrequency treatment with ointment right after and four consecutive days of ointment applications twice a day, while the second arm followed this regimen with a carboxytherapy gel mask application right after and four consecutive days after treatment. Investigator, safety and patient assessments were conducted at 24 hours, 72 hours, and 1-week post-treatment. Safety was monitored throughout. The primary endpoint was defined as the degree of improvement in facial skin quality measured by a trained evaluator using standardized photographs as well as live evaluations rated with the Global Aesthetic Improvement Scale (GAIS). Secondary outcomes included investigator-rated degree of erythema, edema, crusting, exudation, percentage healing, improvement of skin quality and patient satisfaction.
Results: Nine patients completed the study. There was significant improvement on the GSAIS scale in the carboxytherapy gel mask group at both the 24 hour and 1-week follow up compared with the petroleum-based lanolin-containing ointment group. Blinded investigator ratings showed significant improvement of dryness, erythema, edema, crusting, and percentage healing at the 24 hour follow up, with all patients remaining the same a week post-treatment. There were no differences in skin quality between the two groups in either follow up. All patients in the carboxytherapy group were satisfied with the treatment with no adverse effects reported in any of the patients.
Conclusion: Carboxytherapy can accelerate healing post-nanonfractional radiofrequency and is safe and effective with high patient satisfaction compared with the current petroleum-based lanonin containing standard of care.

ADVANCED 3D PHOTOGRAPHIC ANALYSIS OF RADIOFREQUENCY MICRONEEDLING TREATMENTS ON THE FACE

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Background: Radiofrequency (RF) treatments have become a popular option for non-invasive rejuvenation of the entire body. Microneedling has also been a popular treatment modality with extensive options for at home treatments. Recently devices have begun to use a combination of microneedles which delivery RF energy to allow RF to penetrate the skin and increase treatment efficacy. This study utilizes an advanced photography analysis method by building three-dimensional (3D) models of the face which are then used for analysis.
Study Design/Materials and Method: Thirty-two subjects were enroled and treated under an IRB approved protocol for the treatment of facial rejuvenation, jawline and abdominal laxity, acne scars, and facial wrinkles. A subset of subjects had their faces scanned with a camera system which then built a 3D model of the face to be analysed. Subjects were treated up to five times and then asked to return for 1- and 3-month follow-ups. Subjects also completed satisfaction questionnaires and physicians rated subject's overall improvement
Results: Due to COVID-19, only 12 subjects were able to return for their follow-ups while remaining subjects had analysis done for their most recent timepoint. Two subjects elected to continue their treatments to Subjects who had follow-ups delayed were asked to return upon reopening of the study if they felt comfortable returning to the clinic. Remaining subjects were considered lost to follow-up but had interim analysis to analyse their results. While some follow-ups occurred at 1 and 3 months as intended, nearly half of the subjects that returned had follow-ups delayed up to 6 months post-final treatment. Photographic review with the camera system showed up to 15.9% improvement in wrinkles and 15.1% improvement in skin with significant improvement also seen in facial redness and general rejuvenation
Conclusion: The RF Microneedling device showed significant improvement in a variety of indications which were successfully quantified by analysis of 3D facial models.

CLINICAL EVALUATION OF THE SAFETY AND PERFORMANCE OF FRACTIONAL RADIOFREQUENCY FOR THE TREATMENT AND REDUCTION OF FACIAL WRINKLES

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Background: Age-related changes such as skin laxity, dyschromia, fine lines and wrinkles are a source of distress to both men and women. To this end there is a plethora of surgical and non-invasive procedures aimed to eradicate these manifestations including chemical peels, laser resurfacing, microfocused ultrasound, fillers and toxins. Most of these treatments are either associated with long recovery times, insufficient efficacy, pain and undesirable side effects. Fractional RF technology has been shown to stimulate dermal remodelling by heating the tissue and has been used in clinical studies to treat various skin conditions related to aging. The objective of this clinical study was to evaluate the safety and performance of fractional RF for the treatment of facial wrinkles.
Study Design/Materials and Method: A total of 18 patients (13 non-Hispanic and 5 Hispanic; skin types II–V) were enroled in this prospective, single center, evaluator-blind study. Subjects received three treatments on both sides of the face using the 80 or 160 tip handpiece at 3–5-week intervals between each treatment. Follow-up visits were conducted at 6 and 12 weeks after the last treatment. Endpoints included a self-assessment of wrinkle reduction, a patient satisfaction scale (scale 0–5; greater value indicates greater satisfaction), tolerability during the treatment (Visual Analog Scale [VAS]; scale 0–10; greater values indicate more pain), tolerability immediately after the treatment (scale 0–5; greater values indicate more tolerability), and an assessment of treatment safety.
Results: There were 18 female patients that completed the study, average age of participant was 58.6 ± 7.6 years. A self-assessment of patients at 12 weeks reported a total of 75% of patients saw an improvement to their wrinkles (33.3% significant improvement, 8.3% moderate improvement, and 33.3% mild improvement). On average, subjects scored a 3 on the patient satisfaction scale, indicating they were "satisfied" to "very satisfied" with the treatment According to subject assessments, mean pain during treatment was 4.3 and mean tolerability score immediately following treatment was "tolerable" to "very tolerable" (mean score: 3.5). No severe adverse effects were reported.
Conclusion: Final data analysis from this clinical study demonstrates that fractional radiofrequency is a safe and efficacious treatment for wrinkle reduction of patients of all skin types.

EVALUATION OF SINGLE TREATMENT, SINGLE DEPTH SUPERFICIAL MICROFOCUSED ULTRASOUND WITH VISUALIZATION FOR RHYTID IMPROVEMENT

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Background: Microfocused ultrasound with visualization (Ultherapy) is US Food and Drug Administration cleared and indicated for noninvasive lifting of the skin on the brow, face and neck and improving lines and wrinkles of the décolleté. However, no studies have explored its use for skin rejuvenation. This study aimed to assess whether single treatment, single depth MFU-V could achieve superficial skin remodelling and rhytid improvement.
Study Design/Materials and Method: A total of 18 women, ranging from 38 to 64 years of age, received treatment (focal depth 1.5 mm, energy 0.18 J, 14 or 25 mm lines spaced 2–3 mm apart) to three areas: periorbital (120 lines), perioral (100 lines), and accordion lines (120 lines). Outcome was assessed using digital imaging taken at baseline, 90 and 180 days. Two independent clinicians used established rating scales to assess each treatment area. In addition, each subject completed a Subject Global Aesthetic Improvement Scale for each treated area.
Results: The clinicians reported visible improvements at 180 days in the majority of cases (periorbital lines 6/6 cases, accordion lines 5/6 cases and perioral lines 3/6 cases). Those results were in line with subjects' self-assessments. At 180 days, all subjects reported improvement in accordion lines (83% improved, 17% much improved) and periorbital lines (50% improved, 50% much improved). Two-thirds reported improvement in perioral lines (33% improved, 33% much improved). The majority of subjects agreed or strongly agreed they were satisfied with their results (accordion lines, 6/6 cases; periorbital lines, 4/6 cases; perioral lines, 4/6 cases). All subjects tolerated the treatments well, and no serious adverse events were reported.
Conclusion: Single treatment, single depth MFU-V provides aesthetic improvements in periorbital, perioral and accordion lines. The treatment is well tolerated and there is a high level of patient satisfaction. The utility of MFU-V as a noninvasive therapy for superficial skin rejuvenation warrants further investigation.

PAIRED FACIAL TREATMENT WITH 755 NM PICOSECOND LASER WITH DIFFRACTIVE LENS ARRAY AND 1060 NM LASER LIPOLYSIS OF THE SUBMENTUM

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Background: Performing multiple cosmetic treatments in a single session to target different aspects of facial rejuvenation is an effective therapy. Picosecond lasers with a fractionated handpiece can target fine lines, which can supplement submental fat reduction. However, limited data exists on safety and efficacy of single-session treatment strategies.
Study Design/Materials and Method: A prospective clinical study investigated the utility of paired facial treatment with 755 nm picosecond laser with diffractive lens array (DLA) and 1060 nm laser lipolysis (both of Cynosure, Westford, MA) of the submentum. Fifteen subjects were enroled to receive up to 3 picosecond laser and two lipolysis treatments.
Results: Eleven subjects completed the study. Mean age was 52.1 years, and 81.8% were female. Mean body mass index was 28.6. For Fitzpatrick skin type, 45.5% were Type II, 27.3% were Type III, 18.2% were Type V, and 9.1% were Type VI. Of all picosecond laser treatments, 87.9% involved the face and neck, 9.1% only the face, and 3.0% only the neck. Mean pulse count was 10,732.3 pulses. For laser lipolysis, mean irradiance was 1.8 and 2.0 W/cm^2 for the build and sustain phases, respectively. For investigator global improvement scores, 63.6%, 54.5%, and 42.9% had improvement from baseline at 30-, 90-, and 180-day follow-up, respectively. No subject worsened. At 180-day follow-up, 40% maintained improvement from 90-day follow-up. At 90-day follow-up, calculations for neck laxity showed significant improvement of 11.7% from baseline. All subjects improved. Mean

pain score was 3.8/10 without any anaesthesia. Of all subjects, 72.7%, and 71.4% were satisfied at 30, respectively. At 90-day follow-up, 54.5% agreed that treatment made their submentum appear more toned. During the study, no unexpected treatment effects were observed.
Conclusion: Paired facial treatment with 755 nm picosecond laser with DLA and 1060 nm laser lipolysis offered safe and improved clinical outcomes.

EPOSTER ONLY - SAFETY

THERMAL VALIDATION OF SAFE PARAMETERS FOR AN IMPROVED HAIR AND SKIN DUAL-WAVELENGTH LASER

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Background: The safety of a new laser is an important factor in commercialization. 755 nm wavelength lasers are typically used in lighter skinned patients, while darker skinned patients are treated with 1064 nm wavelength lasers. The dual-wavelength laser evaluated in this study combines the two wavelengths to allow for versatile treatment approaches.
Study Design/Materials and Method: Six test scenarios were considered to be instances of "worst case conditions". The included parameters sets were among the upper limits of recommended settings. Subjects were evaluated for clinical safety through test spots. The spots were captured with a thermal camera (FLIR, 30 Hz) to determine the highest surface skin temperature. Thermal camera image analysis determined the maximum skin temperature before, during, and immediately after test shots. Patients were examined daily for 5 days to exclude blistering and crusts. Refrigerated air (Zimmer, Cyro 6) was delivered at a rate of 500 L/minute over the site at −10°C.
Results: Subjects with skin types I and VI were examined. The 755 nm wavelength was used on the subject with skin type I, while the 1064 nm wavelength was used on subjects with skin types I and VI. A total of 111 test spots were performed and captured with the thermal camera. Spot sizes ranged from 2.5 to 18 mm, with fluences ranging from 18 J/cm2 (type VI skin, 18 mm spot, 1064 nm) to 360 J/cm² (2.5 mm spot, type I skin, 1064 nm). The highest temperature captured throughout all test spots was 37.7°C, below the safety threshold of 45°C. No blisters or burns were experienced by any subjects. Crusting was noted 2 days after test spots in three patients, but no significant pigmentation alterations were noted in the follow-up visits. Mild erythema was noted in the type I patient sites for 24 hours.
Conclusion: The dual-wavelength laser equipped with cooling showed no significant adverse effects over a range of settings. Thermal camera images confirmed the absence of extreme surface temperatures.

EPOSTER ONLY - SCARS

AN ANHYDROUS GEL WITH TRIPEPTIDES AND HEXAPEPTIDES FOLLOWING HYBRID FRACTIONAL LASER RESURFACING FOR ACNE SCARS

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Background: Hybrid fractional laser treatment is associated with significant post-treatment increases in erythema and barrier dysfunction. Topical treatments have been formulated to decrease the down time associated with treatment. This study evaluates the efficacy of an anhydrous gel with tripeptides and hexapeptides (Alastin) in wound healing and downtime following hybrid fractional laser treatment for acne scarring.
Study Design/Materials and Method: Subjects with mild to moderate acne scarring were prospectively randomized to receive either an anhydrous gel with tripeptides and hexapeptides or bland moisturizer for 2 weeks prior to and 90 days following hybrid fractional laser treatment. The laser used was a combination 2940 nm Er:YAG, ablative and 1470 nm diode coagulative laser. The laser treatment was repeated 30 days following the first treatment and the subjects continued topical application twice daily for 60 additional days. Transepidermal water loss (TEWL), colorimetry, photographs, high definition three-dimensional (3D) imaging, Global Aesthetic Improvement Scale, patient subjective satisfaction, as well as biopsy for histology were performed.
Results: Nine of the planned 10 subjects were enroled at the time of abstract submission, with 9 completing the study by the time of abstract submission. The erythema index (a^*) increased by 1.37 from the day of laser treatment to Day +4 following laser treatment in the experimental arm and 4.2 in the control group ($P = 0.17$ by two-tailed t test). From the day of laser treatment to Day +4, the TEWL increased by 7.4 g/m^{2}h in the experimental group and 28.1 g/m^{2}h in the control group ($t = 0.045$ by two-tailed t test). After 14 days of applying the experimental topical, the average TEWL decreased by 1.81 g/m^{2}h, while the control arm had an increase in TEWL by 0.47 g/m^{2}h. No subjects in the experimental arm experienced adverse events, while one subject in the control group discontinued the study due to melasma flare. Additional results including biopsy and 3D photography will be available at presentation.
Conclusion: Preliminary results show that the anhydrous gel with tripeptides and hexapeptides suppresses the TEWL increases post-laser treatment compared with a bland moisturizer. This may decrease the down time associated with hybrid fractional lasers and may improve tolerability. This study presents both subjective and objective measurements for patients undergoing fractional laser treatment with or without an experimental topical agent.

CLINICAL EVALUATION OF THE SAFETY AND PERFORMANCE OF FRACTIONAL RADIOFREQUENCY FOR THE TREATMENT AND REDUCTION OF ACNE SCARRING

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Background: Acne scarring results from sequelae of inflammatory acne processes and can cause significant distress for individuals. Current treatment options offered to patients include chemical or laser peels, dermabrasion or non-ablative laser resurfacing but these are usually associated with prolonged recovery times as well as arduous side effects. The objective of this clinical study is to evaluate the safety and performance of fractional radiofrequency (RF) for the treatment of acne scarring.
Study Design/Materials and Method: A total of 15 female patients (15 non-Hispanic, skin types II–VI) were enroled in this prospective, evaluator-blind study of the safety and performance of fractional RF for the treatment and reduction of acne scarring.

Patients received three treatments with either the 80 or the 160-pin handpiece on both sides of the face every 3–5 weeks, with a follow-up at 6- and 12-weeks after their last treatment. Endpoints included a self-assessment of acne scarring, a patient satisfaction scale (scale 0–5; greater value indicates greater satisfaction), tolerability during the treatment (Visual Analog Scale [VAS]; scale 0–10; greater values indicate more pain), tolerability immediately after the treatment (scale 0–5; greater values indicate more tolerability) and assessment of safety.
Results: There were 12 females and 3 males that completed the study, average age at study consent was 39.9 ± 10.6 years. After self-assessment of patients, 80% noted an improvement in their acne scarring (30% significant improvement, 30% moderate improvement, and 20% mild improvement in scarring). On average all subjects indicated they were "satisfied" with the treatment at 12-week follow-up (mean score: 3.0) and all patients would recommend the treatment to a friend (100%). According to subject assessments, pain during treatment was low (mean VAS: 3.5) and pain immediately following treatment was "tolerable" to "very tolerable" (mean tolerability score: 3.4). No severe adverse effects were reported and no immediate responses such as burn, erythema, edema was experienced by any of the patients.
Conclusion: Final data analysis from this clinical study demonstrates that fractional RF is a safe and efficacious treatment for acne scarring of patients of all skin types.

MANAGEMENT OF POST-ACNE SCARS WITH A COMBINATION OF VASCULAR LASER, FRACTIONAL ABLATIVE LASER (CO_2) AND A NOVEL AUTOLOGOUS PLATELET-RICH PLASMA GEL

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Background: Acne vulgaris is a common condition that often results in secondary cutaneous damage in the form of scarring. The combined therapy of lasers and platelet-rich plasma (PRP) is gaining popularity for the management of post-acne-derived cutaneous fibrosis. However, these cutaneous defects usually require shape-specific scaffolds and PRPs provide a limited volume enhancer effect. Recently, a new three-dimensional (3D) gel derived from plasma rich in growth factors technology (PRPGel) has been developed with the aim of overcoming these limitations. The aim of this study was to preliminarily assess the clinical performance of the combination therapy with natural filler made from personal plasma (BTI), vascular laser and fractional lasers for post-acne scar amelioration.
Study Design/Materials and Method: Nine patients suffering from post-acne scars were treated with a combination of vascular laser (pulsed-dye laser), fractional ablative laser (CO_2 laser) and PRPGel. Standardized macrophotographs were taken and patients completed a satisfaction survey. Pre- and post-images were analysed following the ECCA score for acne scar severity grading. Clinicians were asked to fulfil a clinical improvement score and any undesired side effects were recorded.
Results: After the combined therapy patients referred to be highly satisfied as an 8.7 ± 0.9 satisfaction score was achieved following the 10-point Likert's scale. Healthcare specialists objectivated that the scar reduction and the overall skin quality at the end of the study had noticeably improved (7.4 ± 0.7 score). Additionally, the ECCA score showed a significant 55% of improvement comparing to baseline ($P < 0.05$). The treatment promoted an early volumetric disposal that was translated into an immediate soft tissue augmentation and scar amelioration effect No major side effects were recorded, and the tolerance of the treatment was excellent.
Conclusion: This preliminary study suggests that the combined therapy with vascular laser, fractional ablative laser and PRPGel could help in the management of post-acne scars.

MANAGEMENT OF SCARS WITH ENERGY-BASED DEVICES, ACCORDING TO THE COMPONENT OF THE SCAR, IN A PRIVATE MEDICAL CENTER IN BOGOTÁ—COLOMBIA

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Background: There are many reports of the effectiveness of laser for scar management. The purpose of this study was to perform a retrospective review to evaluate the improvement of signs and symptoms in patients with scars of different aetiology treated with different energy-based devices, according to the main component of the scar, using standardized subjective and objective measurement scales, in a private medical center in Bogotá—Colombia
Study Design/Materials and Method: A descriptive, retrospective and longitudinal review of clinical histories in a single private medical center in Bogota—Colombia was performed, which included a total of 685 scars in 348 patients, treated with different types of Energy Based Devices, according to the vascular, pigmentary or texture components. The changes were recorded by the patients, according to the Vancouver subjective scale (EV) and by the operator applying the objective scale of the University of North Carolina (EUNC).
Results: Between June 2012 and June 2020, 685 scars in 348 patients were treated, with an average of four sessions per patient and a minimum follow-up of 3 months after the last treatment. The vascular and pigmentary components were handled differently, with Diode 980 nm, Nd:YAG 1064 LP, Nd:YAG QS1064/532 KTP whose chromophores were hemoglobin and melanin, respectively. The texture was handled with ablative and non-ablative technologies (CO_2, Erbium, Radiofrequency). The aetiology includes postsurgical scars (36%), Burns cars (28%) other traumatic scars (23%) and sequelae of acne (12%). The EV changed from 10.84 to 4.52 (on a scale of 13 points) ($P = 0.000$) and the EUNC decreased from 8.8 to 2.46 (on a scale of 12 points) ($P = 0.000$).
Conclusion: The energy-based therapy applied according to the vascular, pigmentary and texture component in hypertrophic, keloid and atrophic scars improves the signs and symptoms according to both scales, subjective and objective.

MULTICENTER, OPEN LABEL STUDY ON SIMULTANEOUS USING OF INTRADERMAL INJECTION OF POLY-D,L-LACTIC ACID AND MICRONEEDLE RADIOFREQUENCY FOR ACNE SCARS

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Background: Poly-L,L-lactic acid is a substance that causes strong collagen regeneration and has been used mainly to increase extracelluar matrix by injecting it into the subcutaneous

area. Poly-D,L-lactic acid is easy to make in a spherical foam appearance, has soft properties, and has an excellent tissue affinity. The duration of maintenance within tissue is also shorter compared with Poly-L,L-lactic acid. Poly-D,L-lactic acid was injected directly into the dermis of acne scars and microneedle RF is simultaneously used to deliver the drug in the scar regions. This study investigated the safety and effectiveness of the combination therapy.
Study Design/Materials and Method: From March 2019, we observed the progress of more than 60 person with acne scars who visited three hospitals. All patients were received four treatment sessions at 4- to 6-week intervals. During the treatment, level of pain, downtime, post-treatment erythema, hyperpigmentation, scar improvement, occurrence of nodule were observed. PDLA 50 mg (20–50 μm, small sized) in spherical foam appearance was mixed with saline, non-cross HA and lidocaine, and injected into the dermis of scar area. PDLA 200 mg (50–80 μm, big sized) which has an identical structure, was mixed with saline and applied topically to the same area. A 21-pin microneedle RF with 2 mm length (0.3 mm of non-insulated, special structure with a drug-pushing function) was superimposed several times with energy on that area to effectively deliver the drug.
Results: The downtime disappeared after 2–4 days, and long-lasting side effects such as erythema and hyperpigmentation were very rarely observed. Both doctors and patients were able to see a noticeable improvement in acne scars. Formation of nodules due to foreign body reaction has not been observed.
Conclusion: The simultaneous using of Poly-D,L-lactic acid intradermal injection and microneedle RF is considered a safe and powerful treatment method with short downtime and without significant side effects such as hyperpigmentation and nodulation

EPOSTER ONLY - SKIN OF COLOR

ASSESSMENT OF SKIN OF COLOR AND DIVERSITY AND INCLUSION CONTENT PUBLISHED IN LASERS IN SURGERY AND MEDICINE: AN ANALYSIS AND CALL TO ACTION

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Background: Dermatology is the second least diverse specialty in medicine, with a noted underrepresentation of skin of color patients in the academic literature. Given the importance of visual assessments and variations in disease presentation based on skin tone, there is an urgent need to improve the representation of skin of color in both dermatologic education and published research. This study develops criteria to assess skin of color-related publications in Lasers in Surgery and Medicine.
Study Design/Materials and Method: e developed the first prespecified criteria that allows for the assessment of diversity in dermatology literature. Using this criteria, the archives of 52 dermatology journals from January 2018 to October 2020, selected based on Impact Factor and Scopus Ranking, were analysed for association with skin and hair of color, diversity and inclusion, and socioeconomic/health care disparities that affect minority groups.
Results: Out of 52 journals, Lasers in Surgery and Medicine ranked 30th regarding the percentage of articles from 2018 through 2020 relevant to skin of color (7.12%). Across all journals from 2018 through 2020, the mean percentage of articles relevant to skin of color was 15.02%.
Conclusion: The results of our study provide the first-ever benchmark for assessing diversity in published dermatologic literature. We hope that our findings will contribute to ongoing efforts in dermatology to improve the representation of diverse patient populations. Our criteria can be used by journal editors to evaluate their publications for skin of color content, and can also help structure calls for academic work dedicated to skin of color topics. Finally, we encourage leaders in dermatology to utilize our recommendations for improving diversity and inclusion across our specialty.

EPOSTER ONLY - SKIN TIGHTENING

COMPARISON OF 25, 30, AND 60 MM HANDPIECES OF A NOVEL 300W RADIOFREQUENCY DEVICE FOR ABDOMINAL WRINKLES WITH 120-DAY FOLLOW-UP

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Background: Skin structure degrades over time due to a large variety of internal and external conditions which results in the skin becoming lax. Radiofrequency, ultrasound, non-ablative fractional technology, and ablative technology have all been previously used to varying degrees of success to treat lax skin. Radiofrequency energy still requires further investigation to optimize treatment parameters and safety. This study compares the use of the 25, 30, and 60 mm handpieces for a novel 300 W radiofrequency device for the treatment of abdominal wrinkles.
Study Design/Materials and Method: Twenty subjects were enroled and treated with either the 60 mm handpiece five times, or eight times with the 25 or 30 mm handpiece at two study centers. Subjects returned for a 120-day follow-up. Subjects had events assessed, photos collected, and both subjects and physicians completed evaluations of subject results. Blinded graders were also asked to pick out post-treatment photographs from a randomized photo collection of pre- and post-treatment images.
Results: All subjects found the treatment extremely comfortable with an average pain score of 0.3/10 for all handpieces. Treatments lasted approximately 8 minutes for the 60 mm, and 9 minutes with the 25 and 30 mm handpieces, resulting in a relatively quick procedure for the patient. All subjects (100%) treated with the 60 mm (14/14) were satisfied while 83% (5/6) of subjects treated with the 25 or 30 mm handpiece were satisfied, with no significant difference in satisfaction scores between the three handpieces (Fisher's exact, $P = 0.3$). Three blinded reviewers were able to correctly identify the post-treatment image 90% of the time on average. There were no significant adverse events to report besides mild erythema and edema post-treatment that resolved within a few hours
Conclusion: The use of a 300 W radiofrequency device is a safe and effective method for the treatment of abdominal wrinkles with the 25, 30, and 60 mm handpieces all providing statistically similar results.

EPOSTER ONLY - TOPICALS (COMBINED WITH LASER TREATMENTS)

CO_2LASER ABLATION AND TOPICAL BLEOMYCIN FOR TREATMENT OF RECALCITRANT PLANTAR WARTS

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Background: Plantar warts can be highly recalcitrant to treatment. CO_2-laser ablation as well as intralesional bleomycin have both shown moderate efficacy in this difficult to treat condition. To achieve higher clearance rates, CO_2-laser treatment can be combined with other treatment modalities. In this study, we evaluated the effectiveness and tolerability of a new combination treatment consisting of CO_2-laser ablation followed by topical bleomycin for the treatment of recalcitrant plantar warts.
Study Design/Materials and Method: This retrospective chart review and patient survey evaluated the effectiveness and tolerability of CO_2-laser ablation followed by topical bleomycin for recalcitrant plantar warts, in patients treated in the period July 2013–July 2018. After local infiltration with lidocaine, CO_2-laser (10,600 nm) was used for ablation of the entire wart followed by topical application of bleomycin saturated gelatin sponges (1 USP-E/ml in lidocaine 5 mg/ml in normal saline) under occlusion for 72 hours.
Results: Eighteen patients (83% female, median age 41) were included. Six patients (33%) used immunosuppressive medication or were otherwise immunocompromised. A complete remission rate of 61% was achieved after one treatment. Two (11%) recurrences occurred after a median follow-up time of 7 months (range: 2–52) months. Patients reported a median procedure related NRS pain score of 7.0 (range: 4.8–8.0), and a direct post-procedure NRS pain score of 2.5 (range: 2.0–7.0). Moreover, patients reported a NRS pain score of 6.5 (range: 5.3–8.3) that lasted for 2–7 days after the treatment. Local adverse events included hematoma (33%), blistering (6%), infection (6%), mild pigmentary changes (28%), callus (39%) and scar formation (22%). No systemic adverse events were reported. The overall treatment satisfaction score at the end of treatment was 8.0 (range: 7.0–9.0), and 59% of patients would recommend this treatment to others.
Conclusion: Combination of CO_2-laser ablation followed by topical bleomycin shows favourable results and is well-tolerated for treatment of recalcitrant individual plantar warts when conventional treatments have failed.

EPOSTER ONLY - VASCULAR

COST SAVINGS OF IN-OFFICE PULSED DYE LASER TREATMENT OF PORT-WINE STAINS WITHOUT ANAESTHESIA: COMPARISON WITH INTRAVENOUS SEDATION AND GENERAL ANAESTHESIA

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Background: Port-wine stains (PWS) are capillary malformations that often require pulse-dye laser (PDL) treatment. A recent FDA warning raised concerns with repeated use of general anaesthesia in children younger than 3. Physicians have recently advocated for as early treatment as possible in infants 1 year or younger in the office setting without general anaesthesia, which has been both highly safe and effective.
Study Design/Materials and Method: A cost-analysis was performed for PDL treatment of PWS by clinical setting. Costs were compared for in-office treatment without anaesthesia, in-office treatment with intravenous sedation, and operating room treatment with general anaesthesia. PWS was categorized by size according to billing codes (17106, 17107, 17108).
Results: The cost to treat PWS varied depending on the clinical setting. For in-office treatment without anaesthesia, the total cost was $530.36 (17106), $684.95 (17107), and $996.92 (17108). For in-office treatment with intravenous sedation, the total cost was $1,130.56 (17106), $1,285.15 (17107), and $1,597.12 (17108). For operating room treatment with general anaesthesia, the total cost was $3,730.38 (17106), $3,827.36 (17107), and $4,069.70 (17108). Treating PWS in the office without anaesthesia was $600.20 (72.3%) (17106), $600.20 (60.9%) (17107), and $600.20 (46.3%) (17108) less than including intravenous sedation. The cost savings increased to $3200.02 (150.2%) (17106), $142.41 (139.3%) (17107), and $3072.78 (121.3%) (17108) when compared with treating in the operating room with general anaesthesia.
Conclusion: PDL treatment of PWS in the outpatient setting without any anaesthesia instead of in the operating room with general anaesthesia translated to over $3000 in cost savings per treatment. This forecasts to total cost savings of over $18,000–24,000 with a treatment plan of six to eight treatment sessions. More unknown are the health costs incurred by repeat exposure of infants to anaesthesia and sedation, which can include neurocognitive delays. Physicians should accurately weigh overall costs, risks, and benefits when treating PWS.

NURSING/ALLIED HEALTH CASE STUDIES

LASER THERAPY IN THE MANAGEMENT OF COVID-19 PRONING INDUCED ATROPHY AND HYPOPIGMENTATION

Keyvan Nouri, Britney Wilson, Fernanda Sakamoto
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Introduction/Overview: Prone positioning, a postural adjuvant therapy for improving ventilation, is widely used to treat COVID-19 pneumonia complicated by ARDS. The extensive time needed for proning to be effective may result in prolonged pressure points on the face leading to facial ulcer that once healed, can have a lasting impact on the patient as they may lead to scarring, dyspigmentation and atrophy
Analysis: Eight passes of microneedling, bimatoprost solution and two sessions of fractional 10,600 nm CO_2 laser (10 mJ; density 5; 1 pass) spaced at 6-week intervals was used to treat COVID-19 proning induced atrophy, hyperpigmentation, and hypopigmentation
Discussion: Our patient reported marked improvements in the atrophy, hyperpigmentation, and hypopigmentation. No adverse effects were reported.
Conclusion: Clinicians should be aware of the risk of atrophic dyspigmented scars developing from facial pressure ulcers as a result of prone positioning, so as to discuss a therapeutic approach.
Patient Feedback: We hope to further enrich the literature related to the coronavirus pandemic by describing the use of laser therapy to

treat the hypopigmentation, hyperpigmentation, and atrophic scarring that developed due to mechanical ventilation in prone position.

LASER THERAPY AS A TREATMENT FOR THE CUTANEOUS MANIFESTATIONS OF ERDHEIM–CHESTER DISEASE

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Introduction/Overview: Erdheim–Chester disease (ECD) is a rare systemic non-Langerhans cell histiocytosis, characterized by the accumulation of lipid-laden histiocytes with stromal fibrosis. We hope to describe our experience with treating cutaneous manifestations of ECD with CO_2 Laser therapy.
Analysis: Six periorbital and periorbital xanthelasma-like plaques were treated using CO_2 laser therapy.
Discussion: The results observed after a single treatment by fractional 10,600 nm CO_2 Laser Active FX (100 mJ; density 3; 1 pass) was rated as excellent in the patient at her 8-week follow up.
Conclusion: A valuable treatment option to eliminate the cutaneous manifestations of ECD is CO_2 laser therapy.
Patient Feedback: Our patient experienced rapid high-quality healing without any adverse effects.

NON-CME ABSTRACTS

CRYOLIPOLYSIS TREATMENT INDUCES HEAT SHOCK PROTEIN EXPRESSION IN HUMAN SKIN

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Background: Cryolipolysis is a well-known non-invasive procedure for fat reduction, however, the effects on skin are not well established. During cryolipolysis, skin is in contact with the applicator cooling plate and supercooled (non-frozen) up to 75 minutes until rewarmed to body temperature. In general, heat shock proteins (HSP) are known to protect cells against environmental stress and injuries, plus other benefits. The effect of controlled cooling on the expression of skin HSP is unknown. The objective is to investigate HSP response in human skin following *in vivo* cryolipolysis.
Study Design/Materials and Method: Eleven pre-abdominoplasty study subjects (average age/body mass index = 41.8/29.59) were enroled for cryolipolysis treatment with a cup applicator (−11°C for 35 minutes). Tissue samples from treated and untreated abdominal areas were harvested 3 days to 5 weeks after treatment (average 15 days). Immunohistochemistry (IHC) for HSP47 and HSP70 was performed and quantified in epidermal and dermal layers.
Discussion: The results observed after a single treatment by fractional 10,600 nm CO_2 Laser Active FX (100 mJ, density 3; 1 pass) was rated as excellent in the patient at her 8-week follow up.
Results: There were no observable skin changes, such as erythema, scarring or hypo/hyper pigmentation, in treated areas before sampling. IHC showed the epidermis and dermis had higher HSP expression in cryolipolysis treated samples compared with untreated. Histological image quantification identified HSP70 changes in the epidermis on the order of 1.91-fold increase ($P < 0.05$), and in the dermis of 2.39-fold increase ($P < 0.04$). Quantification of HSP47 in the dermis revealed a 1.54-fold increase ($P < 0.01$).
Conclusion: This study revealed significant induction of HSP in epidermal and dermal layers after cryolipolysis. HSP70 is known to be involved in the protection and adaption of skin after thermal stress, providing potential therapeutic benefits. HSP47 is known to be involved in the biosynthesis of collagen type I. Cryolipolytic HSP induction may be relevant for other applications including skin remodelling, rejuvenation, and photoprotection.

THE PHYSICS OF ELECTROMAGNETIC MUSCLE STIMULATION

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Background: Numerical modelling has been used to understand field-tissue interaction in a variety of medical and diagnostic applications. A computational numerical model is presented to explain the physics of non-invasive electromagnetic muscle stimulation (EMMS) by a commercially available device. Maxwell's equations are solved to predict the induced electric and magnetic field produced in the muscle located below the applicator's coil operated by pulsed electrical current.
Study Design/Materials and Method: A computational model was constructed using finite element software (COMSOL Multiphysics) to simulate the interaction of the electromagnetic field produced by the applicator coil and the magnetic and induced electric field in the muscle. Realistic anatomical solid models were used to simulate the geometrical complexity of tissue in the human body. We calculated the characteristic values of the magnetic flux density norm (Tesla), electric field norm (V/m), and induced current density norm (A/m^2) for each tissue layer.
Results: Muscle regions with the highest and lowest magnetic flux density, electric field norm, and induced current norm were identified. The magnetic field induced in the muscle is greatest at the center of the applicator and decays rapidly from the center to the outer edge of the applicator. The induced electric field in the muscle resembles the shape of a torus with higher currents running in synchronicity with the coil current.
Conclusion: Nerve stimulation arises from the interaction of electric fields with the nerve fibres in the human body. The model presented here is a first approach to calculate the local electric field that may polarize and depolarize nerve or muscle membranes to produce the muscle contraction seen following use of EMMS. By inference, the localization of zones with highest induced electric field can be used to improve therapeutic modalities to excite targeted muscles.

VASCULAR CHARACTERISTICS OF PORT WINE BIRTHMARKS AS MEASURED BY DYNAMIC OPTICAL COHERENCE TOMOGRAPHY

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Background: Port wine birthmarks (PWBs) are congenital capillary malformations that have have varied vascular characteristics between patients and even within individual lesions. Vascular superficial plexus depth (SPD) and vessel diameter and density may contribute to variability in color and treatment response. Under-

standing of vessel characteristics associated with different clinical presentations, including color, may be useful for treatment parameter selection. Dynamic optical coherence tomography (D-OCT) can calculate the characteristics of the vasculature such as the SPD and vessel diameter and density at this level.
Study Design/Materials and Method: A cross-sectional observational study was conducted to measure *in-vivo* vascular characteristics as a function of PWB color. Patients undergoing PWB treatment were recruited from three sites. PWBs were classified by color and scanned via D-OCT. SPD and vessel diameter and density were calculated.
Results: A total of 108 patients were scanned. More younger patients had lighter birthmarks and more older patients had darker birthmarks ($P < 0.01$). Purple PWBs had significantly shallower mean SPD than pink PWBs. PWB color was not associated with significant differences in mean superficial plexus vessel diameter or density. Among pink PWBs, each 10-year increase in age was associated with 10.6μm increase in SPD. Among purple PWBs, each 10-year increase in age was associated with 16.2 μm reduction in SPD ($P < 0.02$). In lesions without prior treatment, purple PWBs had 12.7% lower vessel density compared with pink PWBs ($P = 0.01$).
Conclusion: D-OCT measurements of SPD and vessel diameter and density varied based on PWB color and depended on patient age and prior treatment. Superficial aspects of darker PWBs were significantly closer to the epidermis than lighter PWBs, which might impact optimal laser parameters. Future studies should examine which vascular characteristics might be predictive of resistance to vascular laser treatment and whether treatment parameters based on *in-vivo* D-OCT measurements can improve treatment outcomes by altering laser dosimetry.

TREATMENT OF BENIGN PIGMENTED LESIONS WITH A PICOSECOND LASER USING NOVEL HANDPIECES WITH 730 NM AND 532 NM WAVELENGTHS

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Background: Q-switched (QS) nanosecond laser technologies are commonly used to treat benign epidermal and dermal pigmented lesions, but there is increased risk of post-inflammatory hyperpigmentation (PIH) and scarring when treating skin of color. This study assessed treatment with a picosecond laser using a 730 nm handpiece and a 532 nm handpiece with a ring of diffuse fluence emitted around each of the central laser beams.
Study Design/Materials and Method: Healthy adults presenting with mild to severe benign pigmented lesions were enroled. Subjects received four picosecond treatments, at 6-week intervals, to the face and/or body (i.e., chest, arms, neck, etc.) with the 532 nm handpiece and/or the 730 nm handpiece. Blinded investigator assessment of pigment improvement was done at the 3-month follow-up after the final treatment, using a 5-Point Pigment Clearance Scale of 0 = No improvement to 4 = 75–100% clearance. Subjects reported on satisfaction with treatment outcome at the 3-month follow-up, using a 5-point Likert scale.
Results: A total of 84 participants (77 females, 7 males; mean age of 50 ± 9 years, range: 26–69) with Fitzpatrick skin type II ($n = 9$), III ($n = 21$), IV ($n = 53$) and V ($n = 1$) participated in the study. Most subjects (76%) had darker Asian or Mediterranean/Middle Eastern skin. Subjects underwent treatments to the face ($n = 68$) and/or body ($n = 21$). Epidermal pigmentation (i.e., ephiledes, solar lentigines, seborrheic keratosis, mixed dyschromia) was present in 69 subjects, dermal pigmentation (i.e., melasma) in two subjects and mixed epidermal pigmented lesions/melasma in 15 subjects. Full-face treatments were performed with the 532 nm handpiece ($n = 214$ treatments), while the 730 nm handpiece was primarily used to treat focal areas of pigmentation on the face ($n = 38$ treatments) and body ($n = 63$ treatments). A total of 82 treated areas (58 face and 24 body) were assessed for pigment clearance. Most areas (83%, 68/82) responded to treatment with 77% of treated areas showing "Excellent" or "Complete" pigment improvement. There was no significant difference ($P = 0.6985$) in mean pigmentation scores between the two laser treatment cohorts. High satisfaction (94%) with treatment outcome was reported. Darkening of pigment immediately following treatment was common and resolved within several days. Overall rate for PIH was 2.4% (2/84) and 4.8% (4/84 subjects) for rebound melasma that occurred in Asian subjects and resolved with 4% hydroquinone cream.
Conclusion: In this study, a series of three to four full-face treatments with the 532 nm handpiece and focal treatments with the 730 nm handpiece to the face and body resulted in >50% clearance of epidermal and dermal pigmented lesions for 77% of assessed areas. Subjects reported high satisfaction with treatment outcome. PIH rate was low in this population of darker-skinned subjects. Whether melasma rebound was due to laser treatments or seasonal effects is unclear. Longer-term follow-up in a larger study cohort is warranted.

REFLECTANCE CONFOCAL MICROSCOPY MONITORING OF LASER TREATED ACTINIC KERATOSIS AND NONMELANOMA SKIN CANCERS

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Background: Ablative fractional CO_2 laser therapy is a non-surgical, alternative treatment option for patients with actinic keratosis (AK) and superficial nonmelanoma skin cancers (NMSCs). The reported efficacy of laser therapy for these conditions has been variable. Therefore, real-time confirmation of tumour clearance with CO_2 laser therapy would provide clinical value. Reflectance confocal microscopy (RCM) allows for non-invasive visualization of skin cells at nearly histologic resolution, and diagnostic features of AK and NMSCs have been well defined on RCM imaging. Thus, RCM may provide a way to monitor tumour clearance with laser therapy in real-time for AK and superficial NMSC.
Study Design/Materials and Method: In this pilot study, one biopsy-proven squamous cell carcinoma in situ (SCCIS) and four actinic keratoses were removed with ablative fractional CO_2 laser therapy. Treatment was performed using a spot diameter of 5 mm, spot density of 40 dots/cm^2 and energy ranging from 7 to 14 mJ. RCM images were taken both pre-ablation and immediately post-ablation to evaluate for features of AK and SCCIS. Aluminum chloride was applied topically before post-ablation RCM imaging for purposes of haemostasis and enhancement of nuclear contrast.
Results: RCM imaging performed immediately following laser therapy showed no visible features of remaining SCCIS or actinic keratoses. Additionally, by allowing for visualization of the depth of laser penetration, RCM confirmed ablation had reached the superficial papillary dermis in all five lesions.
Conclusion: This pilot study shows that RCM allows for confirmation of clearance post-CO_2 laser ablation of AK and superficial NMSCs.