2017 ELECTRONIC POSTERS (ePosters)

ePoster - Acne

E1

EVALUATION OF VARIOUS ACNE VULGARIS LESIONS BY OPTICAL COHERENCE TOMOGRAPHY

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Background: Acne vulgaris is a chronic inflammatory disease of the pilosebaceous unit. Optical Coherence Tomography (OCT) is an easily applicable optical imaging tool that generates images from backscattered infrared light. With a resolution of 5–10 μm it enables *in vivo* imaging down to a depth of 2 mm. It is a valuable non-invasive technique to examine epidermis and dermis and to monitor various skin-disorders. Despite of 10 years of OCT in the clinic, this is the first systematic clinical study that explores capabilities of OCT in describing various acne lesions by means of comparing clinical presentation of acne lesions with OCT morphology.

Study: OCT images were acquired from the face of 14 patients with acne vulgaris. A series of 500 OCT images were acquired from each patient. By using an OCT system with a swept source tunable multibeam diode laser at lambda = 1305 nm, the acne elements were visualized *in vivo*. The OCT morphology was compared to well-known micromorphology of acne lesions.

Results: OCT identified specific morphological features of various types of acne lesions. Closed comedones were identified as well-defined grey roundish structures in upper dermis circumscribed by a hyper reflective lining and with a slightly thickened epidermis above. Open comedones displayed a dilated hair follicle containing a light-grey mass enclosed by a hyperreflective lining together with an eruption through epidermis. Pustules appeared as round, grey structures inside dermis with a central hyperreflective zone surrounded by a hyperreflective lining. Most papules were located too deep in the dermis to be visualized, but the above epidermis appeared thickened and hair follicles dilated. Nodules were located too deep to be imaged, but displayed thickened epidermis above.

Conclusion: OCT characterizes specific acne lesions and carries a potential to assess acne vulgaris subtypes in future clinical trials, including trials with new upcoming laser- and light-based technologies.

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E2

COMPLETE RESOLUTION OF NODULOCYSTIC ACNE LESIONS WITH A SINGLE SESSION OF A FRACTIONAL CARBON DIOXIDE LASER (CO_2) TOGETHER WITH TOPICAL ISOTRETINOIN DELIVERY THROUGH THE CHANNELS

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Background: All the different forms of severe acne require systemic treatment for several months including oral antibiotics, hormonal antiandrogens and oral isotretinoin. Several laser treatments have been reported for severe acne but three or more sessions are recommended in order to obtain some results. The fractional lasers were developed for rejuvenation and new applications has been described during the lasts years. One of the most interesting application is the drug delivery through the channels created by the ablative fractional lasers which allows the deeper penetration of the drugs.

Study: An 18-year-old female patient presented painful nodulocystic acne lesions on her chest that persisted for 2 years after oral retinoids. During the last year's she received different topical and oral treatments with poor results. She was then treated with a fractional carbon dioxide (CO_2) laser together with an isotretinoin and erythromycin gel that was applied after the laser and maintained for 1 month.

Results: The complete resolution of the inflammatory lesions after a single fractional CO_2 laser treatment together with the topical treatment was observed. Residual scarring was treated with a non-ablative fractional 1540 laser with good results.

Conclusion: The combination therapy of a fractional CO_2 laser with a topical isotretinoin gel can produce an improvement of the nodulocystic acne lesions without serious secondary effects. This could be a useful treatment in cases of nodulocystic acne when other therapies failed.

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E4

FLUORESCENCE IMAGING AND PHOTODYNAMIC THERAPY OF BREAST CANCER CELLS USING ERTHROCYTE-DERIVED NEAR INFRARED NANOPARTICLES

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Background: Optical theranostic nano-constructs provide a potential platform for imaging and phototherapy of cancer. Our group has engineered nano-sized vesicles derived from erythrocytes doped with the FDA-approved chromophore, indocyanine green (ICG). We refer to these constructs as near infrared (NIR) erythrocyte-derived transducers (NETs) since once photo-excited by NIR light they can transduce the energy to fluorescence emission, heat generation, or production of reactive oxygen species. In this study, we investigate the utility of NETs for combined fluorescence imaging and photodynamic therapy of breast cancer (SKBR3) cells *in vitro*.

Study: NETs were fabricated by loading ICG into hemoglobin deleted erythrocytes using a hypotonic buffer. SKBR3 breast cancer cells were incubated in cell media without, or with free ICG (positive control) or NETs for 3 hours, and subsequently irradiated with an 808 nm laser for 15 minutes at power density of 680 mW/cm^2. To demonstrate the utility of NETs to image cancer cells, we used NIR fluorescent imaging following NETs incubation with SKBR3 cells. We used 2′,7′-dichlorofluorescein diacetate as dye probe to detect reactive oxygen species (ROS) and a live dead assay to determine effectiveness of the therapy.

Results: Our flow cytometry and fluorescence imaging results indicate that SKBR3 cells have a higher uptake of the NETs than free ICG. Increased uptake of the NETs was accompanied by a greater photodynamic therapeutic response as evidenced by higher levels of ROS generation and greater fraction of cell death.

Conclusion: Our results suggest that NETs present a promising candidate for fluorescent imaging and photodynamic therapy of cancer.

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E5

REAL TIME OPTICAL LIQUID BIOPSY: SERUM FATTY ACID PROFILING IN A RAT MODEL OF NONALCOHOLIC STEATOHEPATITIS (NASH)

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Background: Autofluorescence analysis of endogenous fluorophores is expected to enhance diagnostic applications of liquid biopsy. Recent results on the autofluorescence (AF) ability to detect separately Arachidonic acid (AA) and other Fluorescing Free Fatty Acids (FFFA) in the lipid extracts of fatty livers prompted us to investigate the AF detection of free fatty acids in the serum of a NASH rat liver model.

Study: NASH was induced in male Wistar rats by 8-week methionine and choline deficient (MCD) diet; control rats received the same diet added with methionine and choline. AF excitation and emission spectra in the near UV-visible interval were recorded from sera and pure, reference compounds. Hepatic enzymes (AST, ALT), cholesterol, triglycerides, HDL and LDL were also evaluated by biochemical, conventional analyses.

Results: Serum AF exhibited well defined emission spectra in the 420–550 nm region ascribable to free fatty acids, besides the expected signal of proteins in the 390–400 nm region. AA and FFFA overall emission in NASH was about 25% lower than in the control. As compared with NASH, AA prevailed on FFFA in the control. Biochemical cholesterol, triglycerides, HDL, and LDL showed a common lowering by more than 50% in NASH, where higher levels of serum hepatic enzymes were also found, consistently with literature.

Conclusion: The autofluorescence of AA and FFFA in the rat serum was here demonstrated for the first time. The ability to detect differences in both overall amount and balance of AA and FFFA between NASH and controls, following prior AF results on the predominance of AA on FFFA in lipid fractions of genetic as compared with diet induced fatty livers, is promising for real time, cost effective AF serum liquid biopsy. Applications can improve the lipid profiling in metabolic disorder and liver diseases, with particular implications on AA and its role in lipotoxicity.

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E6

TRANSDERMAL DRUGS DELIVERY WITH A THERMO MECHANICAL ABLATION DEVICE

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Background: To evaluate the skin permeability of three hydrophilic molecular models: verapamil, diclofenac, magnesium ascorbyl after a skin treatment with a thermomechanical ablative device.

Study: Three supports: Frantz diffusion cell system, *in vitro* porcine skin, *in vivo* patients. Using a pretreatment with TMAb device, with a stainless-steel tip, settings: 400°C—6–9 msec—protrusion 400 μm. Microchannels formed by TMAb technic were microscopically observed after histological procedure and after staining by diagnostic dyes. A tip of 81 pyramidal pins arrayed over 1 cm^2, resulting on a treated skin area 2.4% of microchannels. Permeability of the active compounds through pig skin was determined *in vitro* with a Franz diffusion cell system.

Histology of TMAb treated skin by phenol red dying on pig samples just after treatment. *In vivo* imaging of TMAb treated skin on human patients, by fluorescence confocal microscopy.

Results: Average depth in μm of TMAb micropores measured by confocal laser scanning up to 6 hours showed a stability in shapes and depth, and endurance after their formation. Identification of the morphology of the microchannels created through the stratum corneum. Visualization of the good penetration of a hydrophilic fluorescent agent. Obtention of a Ph sensitive dye image. Results: cumulative permeation graphs of Verapamil, diclofenac, and magnesium ascorbyl showed practical effectiveness of a TMAb device on skin permeability for the TransDermal Delivery of hydrophilic agent. Images showed that fluorescence dye penetrates through the epidermis and goes to the papillary dermis *in vivo*.

Conclusion: TMAb technology is a new effective way to perform efficiently transdermal drug delivery for hydrophilic or charged Molecules on human *in vivo* skin.

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E7

STUDY ON FUZZY MATHEMATICAL MODEL AND INTELLIGENT EXPERT SYSTEM FOR THE TREATMENT OF PORT WINE STAINS WITH PHOTODYNAMIC THERAPY

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Background: Port wine stains (PWS) is a common congenital malformations of superficial dermal capillary network expansion, the incidence rate of $3 \sim 5‰$, requiring a huge clinical treatment demand. Photodynamic therapy (PDT) is an ideal treatment of PWS, but because of the complex process of treatment of multiple interactions, the convergence between clinical treatment and basic theory is not tight enough which limits further research and development of the PDT treatment to PWS.

Study: (1) A multi-factor fuzzy mathematical model for the PDT of PWS was established using Monte Carlo algorithm and Fick's law and fuzzy function. (2) The pharmacokinetic equation of multilayer tissue was established to determine the effective time and the maximum decay time of photosensitizer concentration. By choosing the oxygen consumption of metabolism and photosensitizer as variables, the closed-loop control system of internal oxygen diffusion was established. (3) Combining with case-based and rule-based reasoning, the BP neural network was used to establish an expert system for the treatment of PWS. Eight hundred data cases were extracted and normalized. Eighty percent among them were used as training set and the remaining 20% were used as testing set to test case identification and postoperative predictive function. (4) Fluorescence photometer and MTT assay were used to detect and compare the vascular cell killing effect between the traditional PDT and optimized PDT.

Results: (1) By Lyapunov function, the diffusion of photosensitizer can be determined to have a stable range and according to the constraint condition, the HJB function can be used to design a controller to control input functions such as photosensitizer amount and illumination time. (2) The accuracy rate of the expert system to the similar cases was 71.4%; the accuracy rate of the postoperative prediction was 88.53%, and the prediction error of the adverse reaction was converged between ± 0.42 using BP neural network. (3) The survival rate of the cells treated with PDT was 52.3%, and the cell survival rate was 57.8% treated by the conventional method using MTT assay.

Conclusion: Multivariate fuzzy mathematical modeling can be more accurate description of PDT of PWS in the uncertainty of the inherent law. The expert system is able to predict the effect of PDT on PWS with small errors. Experiments show that the optimized PDT has better therapeutic effect.

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E8

EFFECT OF LONG-PULSED 1,064 nm NEODYMIUM-DOPED YTTRIUM ALUMINUM GARNET LASER ON ROSACEA-LIKE SKIN LESIONS IN BALB/c MICE

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Background: Long-pulsed 1,064 nm Nd:YAG laser (LPND) has been widely used for photo rejuvenation and non-invasive skin tightening by inducing dermal collagen remodeling. Recently, LPND has been reported to be effective for rosacea, although the potential mechanism of has not been fully explored.

Study: To evaluate the histological effects and the molecular mechanism of LPND on rosacea-like skin lesions induced by LL-37 in BALB/c mice. LL-37 was injected intradermally into the dorsal skin of BALB/c mice ($n = 30$), resulting rosacea-like skin twice a day for 2 days. After LL-37 injection, the laser treated group ($n = 15$) were treated with LPND (Candela, Wayland, MA) at 35 J/cm^2, with a pulse duration of 50 milliseconds, and a 10 mm spot. At 48 hours after initial treatment, half of each excised skin sample were stained with H&E and Masson-Trichrome stain for histological analysis and the other half of each skin samples were used to evaluate the mRNA expression levels of procollagen, transforming growth factor beta (TGF-β), matrix metalloproteinase-1,3,9 (MMP-1,3,9), and tissue inhibitor of metalloproteinase-1 (TIMP-1), tumor necrosis factor-α (TNF-α), and interleukin-1α (IL-1α).

Results: LL-37 injection induced typical rosacea features, including erythema, telangiectasia and skin inflammation. Treatment with LPND resulted in a significant reduction of erythema and increased dermal collagen. In addition, the mRNA expression of procollagen-1, TGF-β, and MMPs in laser treated group was

significantly increased compared to that in laser untreated control group.

Conclusion: These results suggest that LPND may improve rosacea by ameliorating dermal connective tissue disorganization and elastosis through MMP-mediated dermal collagen remodeling.

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E9

ZnO NANOPARTICLES AND LASER IRRADIATION AS AN ALTERNATIVE STRATEGY FOR KILLING BACTERIA

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Background: Bacterial infections are a problem in medicine, principally because the bacteria can develop drug-resistant and form biofilms in some implants. Sometimes, these biofilms are almost impossible to eradicate. Therefore, it is necessary to establish noninvasive alternatives to combat infection. Zinc oxide (ZnO) is biocompatible and also has good nonlineal optical properties. These include multi-photonic emission and second harmonic generation which could use for killing bacteria and stimulate photo-drugs. We proposed to use ZnO and laser for induces redox species to combat infection.

Study: We used solution of ZnO nanoparticles and femtosecond laser with wavelength of 1,030 nm and an irradiance of $0.6\,W/cm^2$. We started with a concentration of bacteria (*Escherichia coli* K16) of 104 colonies formation undies (CFU), which were irradiated by 15, 30 and 60 min with and without nanoparticles. Inhibit bacterial growth was measured to quantifying the CFU after 6 hr of irradiation. In addition, we studied the action of nanoparticles and laser light, we used 20,70-dichlorofluorescin diacetate.

Results: Our studies suggest that the combined use of lasers and ZnO yields inhibition of bacterial growth of approximately 90%. The incorporation of nanoparticles offers an additional 20% inhibition when compared to the laser alone which offers up to 70%. The results suggest that nanoparticles generate more redox species that without laser and the laser induces redox species too.

Conclusion: We demonstrate the use of laser light and semiconductor nanoparticles as a potential agent to killing bacteria.

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E10

PHOTOCHEMICAL TISSUE PASSIVATION (PTP) PREVENTS CONTRACTURE OF FULL THICKNESS WOUNDS

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Background: Large surface area wounds, from burns, trauma, or iatrogenic injury, often result in significant scarring and wound contracture as a product of myofibroblast activity in normal wound healing. Photochemical Tissue Passivation (PTP) induces extracellular collagen cross-linking and limits myofibroblast activity. We hypothesized that PTP treatment of wounds would reinforce the wound bed by collagen cross-linking, blunting the fibrotic response, and thereby decreasing contracture and associated morbidities.

Study: Full-thickness, excisional 1×1 cm wounds were created on the dorsa of C57BL/6 mice. Eight dots were tattooed on the skin around the wound perimeter. In the control group, ($n = 16$), wounds were left alone to heal. Treated wounds ($n = 16$) received PTP immediately after wound creation with application of 0.1% solution of Rose Bengal (RB) and exposure to $60\,J/cm^2$ of 532 nm. The area within the tattoo perimeter was serially measured over 6 weeks and percent contracture was calculated. At 7, 14, 21, and 42 days, 4 control and 4 treated mice were euthanized and tissue was harvested for histology.

Results: All wounds were fully healed by the end of the study. Control wounds exhibited almost 20% more contracture by Day 7 ($67.1 \pm 17.1\%$ *vs.* $80.3 \pm 8.5\%$; $p = 0.014$, $n = 16$/group), and over 80% more by Day 14 ($27.8 \pm 8.6\%$ *vs.* 50.3%, $p < 0.05$, $n = 12$/group). Degree of contracture plateaued for both groups by Week 3. By Day 42, wounds had contracted to $13.6 \pm 5.6\%$ in controls and $35.2 \pm 2.9\%$ in treated wounds, a 1.59-fold difference ($p = 0.003$). On histologic review, PTP increased in growth and development of dermal cells, increased vascularity, and appearance of skin appendages earlier and to a greater degree, compared to control wounds.

Conclusion: PTP prevents wound contracture in full-thickness excisional wounds, and improves wound healing. PTP treatment may be applicable for not only for excisional wounds, but also for wounds with a high incidence of contracture and associated morbidity, including adhesions, burns and skin-grafts.

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E11

EXPLORING ANTIMICROBIAL ACTIVITY AND SAFETY OF BLUE LASER LIGHT

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Background: Antimicrobial resistance threatens the effective prevention and treatment of an ever-increasing range of infections. Therefore, alternative antimicrobial strategies need to be developed. A new strategy to control bacterial infections is based on the use of light. The aim of the present study is to evaluate the effect of blue laser light on *Pseudomonas aeruginosa*, which is considered a model for antibiotic-resistant bacteria.

Study: The antimicrobial activity of several diode laser (K-Laser Blue Derma, Eltech s.r.l., Via Castagnole 20/H, 31100 Treviso, Italy) protocols was tested on clinical isolates of

antibiotic-resistant *Pseudomonas aeruginosa* inoculated on Petri dishes and grown in biofilms using Calgary biofilm devices. The following protocols have been tested in blue, red and infrared wavelengths (445, 660, and 970 nm): 200 mW/cm^2 40 J, 300 mWcm^2 40 J, 400 mW/cm^2 40 J, 500 mW/cm^2 40 J, 1 W/cm^2 40 J. Afterwards, a bacterial planktonic growth kinetic experiment was performed evaluating *P. aeruginosa's* wells optical density at several time points after irradiation with the previously described protocols: 0, 6, 12, 18, and 24 hours. Toxicity assays on eukaryotic cells have been performed on oral and skin keratinocytes, lymphocytes, fibroblasts performing direct irradiation with and without growth medium. The temperature changes at irradiation sites were evaluated using a thermographic camera. Finally, bacteria and biofilms have been visualized following laser irradiation using Scanning Electron Microscopy.

Results: Only the blue laser protocols tested showed direct antimicrobial activity on *P. aeruginosa* grown on Petri dishes, biofilms and in planktonic state ($p < 0.0001$). When eukaryotic cells were irradiated with the same protocols, their viability and metabolism didn't show significant changes compared to non-treated controls ($p > 0.05$).

Conclusion: The use of blue laser light seems to represent a promising approach to clear resistant infections not affecting human cell viability. Further investigation is needed to understand its exact mechanism of action and whether it can be applied also to other mucosa and skin pathogens.

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E12

EFFECT OF PRP ON PROLIFERATION AND ALKALINE PHOSPHATASE ACTIVITY OF DENTAL PULP CELLS WITH GaAlAs LASER

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Background: Wound healing and regeneration involves a complex cascade of events including cell proliferation and differentiation. These processes are known to be modulated by growth factors. Application of platelets present in platelet-rich plasma (PRP) has been regarded in the field of dentistry.

Study: In this experimental study, human lower third molar dental pulp cells prepared from Torabinejad Research Center located in isfahan. Cells cultured in culture medium DMEM containing 10% FBS. When cells reached to adequate extent, divided in four groups including PRP, PRP + Laser, Laser, and control for implementation of MTT test and alkaline phosphatase activity test.

Results: Results demonstrated that PRP and PRP + Laser increased cell proliferation and viability up to 3 days but decreased cell proliferation and viability up to 5 days. Laser and control groups significantly demonstrated more cell proliferation and viability than PRP and PRP + Laser groups but were not significantly different among them. Alkaline phosphatase activity was more in PRP + Laser, PRP, and Laser, respectively, which all of them were less than control group.

Conclusion: Laser irradiation can induce cell proliferation and in this field better acted than PRP. However, for assessment of stimulatory effect of Laser and PRP more studies are warranted.

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E13

EFFECT OF LOW-LEVEL LASER OR OCCLUSAL SPLINT USE ON MUSCLE ACTIVITY AND BITE FORCE IN CHILDREN WITH BRUXISM – RANDOMIZED, CONTROLLED TRIAL

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Background: The aim of this study was to evaluate changes in bite force and muscle activity after therapy low-level laser was performed on the masseter and temporal muscles and the use of occlusal splint for children with bruxism.

Study: Forty-eight children were divided into four groups: Group 1—monitoring without bruxism; Group 2—low-level laser therapy; Group 3—occlusal splint; Group 4—monitoring children with bruxism. All children were submitted to initial and final evaluations of bite force and muscular activity. The children in Group 2 were submitted to low-level laser parameters (potency of 70 mW, energy density of 1.675 mW/cm^2, 12 irradiated points, 1 J per radiated point for 20 s, 12 sessions—12 J/session—2 times per week), and Group 3 was treated with occlusal splint therapy for a period of 30 days.

Results: The results were computed and statistical analysis performed using a significance level of 95% ($p \leq 0.05$). Statistically significant differences were found in muscle activity in Group 3 ($p = 0.003$) and bite force in both Groups 2 ($p = 0.001$) and 3 ($p = 0.007$).

Conclusion: The results indicate that the use of an occlusal splinted to a reduction in muscle activity and an increased in bite force in children with bruxism, whereas low-level laser therapy did not alter muscle activity, but provided an increase in bite force in these children.

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E14

STUDY OF PAIN IN YOUNG ADULTS WITH TEMPOROMANDIBULAR DISORDER

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Background: The aim of the present study was to evaluate pain, mandibular movement and electromyographic signal in individuals with temporomandibular disorder (TMD).
Study: Individuals aged 14–23 years were evaluated. The RDC-TMD were performed for the diagnosis of TMD and pain was assessed using a visual analog scale (VAS). The participants were submitted to an electromyographic analysis of the mastigatory muscles bilaterally. The variables were treated using the Studenťs T-test to analyze the difference between the VAS responses in individuals with and without TMD, and the Pearsońs correlation coefficients was used to evaluate the correlation among the variables.
Results: A total of 29 individuals were evaluated, 44.8% ($n = 13$) without TMD and 55.2% ($n = 16$) with TMD. The mean VAS for the right and left temporal muscles were the highest, 3.938 and 4.125, according to participants with TMD. It was possible to observe a statistically significant correlation ($r = -535$, $p = 0.03$) between maximum mouth opening and pain on the right masseter muscle. On lateral movements, it was observed statistically significant correlation between right and left lateral excursion and pain on temporal muscles ($p = 0.04$). The assessment of muscle activity through electromyography during mastication showed a statistically significant correlation between increased muscle activity in the right ($r = 0.652$, $p = 0.006$) and left temporal muscles ($r = 0.6591$, $p = 0.003$) and right masseter ($r = 0.540$, $p = 0.031$) and pain in the right masseter muscle. In isotonic condition the correlation was observed between pain on left ($r = 0.526$, $p = 0.036$) and right ($r = 0.501$, $p = 0.048$) masseter muscles and greater activity in the left temporal muscle in TMD patients.
Conclusion: The greater the pain reported by patients with TMD, smaller mandibular movements and increased muscle activity are presented.

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E15

BOND STRENGTH OF ABRADED AND NON-ABRADED BLEACHED ENAME TO RESIN AFTER ErCr:YSGG LASER IRRADIATION

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Background: The objective of the study was to evaluate the microtensile bond strength (μTBS) of a composite resin to abraded or not abraded bleached enamel after ErCr:YSGG laser irradiation and observe the fracture patterns of the tested interfaces.
Study: Two hundred twenty-eight bovine incisors were sectioned, resulting in 228 enamel blocks ($7 \times 4 \times 4\,mm^3$) that were divided into twelve groups ($n = 19$) according to the factors "adhesion" after bleaching (immediate adhesion; after a 14-days; and a control group with adhesion on unbleached teeth), enamel "abrasion" (with or without abrasion simulating cavity preparation); "laser" (with or without ErCr:YSGG laser irradiation). Bleached enamel groups were treated with 20% carbamide peroxide, 8 hours per day for 21 days. Abrasion was performed with silicon carbide sandpaper. Specimens were restored with adhesive system and a composite resin (Adper Single Bond 2 and Z250; 3M ESPE). After 7 days, specimens were prepared by cutting into 1 mm beans to microtensile bond strength test performed in a universal testing machine. Fracture mode analysis was performed using a stereoscopic loupe. Data of μTBS was statistically analyzed by three-way ANOVA at the 95% confidence level and compared by Tukey post-hoc test ($\alpha = 0.05$).
Results: There was no statistically significant difference for the triple interaction and double interactions between factors. There was no significant difference between the factors "adhesion," "abrasion," and "laser." Statistically significant differences were observed for "laser" factor, the laser irradiation resulted in bond strength values significantly lower than groups that did not receive laser irradiation. All groups had a high percentage of adhesive failures.
Conclusion: Abrasion provided no benefit to bond strength of composite resins to bleached enamel, treatment with the ErCr:YSGG (20 Hz, 0.5 W, $28.29\,J/cm^2$) reduced the bond strength of composite resins to enamel.

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E16

DEVELOPING A SALIVA-BASED ORAL CANCER RISK TEST FOR UNDERSERVED POPULATION IN A COMMUNITY-BASED SETTING

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Background: Long-term goal is to develop a non-surgical technique based on salivary transcriptomic biomarkers in conjunction with Optical Coherence Tomography (OCT) imaging to diagnose and monitor oral premalignancy and ensuing cancer risk in patients with leuko- and erythroplakia. The objective of this study is to identify the relationship between OCT imaging-based biomarkers and salivary transcriptomes involved in deregulation of cell proliferation and inherent death in patients with dysplastic leukoplakia and erythroplakia.
Study: Five patients with dysplastic oral lesions were monitored over 3 months. Lesions were imaged and photographed at 0, 1, and 3 months and saliva was collected. RNAase inhibitor was added to the saliva and centrifuged. Two different RNA extraction protocols were used for mRNAs and miRNAs. To validate four mRNAs, q-PCR was performed with use of an ABI 7500 real-time PCR System. Isolated RNA was reverse transcribed into cDNA by means of RNA-directed DNA polymerase. The resulting cDNA was used for PCR amplification with a PCR mix using primers for each biomarker from Sigma-Genosys. OCT images were scored on

a standard scale of 0–6 and read by a blinded experienced examiner. Histopathology reports were obtained.
Results: Five subjects completed this pilot study. Individual lesions showed considerable internal heterogeneity. OCT image-based diagnoses were in agreement with histopathological diagnosis in 4/5 subjects (kappa value 0.8). In 3/5 subjects, lesions showed progression between visit 2 and visit 3, based on OCT imaging, although clinically the lesions appeared unchanged. In these 3 subjects, changes to mRNA markers IL1B and IL8 were observed, but they were not consistent between patients. This may be due to the considerable heterogeneity of the lesions. In the one patient who had progressed to oral squamous cell carcinoma, raised levels of miR181c and miR181b were identified.
Conclusion: Larger studies are underway to elucidate the role of specific mRNAs and miRNAs as possible predictors for the progression of oral dysplasia. This research was supported by the National Institutes of Health under grant No. P41EB015890 (Laser Microbeam and Medical Program: LAMMP) and No. 1R03EB014852 (National Institute of Biomedical Imaging and Bioengineering: NIBIB), the Beckman Foundation and (National Center for Research Resources: NCRR) and (National Center for Advancing Translational Sciences: NCATS) and NIH under grant No. UL1 TR000153.

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E17

RHINOPLASTY SURFACE PROFILOMETRY USING OPTICAL COHERENCE TOMOGRAPHY

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Background: The sharpness of rhinoplasty instruments is critical to achieving accurate results and reducing complications associated with rhinoplasty. Sharper instruments allow for finer control and manipulation—a rule that applies to the scalpel in soft-tissue surgery, as well as for the osteotome or nasal rasp in cutting bone. Optical Coherence Tomography achieves micrometer resolution imaging, and the ability to precisely assess dulling by measuring the volume loss resulting from use.
Study: Imaging was obtained using a Fourier domain Long Range-Optical Coherence Tomography (LR-OCT) utilizing near-infra-red swept-source laser (central wavelength 1,310 nm), with axial resolution of $\sim$10 μm and full axial range of up to 10 mm. The output light was split by a 90:10 coupler into a sample arm (instrument), and reference arm (mirror), respectively. An acousto-optic modulator was used in the reference arm to generate a carrier frequency of 100 MHz, enabling "long range" axial imaging of targets up to 10 mm away. Flexible, side-view probes were constructed using an optical fiber encased in a torque coil coupled with a Gradient Index Rod (GRIN) lens. The probe was proximally connected to an external rotational motor that allowed for high-speed rotation at 25 Hz and retraction of the probe along the longitudinal surface of the instruments. Instruments were imaged when brand new, and subsequently after each use. Images were processed and then 3D reconstructions were created. Image processing included calculation of cross sectional area of each 2D slice, which were then summed across a consistent vertical cutoff point to determine volume.
Results: In total, eight tungsten carbide nasal rasps (No. 1–8), osteotomes (16 mm), and microosteotomes (6, 4, and 2 mm) were imaged using LR-OCT. Preliminary data shows visualization on 2D slices of volume loss, as well as on 3D reconstructed models for each of the instruments.
Conclusion: LR-OCT may be a useful tool in the quantification of instrument dulling. This may prove beneficial in determining the frequency of instrument recycling for institutions, and may also provide an improvement over scanning electron microscopy in terms of speed for industrial applications.

ePoster - ENT / Dental

E18

LASER-ASSISTED CONTROL OF EPISTAXIS IN HEREDITARY HEMORRHAGIC TELANGIECTASIA: A SYSTEMATIC REVIEW

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Background: Hereditary hemorrhagic telangiectasia (HHT), or Osler–Weber–Rendu disease, is an autosomal dominant disorder which most commonly manifests in the head and neck as recurrent epistaxis. Such episodes significantly impact patients' quality of life and are occasionally life threatening. One effective means of controlling epistaxis involves laser photocoagulation of intranasal telangiectasias. In this report, we systematically review the safety, efficacy, and duration of effect of laser-assisted control of HHT-related epistaxis.
Study: The PubMed and MEDLINE databases were reviewed prior to a publication date of October 2016 to identify articles focusing on laser photocoagulation of HHT-related telangiectasias. Data on sample size, laser type, safety (e.g., complications), efficacy, number of procedures, and duration of treatment effect were collected.
Results: Two hundred and sixty-five articles were identified in the initial search, of which 14 articles met inclusion criteria, accounting for 437 patients. The most commonly used laser was Nd:YAG ($n = 5$), followed by KTP ($n = 3$). In nine studies, treatment was performed under general anesthesia. No complications or deaths from treatment were noted in any of the studies. There was no consistent duration of effect, ranging from 2 to 16 months. In all studies, a majority of patients (>50%) reported improvement in quality of life or severity of disease, though only three studies used validated outcomes instruments, whereas all other studies utilized subjective patient-reported outcomes.
Conclusion: HHT is a lifelong disease, with patients persistently plagued by debilitating epistaxis. Laser photocoagulation of intranasal telangiectasias appears to be overall safe and efficacious in alleviating epistaxis in

HHT patients. There is limited data in optimal choice of laser wavelength, duration of treatment effect, and appropriate outcomes measurement.

ePoster - ENT / Dental

E19

EFFECT OF LED IRRADIATION ON STEM HUMAN EXFOLIATED DECIDUOUS TEETH (SHED)

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Background: Researchers have continually sought methods for maintaining high rates of stem-cell proliferation and viability. However, few reports have addressed the effects of LED irradiation on stem cells from human-exfoliated deciduous teeth (SHED). This study investigated the effects that LED (630 nm, 75 mW, 37 mW/cm^2) with different radiant exposures have on the cell cycle and senescence of SHED.
Study: This study investigated the effects that LED (630 nm, 75 mW, 37 mW/cm2) with different radiant exposures have on the cell cycle and senescence of SHED. Cultures were irradiated with LEDs (2, 4, 8, 16, and 32 J/cm^2). Non-irradiated cultures served as a control. After 24 hours, cultures' cell cycles were evaluated using flow cytometry. The percentage of cells in senescence was determined by counting stained cells (after applying a β-galactosidase cell staining kit) using photographs obtained directly from an inverted microscope.
Results: The cultures irradiated with 2 or 16 J/cm^2 had higher percentages of cells in the synthesis phase than did the control cultures ($p < 0.05$). However, no significant difference in cell senescence was found between the control cultures and the cultures irradiated with 2 or 16 J/cm2.
Conclusion: LED irradiation at 630 nm (75 mW and 37 mW/cm^2) with radiant exposure of 2 and 16 J/cm^2 was capable of inducing a proliferative response in stem cells without causing senescence. Thus, LED may provide a useful tool for modulating SHED in tissue engineering and regenerative medicine.

ePoster - ENT / Dental

E20

MICROLEAKAGE OF "BULK-FILL" COMPOSITE RESIN FOR CLASS II RESTORATIONS TREATED WITH CO2 LASER: AN *IN VITRO* STUDY

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Background: CO_2 laser is able to transmit energy to the dental tissue, making a superficial etching and raising the adhesion force between the tooth and the restorative material. Bulk-fill composites allow layers of until 4 mm, having a simplified application technique.
Study: Twelve human caries-free primary molars were selected and two vertical slot cavities (occluso-mesial and occluso-distal) were prepared. The teeth were randomly divided into four groups ($n = 6$): Group 1—37% phosphoric acid gel etching + Bulk Fill (Shofu Inc.); Group 2—37% phosphoric acid gel etching + Bulk-Fill Flow (Dentsply); Group 3—CO_2 laser irradiation + Bulk Fill (Shofu Inc.); Group 4—CO_2 laser irradiation + Bulk-Fill Flow (Dentsply). The samples were cut longitudinally and immersed in 0.5% methylene blue tracer for 4 hours. The data were analyzed statistically using the nonparametric Wilcoxon test ($p < 0.05$).
Results: Microleakage scores ranged from 0 to 2 in all groups and no statistically significant differences were found among the groups ($p > 0.05$).
Conclusion: No significant difference in microleakage, as determined using dye penetration, was found for the composite resins tested when class II restorations were performed with previous preparation of the cavity using either CO_2 laser etching or 37% phosphoric acid etching.

ePoster - ENT / Dental

E21

DIAGNOSIS OF EARLY OCCLUSAL CARIES IN PRIMARY TEETH BY DEFAULT SCATTERING COHERENT LIGHT SPECKLE

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Background: The detection of incipient lesions of occlusal caries is a difficult task that requires a rigorous examination is commonly used visual and radiographic inspection. Tooth caries induce the mineral loss, alters the optical properties of the affected tissue, so the study of these properties can produce non-invasive and non-destructive methods for early diagnosis of caries lesions. Thus, the objective of this project is to correlate the results obtained by visual examination by ICDAS and the method by coherent light scattering speckle pattern (statistical patterns of optical granules (speckle) generated by sound and injured dental tissues).
Study: Therefore, we used 30 healthy deciduous molar teeth collected from the Biobank Human Teeth, Faculty of Dentistry, University of São Paulo who had carious lesions induced by pH cycling method. The samples were evaluated for making the diagnosis of caries by two methods: ICDAS and speckle pattern of coherent light scattering in the periods after 5, 10, and 15 days.
Results: There is statistical different between scattering speckle image of the sound area when compared to the carious area. However, there was no statistical

difference among the groups in the periods after 5, 10, and 15 days. Results were statistically analyzed using $\alpha = 0.05$ significance level.

Conclusion: We concluded that speckle is able to diagnose early caries lesions and non-cavitied, in contrast of visual evaluation which is more efficient to diagnose older and cavitied lesions.

ePoster - ENT / Dental

E22

EFFECT OF LOW INTENSITY LASER ON THE FUNCTIONAL ACTIVITY OF DENTAL PULP FIBROBLASTS EXPOSED TO EXPERIMENTAL DENTAL ADHESIVE

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Background: The restoring tooth resins do not obtain to adhere to the dental elements, nor of chemical form neither mechanics, the dental adhesives had been developed to be an agent of union between teeth and the resins you polymerized restoratives, in the present time, as many resins how much adhesive they are photopolymerizable, being able itself to use LED or LASER. Depending on the proximity of the dental pulp to the surface to be restored it can unchain an inflammatory process in the pulp of this dental element. Being thus, this work had as objective to evaluate the inflammatory biomodulation of the laser of low intensity (LBI) of diode in cells of dental pulp (fibroblasts) 1 displayed to the adhesive experimental models.

Study: Power 30 mW, area of the beam 0.04 cm^2, time 60 seconds for well and wavelengths 660 and 808 nanometers. The groups will be divided in: Basal group; Laser group 660 nm; Laser group 808 nm; Adhesive group 1; Adhesive group 2; Grupo AD1 + laser 660 nm; Grupo AD1 + laser 808 nm; Grupo AD2 + laser 660 nm; Grupo AD2 + laser 808 nm. The analysis of the levels of cytokines (TNF-α, IL-1β, IL-6, IL-10) was evaluated for ELISA.

Results: We found increased on cytokines levels when using the laser (660 and 808 nm) in relation to the group Adhesive 1 and the laser 808 nm against the Adhesive 2.

Conclusion: We suggest that the adhesive with increased permeability (Adhesive 2) causes less activation of fibroblasts possibly helping in the resolution of inflammation and tissue repair.

ePoster - Fat

E23

EVALUATION OF A PROTOTYPE LARGE CUP CRYOLIPOLYSIS APPLICATOR FOR FAT REDUCTION IN THE ABDOMEN

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Background: Previously, a cryolipolysis flank study compared a traditional medium applicator to a prototype cooled cup applicator and showed equivalent efficacy with greater tolerability and reduction in duration. This abdomen study investigated a similar cooled cup applicator with a modified large parallel plate vacuum applicator.

Study: A prototype large volume cryolipolysis cup applicator was used to treat $n = 20$ subjects bilaterally in the abdomen. A traditional applicator for 60-minute treatment (T60) was compared to the prototype for 45 minutes (P45) and the prototype for 60 minutes (P60). Treatment efficacy was evaluated by MRI, calipers, and blinded photo review. Safety was evaluated by recording incidence of device- and/or procedure-related adverse events. Subject surveys were administered 12 weeks' post-treatment.

Results: Independent review from three blinded physicians found 77% correct identification of baseline photographs for T60, 88% for P45, and 85% for the P60. Mean procedural pain scores (0–10 scale) were 4.2 for T60, 2.2 for P45, and 2.1 for P60; one week post-treatment, pain scores were 3.7 for T60, 1.9 for P45, and 1.5 for P60; all pain scores were 0 by 4-week follow-up. Subject surveys revealed 100% satisfaction and 80% visible fat reduction for T60; 89% satisfaction and 84% visible fat reduction for P45; 78% satisfaction and 89% visible fat reduction for P60. Caliper measurements revealed statistically significant reduction from baseline ($p < 0.0003$) but insignificant differences between applicator conditions T60, P45, and P60 ($p > 0.05$). Thus, similar efficacy was shown between the prototype and traditional applicator conditions. Surveys showed that of those with a preference, 91% preferred P45.

Conclusion: For all study conditions, cryolipolysis was shown to be safe, effective, and well-tolerated. The prototype 45-minute condition was shown to have improved tolerability and patient preference with similar efficacy to the traditional applicator.

ePoster - Fat

E24

PARADOXICAL ADIPOSE HYPERPLASIA FOLLOWING CRYOADIPOLYSIS REFRACTORY TO TUMESCENT LIPOSUCTION

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Background: Current vacuum-assisted cryoadipolysis technology utilizes controlled thermal diffusion to take advantage of the intrinsic cold-sensitivity of subcutaneous adipocytes, leading to safe, non-invasive localized fat reduction. Adverse events after cryoadipolysis are typically mild and transient. Paradoxical adipose hyperplasia (PAH) is a recently reported adverse event from cryoadipolysis that represents a delayed increase in adipose tissue localized to the treatment site and has been reported to improve with liposuction.

Study: We present a case of PAH post-cryoadipolysis of bilateral upper abdominal folds.
Results: Although tumescent liposuction was performed as corrective therapy, clinical recurrence of PAH occurred within several months.
Conclusion: PAH post-cryoadipolysis is not yet well understood, but may be a local subcutaneous tissue response to hypoxia or reduced sympathetic innervation.

ePoster - Fat

E25

EVALUATION OF THE SAFETY OF A NOVEL 1,060 nm DIODE LASER

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Background: Novel methods of non-invasive fat reduction are becoming more popular as patient expectations and demands increase. With any new modality, the potential for unknown adverse events is a concern. This study sought to evaluate the safety over a one year period for a novel 1,060 nm diode hyperthermic laser for non-invasive lipolysis.
Study: One hundred and thirty-six number of patient records were reviewed at a single site for this retrospective study. Patients ranged in age from 18 to 72 years. The minimum BMI treated was 22 and the maximum treated was 32. Eighty-two percent of patients were female and 18% were male. All skin types I–VI were treated over the course of the year.
Results: The most common side effect observed was mild tenderness in the treatment area, which was transient in nature for all patients. Other side effects included nodules (11%), edema (5%), Erythema (2%), Hardness (4%), and bruising (1%). All of these were mild and transient in nature, and resolved without intervention. There were no instances of burns, paradoxical hyperplasia, or shelving.
Conclusion: Evaluation of patient records indicate that there were no moderate or severe adverse events in this analysis. Mild adverse events were all transient in nature and caused insignificant impact to the patients. Use of a 1,060 nm diode laser appears to have a high safety profile for non-invasive lipolysis.

ePoster - Fat

E26

ANALYSIS OF FAT REDUCTION USING ADVANCED IMAGING TECHNOLOGY FOLLOWING NON-INVASIVE 1,060 nm DIODE LASER TREATMENT

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Background: Various modalities have been utilized to treat unwanted fat non-invasively for the purpose of body contouring as an alternative to surgery in order to avoid potential complications and downtime. The 1,060 nm diode laser has recently been shown to treat unwanted fat (Katz, Bass, et al., ASLMS 2015). This study is designed to analyze patients treated for unwanted fat with the 1,060 nm diode using multiple systems compiling visual three-dimensional evidence and physician grading.
Study: Fifteen patients, aged 20–62 enrolled to undergo treatment with the 1,060 nm diode laser. Treatment areas included arms, back/bra fat, and male breast (gynecomastia). Two treatments were performed at 6 week intervals, and patients had follow up visits at 1.5 and 3 months after final treatment. Three-Dimensional Photography was taken at each treatment and follow-up visit and was used to grade clinical improvement. Image grading was completed by one dermatologist and one plastic surgeon using a Global Aesthetic Improvement Scale.
Results: Evaluation at the 6-week follow-up visit showed 3 patients (20%) very much improved, 9 (60%) improved, and 3 (20%) had no change. Graders were able to correctly identify the pretreatment image in 12/15 patients. Patient satisfaction showed 1 patient (6.7%) extremely satisfied, 10 (66.7%) satisfied, and 4 (26.6%) slightly satisfied. Thirteen patients (86.7%) indicated they would recommend the procedure. There were no adverse events. At time of submission, not all patients have completed 12 week follow up, but those that had reported high levels of satisfaction and photography indicating significant improvement in contour.
Conclusion: When analyzed using advanced imaging sources, the degree of body contouring with the 1,060 nm diode laser is visible and shows significant reduction in fat.

ePoster - Fat

E27

CRYOLIPOLYSIS FOR NONINVASIVE CONTOURING OF THE PERIUMBILICAL ABDOMEN WITH A NON-VACUUM SURFACE APPLICATOR

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Background: Although most cryolipolysis treatments are performed with vacuum applicators, patients may have areas of fibrous, non-pinchable fat or find the vacuum suction to be uncomfortable. This study evaluates a non-vacuum conformable surface applicator for cryolipolysis of the periumbilical abdomen.
Study: A commercially available non-vacuum cryolipolysis applicator was used to treat the periumbilical abdomen of 20 enrolled subjects in a single-center clinical trial. Each subject underwent a single treatment cycle delivered at -13°C for 75 minutes, with an optional second treatment performed 10 weeks later. Treatment efficacy was evaluated by blinded review of clinical photographs. Safety was evaluated by recording the incidence of device- and procedure-related adverse events. Subject surveys were administered 10 weeks after each treatment session.

Results: Twenty subjects completed one treatment, of which six subjects underwent the optional second treatment. Independent review from three blinded physicians demonstrated 77% correct identification of baseline photographs after one treatment session. The correct identification rate improved to 100% after a second treatment. Patient questionnaires after one treatment revealed that 50% of subjects were satisfied, with 60% willing to recommend the procedure and 60% reporting visible fat reduction. Following a second treatment session, however, 100% of subjects were satisfied, 83% were willing to recommend the procedure, and 100% reported visible fat reduction. There was no device- and procedure-related serious adverse events reported.
Conclusion: Cryolipolysis with a non-vacuum conformable surface applicator is safe, effective, and well tolerated for non-invasive reduction of fibrous periumbilical abdominal fat. The study data demonstrates that treatment efficacy and subject satisfaction with two treatments is significantly greater than with a single session.

ePoster - Fat

E28

MULTISOURCE PHASE CONTROL RF COMBINED WITH PULSED VACUUM FOR CIRCUMFERENCE AND CELLULITE REDUCTION, A PRELIMINARY STUDY

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Background: Increased abdominal and thighs circumference are a growing concern among our patients. Cellulite appears mostly in women and consists of changes in fat cell accumulation together with poor blood circulation and disturbed lymphatic drainage. The first noninvasive treatments for body contouring were based on suction systems that were thought to enhance lymphatic drainage and improve microcirculation. In the second generation of these devices, bipolar RF or IR light emission were added to the suction mechanism enhancing blood flow in the treated area. Limitation of these devices was the tissue penetration of both IR and bipolar RF. In contrast to bipolar (or "multipolar" RF that uses one RF generator, multisource phase control RF (3deep) uses six RF generators simultaneously allowing deeper tissue penetration without the need of active surface cooling. Thermal studies of this handpiece have shown heating of 52°C at the depth of 26 mm. In this pilot study, we investigated the efficacy of a novel treatment handpiece that combines multisource RF and pulsed vacuum suction massage.
Study: Ten subjects were enrolled in this pilot study. All subjects were treated with a multisource RF/vacuum massage handpiece. The treatment areas were buttocks, thighs, abdomen and flanks. Treatment protocol included weekly eight treatments. All patients were photographed before the first treatment, after four treatments and one month after the eight treatment at a standard distance and illumination. Weight and circumference measurements were recorded at each visit.
Results: Treatment was painless. No adverse events were reported during and after the treatments. Circumference measurements have showed reduction in treated area. B&A photos indicate on an improvement in skin laxity and texture as well as reduction in cellulite appearance.
Conclusion: This pilot study investigated the efficacy and safety of a new body shaping handpiece. Preliminary data shows high efficacy for both circumference reduction and cellulite without pain or other adverse effects. Large-scale study is needed to further evaluate the treatment efficiency and long-term results.

ePoster - Fat

E29

EFFECTIVITY OF A FIELD RADIOFREQUENCY AND THERAPEUTIC TARGETED VIBRATIONS COMBINED TREATMENT FOR FAT REMOVAL

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Background: Non-invasive body shaping as one of the youngest segments of the aesthetic medicine is currently booming. There are several respected technologies including lasers, ultrasound, cryolipolysis, therapeutic targeted vibrations and radiofrequency (RF). Effect of these devices is based either on cooling or overheating of the subcutaneous adipose tissue (SAT). However, quantum of scientific evidence seems to be in favor of the heat induced fat reduction. Also, hyperthermia techniques are well-established in other medical fields such as oncology. Primary objective of this study is to evaluate efficacy and safety of a contactless RF device in combination with a vibration device. The RF device has already been proven effective by several studies including evidence of thermally induced apoptosis. The vibration device is expected to improve the effect of the thermal therapy by increasing local blood circulation and stimulating lymphatic system.
Study: Twenty-two subjects (with BMI < 30) enrolled for this study out of which 21 absolved four treatments by RF device and vibration device. One subject did not finish the treatments for reasons not related to the study. Changes in waist circumference and SAT thickness were measured at the baseline and 3 months after the last treatment. During the study course weight and hydration of subjects were controlled.
Results: Average waist circumference reduction was 5.26 ± 1.22 cm. Ultrasound showed an average 3.97 ± 1.03 mm statistically significant ($p < 0.05$) reduction in SAT thickness. Subjects reported overall satisfaction with the results and mentioned its positive effect on the abdominal skin laxity.
Conclusion: Obtained results suggest a positive influence of the vibration device on the efficacy of the therapy.

Measured data were more significant and consistent than after single RF device therapy (the least measured reduction in waist circumference 2.5 cm, no non-responders). Results of waist circumference decrease correlated with the observations of SAT thickness reduction.

ePoster - Fat

E30

THREE-DIMENSIONAL STEROPHOTOGRAMMETRY FOR MEASURING VOLUMETRIC CHANGES IN SUBMENTAL CRYOLIPOLYSIS

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Background: High-resolution three-dimensional stereophotogrammetry offers unparalleled advantages in objective and detailed skin contour characterization, quantification, volumetric and surface area analysis. This study aims to illustrate the benefits of three-dimensional sterophotogrammetry through analysis of non-invasive fat reduction of the chin using cryolipolysis.
Study: Retrospective analysis was performed of selected patients who underwent treatment with cryolipolysis (Zeltiq) between February and June 2016. The benefits of three-dimensional sterophotogrammetry (Canfield Scientific) are presented.
Results: Using principles of image triangulation, six high resolution images are captured simultaneously and a stereo processing algorithm identifies corresponding details in the images to calculate three-dimensional surface coordinate points. As an aggregate, the resulting tens of thousands of coordinate points are used to construct dimensionally accurate surface models. Prior studies have validated three-dimensional sterophotogrammetry as having high precision and reproducibility. This study presents high-quality three-dimensional images to illustrate changes in submental volume, height difference, degree of submental lift and surface area reduction, thereby exemplifying the broad applicability of this imaging technique.
Conclusion: Three-dimensional sterophotogrammetry technology provides clinicians with enhanced options that extend beyond simple two-dimensional photography. The technology has a range of applications including analysis of various skin lesions such as hypertrophic and keloid scars, skin surface and volumetric changes as well as detailed skin contour, surface depth, height and roughness analysis. This study illustrates the benefits of the technology for measuring volumetric changes in submental cryolipolysis. In addition to pre/post-treatment comparative assessments, three-dimensional sterophotogrammetry can aid in practice marketing as well as patient-physician consultation rapport, planning and improved patient satisfaction.

ePoster - Fat

E31

REVIEW OF MAUDE DATABASE ON EFFICACY AND SAFETY OF CRYOLIPOLYSIS

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Background: A cryolipolysis device has been cleared by the United States (US) Food and Drug Administration (FDA) since September 2010 for subcutaneous fat reduction of the flanks, abdomen, thighs, submental region, bra fat, back, and banana rolls (infra-gluteal folds). This device has gained popularity and is now available in over 70 countries for treating patients of all ethnicities.
Study: A systematic review of the peer-reviewed literature and review of relevant reports to the FDA Manufacturer and User Facility Device Experience (MAUDE) database was performed. Two reviewers assessed reports for relevance and eliminated duplicates using forced agreement.
Results: As reported in the literature, cryolipolysis is typically well-tolerated with mild edema, erythema, bruising, pain, and transient numbness during treatment that resolves without intervention after several days. Uncommon adverse effects include persistent or late-onset pain and the development of paradoxical adipose hyperplasia (PAH) of treated areas. One case of prolonged neuropathy was reported. Despite the concern that cold injury to melanocytes may result in dyschromia, there has only been one report of pigmentary abnormality following treatment with cryolipolysis. Among 83 entries for the search term "Zeltiq" on the MAUDE database, 75 were identified as unique reports (see Table 1). Approximately 33% of all unique entries reported two or more adverse events. The most commonly reported adverse events were the enlargement of the treated area (52.0%), followed by induration (38.7%), hernia (16.0%), pain/dysesthesia (12.0%), unfavorable contour (6.7%), and weight gain (2.7%). There was one report each of cerebral aneurysm, incarcerated hernia, deep vein thrombosis, skin laxity, fascial laxity, ineffectiveness, edema, erythema, and hyperpigmentation.
Conclusion: In conclusion, cryolipolysis has been well-documented in the literature to be effective at reducing subcutaneous adipose tissue in different areas and skin types/ethnicities. Adverse effects, including pigmentary changes, are rare with cryolipolysis.

ePoster - Fat

E32

EXPERIMENTAL AND NUMERICAL EVALUATION OF TRANSCUTANEOUS LASER LIPOLYSIS WITH 1,064 nm Nd:YAG LASER IN HUMAN SUBJECTS

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Background: The aim of this study is to experimentally and numerically evaluate the minimally invasive transcutaneous lipolysis in human subjects in order to improve understanding of the procedure.
Study: Transcutaneous laser lipolysis was performed in three healthy volunteers. The irradiated area was approximately $10 \times 10\,cm^2$. During the procedure, irradiance of $0.6–1.4\,W/cm^2$ was used for 4–7 minutes using a 1,064 nm Nd:YAG laser. Two irradiation scenarios were considered: Without and with forced air cooling during irradiation. The skin surface temperature was continuously recorded with an infrared camera, and the diffuse reflectance spectrum (DRS) of skin in the 400–1000 nm spectral range was measured before and after the irradiation. A one-dimensional model of the treatment was developed taking into account light and bio-heat transport, including effects of perfusion. The model was used to fit the measured data in order to determine physiological parameters of the irradiated area, and to evaluate the procedure by varying the treatment and physiological parameters.
Results: Increased perfusion during laser lipolysis as detected from the measured temporal evolution and modeling was found to have a considerable influence on the procedure. The increased perfusion resulted also in the change of the diffuse reflectance spectrum indicating significant change of the blood volume.

A good agreement between the model and the measurements is obtained.
Conclusion: The measurements and the numerical model show that an appropriately high irradiance must be used during laser lipolysis in order to overcome the cooling effects of perfusion. The developed numerical model can be used to optimize temperature distribution within irradiated tissue for improved treatment outcome.

ePoster - Fat

E33

LOW-LEVEL DIODE LASER THERAPY FOR FAT REDUCTION TREATMENT

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Background: A large number of patients currently seek minimally invasive aesthetic options for fat reduction treatments, especially in the abdominal region. Although lipoplasty is still sought, the risks, financial costs, and the down time associated with this surgical procedure have led to the development of a number of non-surgical techniques for body contouring. Among these techniques is low-level laser therapy with the non-surgical, low-level diode laser device (Chromogenex, United Kingdom).
Study: The objective of this paper is to evaluate the abdominal fat reduction achieved in patients submitted to low-level diode laser therapy in a private clinic. In this study, thirty patients were evaluated clinically by the measurement of waist circumference and through photography taken before each laser session, weekly during the treatment. Their follow up occurred 1, 2, and 3 months after completing the treatment, a course of eight sessions done twice a week for 4 weeks.
Results: The study showed a clear improvement in body contouring and a variation of circumference reduction in the abdominal region from 3 to 12 centimeters in all patients. The results were maintained 3 months after the treatment was finished, with positive evaluation of the treatment and satisfaction of all patients.
Conclusion: The low-level diode laser device system is a low-level diode laser therapy that reduces measurements but not weight and improves the aspect of body contour. The results of this study confirm that treatment with the low-level diode laser is safe and effective in reducing the fat layer in the abdominal area, as it is a non-invasive painless treatment that does not interfere with patients' daily activities.

ePoster - Fat

E34

A NOVEL ALGORITHM TO OPTIMIZE PEAK DOSIMETRY FROM A 1,060 nm DIODE LASER FOR SUBCUTANEOUS FAT REDUCTION WHILE MAINTAINING PATIENT COMFORT

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Background: To develop an optimization algorithm using a 1,060 nm hyperthermic diode laser for non-invasive lipolysis to achieve the balance between maximizing clinical endpoint while minimizing patient discomfort.
Study: Thirty-five areas (flanks, lower abdomen, upper abdomen, periumbilical, and/or thighs) on 27 patients were treated with a minimum of three applicators per treatment with a 1,060 nm diode laser. After the 4-minute heat build cycle at $1.1\,W/cm^2$, the energy output was incrementally increased by $0.05\,W/cm^2$ based on patient tolerance and time intervals were recorded. End energy achieved was grouped into low settings ($0.9–1.05\,W/cm^2$), moderate settings ($1.10–1.25\,W/cm^2$), or high settings ($1.30–1.40\,W/cm^2$). Patients were evaluated for level of improvement on a five-point scale, where zero is no improvement and four is excellent improvement and results were correlated to the level of energy achieved during treatment. Adverse events were also recorded.
Results: 68.6% of patients were able to tolerate high energy output of $1.3–1.4\,W/cm^2$, while 22.9% tolerated moderate settings and the remaining 8.5% were able to only tolerate lower settings. Overall, 85.7% of the 35 areas treated achieved moderate to excellent improvement. Of the good to excellent treatment outcomes, 87.5% of these patients were treated within the high setting parameters. There were four cases of minor induration, all of which resolved without intervention by 6 weeks and all occurred in patients with higher settings. No other adverse events were observed.
Conclusion: With proper patient selection and incremental increases in energy, a 1,060 nm hyperthermic laser is

well tolerated at higher settings through an incremental increase in energy, resulting in greater patient tolerance and what appears to be a greater clinical reduction of localized subcutaneous fat. Although the n value is low, further evaluation would be warranted in comparing lower and higher settings and clinical results.

ePoster - Imaging

E35

MULTIPHOTON MICROSCOPY FOR *IN VIVO* IMAGING OF ALOPECIA

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Background: The detection and classification of alopecia generally requires confirmation by histological diagnosis. Histological samples require biopsy, which is an invasive procedure, with potential complications for patients such as pain, infection, and poor cosmetic outcome. MPM is a nonlinear laser scanning microscopy technique that features high three-dimensional resolution and label-free molecular contrast. Several endogenous tissue components can be visualized, including collagen (through second-harmonic generation), NADH, FAD, keratin, melanin, and elastin fibers (through two-photon excited fluorescence). The purpose of this study was to demonstrate the capability of MPM to image *in vivo* different types of alopecia and identify diagnosis criteria.

Study: This study utilized a multiphoton tomograph (JenLab GmbH, Germany). Nine subjects with the diagnosis of androgenetic alopecia, alopecia areata, frontal fibrosing alopecia and two healthy subjects were recruited from the dermatology clinics at the University of California, Irvine. All patients gave written consent according to an approved institutional review board protocol.

Results: We detected the following features associated with androgenetic alopecia and alopecia areata (non-scarring alopecia): (1) Miniaturization of the hair shaft, (2) widening of follicular spaces, and (3) superficial sebaceous glands. In frontal fibrosing alopecia cases (scarring alopecia), we detected changes in arrangement and orientation collagen and elastic fibers; these changes correspond to perifollicular fibrosis seen in histology.

Conclusion: Our data highlights important parameters for the evaluation of alopecia with MPM. These include differences in hair shaft and follicular diameter as well as variations in the quality of the collagen and elastic fibers. Visualization of sebaceous glands in the papillary dermis was a key finding in miniaturized follicular units in androgenetic alopecia cases. This study highlights the possibility of MPM to diagnose alopecia by non-invasive means as well as the ability to monitor *in vivo* hair follicle response to treatment.

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COMPARISON OF 311 nm Ti:SAPPHIRE LASER VERSUS 308 nm EXCIMER LASER TREATMENT FOR VITILIGO: A PROSPECTIVE, RANDOMIZED, CONTROLLED, NON-INFERIORTY TRIAL

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Background: The 308 nm excimer laser (EL) has been widely used for localized vitiligo. Recently, the 311 nm Ti: Sapphire laser (TSL) was developed following the peak spectrum of NBUVB (311 nm).

Study: A randomized controlled non-inferiority trial based on split-body was performed to compare the efficacy and safety of TSL *vs.* EL in the treatment of vitiligo. The paired symmetric vitiliginous lesions were randomized to TSL or EL treatment groups. All lesions were treated twice weekly for a total of 12-week period. The degree of repigmentation was assessed as percent from baseline by using a computer program every 4 weeks, and the non-inferiority margin was set at 10%.

Results: A total of 20 patients, aged 23–79 years, were enrolled. Seventy-four paired lesions were assigned to EL group ($n = 37$) or TSL group ($n = 37$). Until now, 29 paired lesions complete the 12-week trial, and the interim analysis of the last observation was conducted. The mean difference between two groups (EL minus TSL) was -4.431%, and the 95% confidence interval (from -16.011 to 7.149) was lower than the non-inferiority margin (10%). No serious adverse effect was observed in either group.

Conclusion: The present study demonstrated that 311 nm TSL was as effective as 308 nm EL in the treatment of vitiligo. TSL treatment was tolerable with similar profiles of adverse effects of excimer laser treatment, and has some advantages including deeper penetration by the 311 nm wavelength and the use of a solid medium with reduced maintenance costs.

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E37

CLINICAL EVALUATION OF A NON-ABLATIVE MONOPOLAR RADIOFREQUENCY DEVICE FOR TREATMENT OF FACIAL RHYTIDS AND SUBMENTAL LAXITY – AN INVESTIGATIONAL STUDY WITH 60 SUBJECTS

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Background: Radiofrequency (RF) technology has been extensively used to address wrinkle and cellulite reduction, treatment of hyperhidrosis, and even subcutaneous adipolysis. RF induced neo-collagenases results in improvement of skin texture which, in turn, may result

improve appearance of the facial and neck skin. A monopolar RF device was evaluated for safety and efficacy in this study for the treatment of facial rhytids and submental laxity.

Study: A total of 60 patients ages 32–70 years have received a single to 7 treatment on the face (6 imprints) and submentum (5 imprints) using the A monopolar RF device with a 16 cm^2 handpiece. Patients enrolled in the study were treated with a target temperature range of 44–45°C with no overlap. Clinical improvement of treatment areas was independently determined by two masked assessors. Photographic evaluations were performed at baseline, immediately after treatment, at 3 months after treatment. Patient satisfaction metrics were also obtained at each follow-up visit.

Results: Significant improvement of facial rhytids and submental laxity was observed in majority of the patients. Patient satisfaction scores paralleled the clinical improvements observed. Most common immediate and expected clinical effects were erythema and edema lasting anywhere from an hour to as long as 3 hours.

Conclusion: Bulk dermal heating using a 16 cm^2 handpiece can be safe and effective to treat facial rhytids and submental laxity.

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DIRECT LASER-INDUCED BACTERIAL INACTIVATION

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Background: With the quick spread of antibiotic resistant bacteria, photodynamic therapy (PDT) and the use of nanoparticles are among the most popular bacterial inactivation strategies. Nonetheless, mechanisms of PDT resistance similar to those in drug resistance have been found by several authors, and there exists a toxicity concern over the use of certain metallic nanoparticles. We demonstrate a bacterial inactivation technique by ultrashort pulse direct-laser irradiation that does not require any external agent.

Study: In our study, near-infrared femtosecond laser pulses at 92 MHz repetition rate were used to irradiate solutions of distilled water with a wild strain of *E. coli* (BL21). Samples contained a significant number of cells (~10^7 cell/ml), which remained in constant movement during treatment with the help of a magnetic stirrer in order to promote bacteria-light contact.

Results: Our results show that if the peak power density and treatment time are chosen correctly, these cells can be inactivated with fluences per pulse as low as ~1 mJ/cm^2. A 7-log10 reduction was observed when irradiations were performed using an average power of 350 mW during 2.5 hours but not less; average power can be reduced down to 200 mW whilst keeping such effectiveness.

Conclusion: The methodology described in this work eliminates the requirement to supply cells with therapeutic agents while still achieving remarkable pathogen reduction. Fluorescence microscopy characterization is currently underway to identify the type of damage being caused to the cells by either individual high peak power density or by incubation effects due to the high repetition rate delivery of pulses.

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THE PAST, PRESENT, AND FUTURE OF LASER THERAPY FOR TOENAIL ONYCHOMYCOSIS

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Background: Onychomycosis is a fungal nail infection primarily caused by dermatophytes, non-dermatophyte molds and yeasts. Conventional treatments (systemic and topical antifungals) are not always effective. Lasers provide an alternative option for patients, as they theoretically elicit fungicidal effects through selective photothermolysis, but in practice, produce mixed results. Current FDA approval stipulates lasers are to be used to temporarily increase the amount of clear nail. The objective of this work is to compare laser-induced improvement rates for toenail onychomycosis to conventional therapies and FDA approved indications.

Study: A literature search (PubMed, Clinicaltrials.gov, Medline and Embase) produced 21 eligible studies for review. Eligible studies included RCTs, non-randomized, uncontrolled and retrospective studies with at least one of the following outcome measures; complete cure, mycological cure, clinical cure, or clinical improvement.

Results: Most laser studies were non-randomized, uncontrolled, non-blinded studies. Mycological cure (negative culture and negative microscopy) was evaluated in two studies using patients as the unit of analysis with an average rate of 11%; mycological cure increased to 63% (3 studies) when nails were used as the unit of analysis. A clinical cure (100% clear nail) of 13% was found across studies regardless of the unit of analysis used. Clinical improvement (at any time point) was found in 36% of patients (5 studies) and 67% of nails (9 studies). An increase in clear nail at 12 weeks was found to be 2.6 mm across onychomycotic nails in monotherapy studies.

Conclusion: Published studies of laser therapy provide preliminary evidence of clinical improvement and clear nail growth in toenail onychomycosis, consistent with FDA approval. Currently, efficacy rates for medical endpoints do not equal or exceed those for conventional therapies. Future laser studies should contain standardized endpoints and follow FDA recommendations.

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CHALLENGES OF LASER ASSISTED DRUG DELIVERY FOR THE TREATMENT OF PALMOPLANTAR DERMATOLOGIC CONDITIONS

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Background: Topical drug delivery is hindered by the stratum corneum, which is much thicker on palmoplantar surfaces. Fractional ablative lasers, such as the carbon dioxide (CO_2) laser, have been studied in regards to laser assisted drug delivery. Per literature review, few small trials have been conducted to deliver drugs to the palms using fractional CO_2 laser. In this proof-of-concept study, we measure the depths created by this laser using various settings, as visualized through histopathology.

Study: A fresh human cadaveric hand was obtained from the anatomy department for this study. Fractional CO_2 (Lumenis, Santa Clara, CA) was used to create channels at five different active energy settings ranging from 80 to 200 mJ and five different deep energy settings from 20 to 150 mJ, all with a spot size of 10 um and densities ranging from 10 to 25%. A skin specimen was removed from each site using a 4-mm punch tool (Miltrex, York, PA) and subsequently stained with hematoxylin–eosin (H&E). The vertical channels were then measured under 10× zoom.

Results: Utilizing active fractional CO_2 settings of 80, 100, 120, 150, and 200 mJ, the lengths of the channels created on all samples measured 0.31 mm on average, which approximated the width of the stratum corneum. With the deep settings of 20, 40, 60, 100, and 150 mm, the following respective vertical lengths were measured on average: 0.28, 0.56, 1.59, 1.69, and 1.64 mm.

Conclusion: The lowest setting that penetrated the stratum corneum, creating a vertical channel of 0.56 mm, is the deep fractional setting at a fluence of 40 mJ and density of 25%. This also correlated with serous discharge on the cadaveric palmar hand during the laser procedure. The next step is to study these settings on human palmar skin, followed by application of topical medications.

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LASER THERAPY IN XANTHELASMA PALPEBRARUM: A SYSTEMATIC REVIEW OF THE LITERATURE

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Background: Xanthelasma palpebrarum is a benign periorbital xanthoma with substantial cosmetic and psychosocial burden for patients. Treatment modalities should be considered based on efficacy as well as cosmetic outcome. Laser modalities in the treatment of xanthelasma palpebrarum have not been comprehensively reviewed and discussed. Accordingly, the present study seeks to systematically and critically review the available literature discussing laser treatment of xanthelasma palpebrarum.

Study: PubMed was systematically reviewed for reports on laser therapy in the treatment of xanthelasma palpebrarum.

Results: A total of 21 studies were included in this review discussing laser treatment of xanthelasma palpebrarum. Laser types included carbon dioxide, yttrium aluminium garnet, pulsed dye, argon, and a 1,450 nm diode laser. The carbon dioxide laser was the most commonly reported modality followed by yttrium aluminium garnet laser. All of the laser modalities offered moderate to excellent clearance rates with minimal side effect profiles.

Conclusion: Further large scale studies comparing different laser modalities is required to determine the best laser modality. However, laser modalities as a whole offer a treatment an option for xanthelasma palpebrarum that is cosmetically excellent with a reasonable side effect profile.

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LASERS FOR ONYCHOMYCOSIS – CASE SERIES

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Background: In the armamentarium of available treatment strategies for onychomycosis, lasers have recently been explored as viable treatment modalities for this common nail pathology. The FDA has currently approved the 532 nm, 630–680 nm, short pulse 1,064 and 1,320 nm Nd:YAG lasers, Q-switched Nd:YAG 1064 nm laser, 870/930 nm combination and 980 nm diode lasers for the treatment of onychomycosis. Although the literature evaluating the efficacy of lasers on treating onychomycosis is scant, additional treatment options include ultraviolet (UV) light, photodynamic therapy (PDT), the femtosecond infrared titanium sapphire 800 nm laser, the 1319 infrared laser, BroadBand Light from a filtered flash lamp, and ablation with the CO_2 laser. Additional randomized controlled trials should be conducted to evaluate the efficacy of lasers in treating onychomycosis.

Study: Patients were treated with 980 nm diode laser therapy for toenail fungus with a range of 1–13 treatments in our clinic.

Results: Although there was some clinical improvement with proximal nail clearance, no patients experienced complete clearance.

Conclusion: Lasers and light therapies are exciting and upcoming treatment options for the treatment of onychomycosis. We are presenting our experience with the use of lasers for treatment of onychomycosis as a starting point for the discussion of this challenging condition to treat.

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LASERS FOR SKIN CANCER – CASE REPORT

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Background: Skin cancer is the most common cancer affecting humans and its incidence is on the rise. Rogers et al. (2010) reported that the current estimate of incidence of non-melanoma skin cancer (NMSC) in the US is ~3.5 million cases a year affecting ~200 million people. This equates to ~4 million office visits per year for NMSCs. With such a significant burden of disease, cost-effective therapeutic options that offer patients a high cure rate with minimal down time and risk of side effects, as well as a favorable cosmetic outcome are always being sought. Lasers have recently found applications in the treatment of skin cancer. Basal cell carcinomas (BCC) in particular are characterized by a capillary-like vasculature that supports and maintains tumor growth and progression. Lasers that specifically target these superficial telangiectasia are thought to decrease tumor burden or eliminate the tumor altogether with minimal damage to surrounding tissue. Lasers may be particularly effective for patients who cannot tolerate the inflammatory side effects of topical agents, those who are poor candidates for surgery, and those with multiple cancerous lesions.

Study: We are presenting a patient with a history of numerous BCCs primarily of the lower extremities, presenting with three new lesions. Biopsy of each lesion showed superficial BCC. These lesions were treated with the 595/1064 nm multiplex laser for a total of three sessions at 1 month intervals. One month after final treatment, excision of the remaining lesion was performed and examined for residual BCC.

Results: After treatment, one lesion showed no evidence of residual BCC and two lesions demonstrated superficial BCC with clear margins.

Conclusion: Our patient showed a good response in 1 out of 3 BCCs treated. While lasers have been shown to be safe and effective options for the treatment of BCC in certain clinical settings, the combination of 595/1,064 nm did not appear to be effective for this patient. However, more research is needed to confirm these observations, and to optimize the treatment parameters.

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E44

A 66-YEAR-OLD WOMAN WITH PHAKOMATOSIS PIGMENTOVASCULARIS

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Background: A 63-year-old woman presented in 2012 with significant pigmentation as well as vascular changes present since birth, consistent with phakomatosis pigmentovascularis type II. Outside workup by both ophthalmology and neurology revealed bilateral cataracts, vertigo, Meniere's disease, and left hemifacial spasms.

Study: Examination noted mottled blue/black pigmentation on the face, arms, chest, shoulders, upper back, and lateral thighs. Deeply erythematous plaques on the left cutaneous upper lip, right mandible, back, and left leg. MRI of the chest revealed no internal vascular malformations. Patient was referred for laser therapy with a series of laser treatments over the course of 1 year.

Results: Under topical anesthesia and local/regional nerve blocks, treatments using Q-switched (QS) Ruby (694), QS Alexandrite (755), and Nd:YAG (1064) for the pigmentation changes on the face and long pulsed 595 nm pulse dye laser and long pulsed Nd:Yag (1,064 nm) to the vascular malformations on the left upper lip, right mandible, and left calf. Patient has undergone 12 treatments to date with significant improvement.

Conclusion: Phakomatosis pigmentovascularis type II, is the most common of the subtypes of this group of disorders with a combination of vascular malformations and melanocytic or epidermal nevi. Types II presents with nevus flammeus and dermal melanocytosis. Associated systemic findings may include intracranial and visceral vascular anomalies, ocular abnormalities, choroidal melanoma, bilateral deafness, malignant hypertension, and hemihypertrophy of the limbs. Interdisciplinary treatment is essential in patients with systemic involvement. The appearance of vascular nevi can be improved with the use of pulse dye laser, while that of pigment nevi can be ameliorated with Q-switched lasers.

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E45

THE SYNERGISTIC EFFECT OF LIDOCAINE AND HYPERTHERMIA AS A NEW POTENTIAL TREATMENT FOR RAPIDLY GROWING LESIONS SUCH AS WARTS AND EPIDERMAL NEOPLASMS

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Background: Cutaneous warts affect 2.4–12.9% of the general population. Current treatments for warts are often ineffective and painful. Hyperthermia at 44°C has been utilized as a more tolerable treatment option but is limited to an efficacy of ~50%. Lidocaine, a local anesthetic, has been shown to sensitize cells to hyperthermia resulting in an increased cell killing of several tumor cell lines. Our hypothesis is that more rapidly dividing cells, such as HPV transformed cells in warts or cancer cells, are more susceptible to lidocaine-hyperthermia combined treatment compared to resting cells.

Study: We evaluated four human keratinocyte cell lines, including primary, spontaneously transformed, and HPV transformed lines, as well as a fibroblast cell line in different cell cycle stages (resting *vs.* proliferating). Cells

were pre-incubated with lidocaine in a range of 0–0.4% for 20 min prior to heating for 10 minutes at temperatures ranging from 37 to 44°C. Cell viability, apoptosis, and cell cycle were assessed 24 h after heating.

Results: Our results demonstrate that lidocaine enhances hyperthermia-induced cell killing of keratinocytes and fibroblasts in a dose-dependent manner. There was no significant difference in the susceptibility of proliferating keratinocyte cells lines to treatment, with viability loss of >90% after preincubation with 0.4% lidocaine in combination with heating at 44°C. In contrast, confluent cell cultures were significantly more resistant to cell killing. Cell killing was mediated by apoptosis and was cell cycle dependent with rapidly proliferating cells being more susceptible to this combined treatment.

Conclusion: With further investigation, this may provide a new therapeutic modality for cutaneous warts and epidermal neoplasms.

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LASER AND LIGHT THERAPY OF DISSEMINATED SUPERFICIAL ACTINIC POROKERATOSIS: A SYSTEMATIC REVIEW

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Background: Disseminated superficial actinic porokeratosis (DSAP), the most common of the clinical variants of porokeratosis, is an autosomal dominant cutaneous disorder of keratinization with a 7.5–10% rate of malignant transformation. Treatments of DSAP are poorly standardized, thus a wide variety of therapeutic interventions are utilized for long term management of this progressive disorder, with varied efficacies.

Study: A systematic review of light and laser treatment modalities was conducted to include 26 cases of patients with DSAP. All cases presented with multiple lesions on various sun exposed areas of the skin, with the greatest presentation on the legs and arms. These lesions were slow-growing, with an average of 9.9 years from initial presentation to treatment. All cases were treated with various forms of light and laser therapy modalities with varied levels of successful outcomes and lesion remission.

Results: Daylight photodynamic therapy overall was the least successful treatment modality, with clinical improvement seen in a minority of patients (MAL-PDT, N = 9, 33.3%; ALA-PDT, N = 3, 0%; hypericidin-PDT, N = 2, 0%) after numerous post-procedural side effects of hyperpigmentation, inflammation, erythema and discomfort. Overall, PDT demonstrates poor outcomes with greater incidence of side effects in the available reports. Response rates of DSAP lesions treated with lasers were as follows: (Q switched ruby lasers, N = 2, 100%; CO_2 laser, N = 1, 100%; PDT and CO_2 combination therapy, N = 2, 0–50%; Erbium and neodymium YAG lasers, N = 2, 100%; fractional 1,927-nm thulium fiber lasers, N = 2, 100%; Genz rays, N = 1, 100%; and fractional photothermolysis, N = 2, 100%). Side effects of laser therapy were minimal and included mild erythema, slight hyperpigmentation, and moderate edema.

Conclusion: Laser therapy is a promising treatment option for DSAP with an excellent side-effect profile. However higher power studies are required to determine optimal guidelines for laser treatment of DSAP.

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A NOVEL METHOD OF TREATING INTRAVASCULAR PAPILLARY ENDOTHELIAL HYPERPLASIA, LITERATURE REVIEW AND CASE REPORT

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Background: Intravascular papillary endothelial hyperplasia (IPEH) or Masson tumor is a benign tumor of cutaneous or subcutaneous vessels. IPEH is generally not considered as a distinct clinical manifestation. It is a reactive condition with unique histopathological features due to endothelial cell organization and re-canalization around thrombosis. IPEH is classified as a primary type if intravenous thrombosis occurs, or a secondary type if it involves other vessel types or vascular neoplasms, such as cavernous hemangiomas, glomuvenous malformations (glomangiomas), spindle cell hemangiomas or pyogenic granulomas. IPEH mostly affects young adults with an average age of 34, but cases in children have also been reported. Treatment modalities described in the literature include surgical excision, sclerotherapy prior to excision with sodium tetradecyl sulfate, and treatment with the daily oral beta blocker, nebivolol.

Study: A 50-year old female presented with a 3-year history of an asymptomatic slowly growing lesion on the left malar cheek at the lid-cheek junction. She denied antecedent trauma to this area. Her past medical history was remarkable for hypertension and osteoarthritis. Clinical examination showed a dome-shaped non-friable somewhat pedunculated violaceous 7×7 mm vascular papule on a 5×5 mm base (Figure 1a). After infiltration with local anesthesia, the plaque was debulked using a flexible blade and the base of the lesion was treated with four non-stacked pulses of a Nd:YAG laser with settings of 3 mm, 30 ms, 250 J with a treatment endpoint of hemostasis and mild purpura (Cynosure, Inc., Wesford, MA).

Results: Clinical follow-up seven months after the treatment revealed a diminutive slightly pink and atrophic scar without evidence of recurrence of the Masson tumor. The patient was extremely pleased with the outcome and declined the offer for additional treatment to improve the color and texture of the scar.

Conclusion: The long-pulsed Nd:YAG laser has been used to treat a number of vascular malformations and neoplasms, including port wine stains. The mechanism of the Nd:YAG treatment of vascular lesions is thought to be

vessel destruction as a result of heating. A detailed review of the published literature did not reveal prior description of the treatment of Masson's tumor with surgical debulking and Nd:YAG laser treatment of the base and this may be a treatment approach worthy of further investigation.

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TOPICAL BRIMONIDINE TO REDUCE POSTOPERATIVE ERYTHEMA AFTER IPL-TREATMENT OF FACIAL TELANGIECTASIAS

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Background: Lasers and intense pulsed light (IPL) are standard symptomatic treatments of superficial telangiectasias, but associated postoperative erythema may cause patient discomfort. The objective is to investigate whether topical brimonidine attenuates IPL-induced erythema in patients with moderate to severe facial telangiectasias.

Study: A randomized, dual-centre, single-blinded, intra-individual, split-face controlled clinical trial on brimonidine *vs.* no treatment (control) in 20 patients treated in Denmark ($n = 10$ patients) and Belgium ($n = 10$). Brimonidine was applied to the allocated side and incubated for 30–60 minutes after each of three facial IPL-treatments scheduled at 3-week intervals. Patients were assessed at each treatment and at follow-up visits the day after the first treatment and at 1 month after the final treatment. Assessments included blinded clinical on-site evaluation, objective erythema-score quantified with an imaging system and safety.

Results: Interim-analysis on data from first 10 patients completing the study indicated that topical brimonidine slightly reduced IPL-induced erythema-score by 19% compared to control (11.3 *vs.* 14.9; $P = 0.037$, first treatment). Clinical on-site evaluation was in favour of brimonidine, but did not reach significance ($P = 0.313$, first treatment). Based on a validated five-point scale: $0 = 0\%$ vessel clearance and $4 = 75$–100% (excellent response), all patients received an excellent reduction in telangiectasias after three IPL-treatments. Finally, no side effects were reported in association with brimonidine. Complete study data will be presented.

Conclusion: Preliminary data suggest that topical brimonidine may reduce IPL-induced erythema to a minor extent.

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E49

SAFETY OF LASER GENERATED SHOCKWAVE TREATMENT OF BACTERIAL BIOFILM INFECTIONS

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Background: Chronically infected wounds frequently harbor bacterial biofilms, which prevent effective penetration of antibiotics, and may often only be treated with mechanical debridement. Laser generated shockwave (LGS) therapy is a novel selective debridement therapy for biofilm disruption. Previous studies have demonstrated the efficacy of LGS in disrupting biofilms *in vitro*. In this study, we aim to determine the safety of the LGS technology in an *in vivo* rodent model.

Study: The dorsal skin of Sprague–Dawley rats was shaved and a surface area covering $5 \times 3\,cm^2$ was treated with LGS. Settings for LGS were based on a 1,064 nm Nd:YAG laser (pulse duration 9 ns) with laser fluence of $110.14\,mJ/mm^2$. Following treatment, skin samples were excised and histologic analysis was performed to assess for tissue injury or inflammation. The treatment group consisted of 18 rats ($n = 6$/each for 1-hour post-treatment, 24-hour post-treatment, 72-hour post-treatment). An additional four control (untreated) rats were included in the analysis.

Results: No gross injury was noted for any of the samples when compared to control. On histologic analysis, no evidence of thermal or mechanical tissue injury or inflammatory response was noted.

Conclusion: LGS appears to be safe for the laser energy settings shown to be effective against bacterial biofilm *in vitro*. No gross or microscopic injury to normal tissue was noted following treatment. This lends further support to the overall safety profile of LGS and serves as a bridge towards *in vivo* efficacy studies.

ePoster - PDT

E50

THE ANTIMICROBIAL EFFECT OF PHOTODYNAMIC THERAPY ON THE SURFACES OF DENTAL IMPLANTS – *IN VITRO* PILOT STUDY

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Background: When treating peri implantitis, the decontamination of the implant surfaces is one of the main goals. The use of photodynamic therapy, has emerged as a new and potentially efficient decontamination method. The aim of this study was to determine the antimicrobial effect of photodynamic therapy using two different light sources on dental implants contaminated with anaerobic bacteria.

Study: For this pilot study, 12 titanium dental implants were used. The implants were put into bacterial suspension prepared from three different bacteria: Prevotella

intermedia, Aggreggatibacter actinomycetemcomitans and Porphyromonas gingivalis. for 72 hours in anaerobic conditions. After contamination, the implants were divided into three groups (two treatment groups and one control group). The implants belonging to the first treatment group were coated with a toluidine based photosensitive dye for 60 seconds, and then treated for 60 seconds with a light source with 660 nm wavelength, and 320 μm fiber tip (*Hager & Werken*). The implants belonging to the second treatment group were coated with methylene blue based photosensitive dye for 60 seconds, and then treated for 60 seconds with a light source with 660 nm wavelength, and 3D Pocket Probe (*Bredent Medical*). The negative control group did not receive any treatment. After treatment, the implants were placed into test tubes containing 2 ml phosphate buffered saline, they were vortexed for 60 seconds and 200 ul from each tube was spread into Columbia agar plates for 72 hours. Colony Forming Units (CFU) were counted and the data were compared to the control group.

Results: The results show that there is statistically significant bacterial reduction in both treatment groups: >99% bacterial reduction; $p < 0.05$, however there is no statistically significant difference between the two treatment groups ($p > 0.05$).

Conclusion: Based on our study, antimicrobial photodynamic therapy can achieve significant decontamination of the implant surfaces, however the total resolution of the bacteria is not achieved.

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E51

PR-PDT, OPTIMISATION BY NAFL AND IPL WITH 5ALA LIPOSOMIAL SOLUTION

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Background: Topical photodynamic therapy (PDT) is acknowledged to be a safe and efficient therapeutic option for the selective destruction of actinic keratosis and superficial carcinomas. Over the past 15 years, topical PDT has also been shown to be a possible method for "photorejuvenation."

Study: We treated one of our patients with a combination of intense pulsed light (IPL), 5-aminolevulinic acid (ALA)-mediated photodynamic therapy (PDT) and a non-ablative fractional laser in the treatment of photodamaged skin. First a full pass with a non-ablative fractional photothermolysis laser (wavelength 1,550 nm) was performed. The patient's face was then subsequently moistened every 5 minutes during 1 hour with an ALA 0.5% ALA liposomal solution. This treatment was then followed immediately by 5 passages of a IPL treatment (400 nm, 5 J/cm^2, 30 ms). Fluorescence measurements (FluoDerm) were performed during and after the treatment.

Results: Patient satisfaction with the treatment was high and the treatment did not lead to any unexpected side effects. Erythema and edema lasted as expected for several days. We find this technique delivers better improvement than if any of the laser and light treatments are performed alone.

Conclusion: The photodynamic rejuvenation technique seems to show excellent efficacy and tolerability. A prospective, split face clinical trial investigating the efficacy with objective outcome measurements of the described procedure is currently conducted at our center.

ePoster - PDT

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ASSESSMENT OF CLINICAL EFFECTS OF PHOTODYNAMIC THERAPY IN THE TREATMENT OF HALITOSIS IN BRONCHIECTASIS PATIENTS: A PILOT STUDY OF A RANDOMIZED CONTROLLED CLINICAL TRIAL

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Background: The association between oral health and chronic obstructive pulmonary disease (COPD) has been widely studied and the aspiration of oral resident microorganisms is one of the most accepted mechanisms for pulmonary exacerbation. Bronchiectasis has many clinical similarities with COPD, but to date the oral health of these patients has not been studied. Since halitosis has been reported in these patients and the decrease in oral microbial load may contribute to the reduction of these exacerbations, the objective of this study was to evaluate the clinical effect of photodynamic therapy (PDT) in the treatment of halitosis in bronchiectasis patients.

Study: Bronchiectasis patients and healthy ones diagnosed with halitosis (>112 ppb) were included in the study. Patients were divided into two groups: G1—experimental (bronchiectasics patients) undergone photodynamic therapy (PDT) applied to the posterior two-thirds of the dorsum of the tongue ($n = 12$) and G2—control group (healthy patients) was realized exactly the same treatment ($n = 12$). Gas chromatography were used for the diagnosis of halitosis at baseline and after PDT treatment through the analysis of three volatile sulfur compounds. A single session was performed with methylene blue photosensitizer (0.005%) applied to the middle and posterior thirds of the dorsum of the tongue. After 5 minutes a total of six points were be irradiated (660 nm, 100 mW, 320 J/cm^2, and 9 J/ 90s per point).

Results: Comparisons were made using the Mann Whitney test, with the level of significance set at 5% ($p < 0.05$). After PDT treatment, there was a reduction of halitosis ($p < 0.001$), as there was an increase in sulfur compounds (Hydrogen sulphide). In the evaluation of the dimethylsulphide and methylmercaptan gases there was no difference between the groups ($p > 0.001$).

Conclusion: It is concluded that PDT was effective in the treatment of halitosis in bronchiectasis patients for hydrogen sulphide, found in the coated tongue.

ePoster - PDT

E53

BP NEURAL NETWORK PREDICTS THE THERAPEUTIC REGIMEN AND PROGNOSIS OF PHOTODYNAMIC THERAPY FOR THE TREATMENT OF PORT WINE STAIN

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Background: The diagnosis and treatment of port wine stain (PWS) is still in the stage of relying on expert experience. This paper used back propagation artificial neural network (BP-ANN) algorithm to give treatment regimen such as the dosage of photosensitizer, laser power density and irradiation duration, and prediction of therapeutic effect using Matlab software for photodynamic therapy (PDT) treatment of PWS.

Study: Enrolled were 875 PWS clinical cases, 700 cases acted as training set and 175 cases were acted as test set. Based on BP-ANN algorithm of Matlab platform, the input variables were age, sex, body weight, pathological type, previous treatment plan and treatment site, and the output variables were the dosage of photosensitizer, laser power density, irradiation time and evaluation of the curative effect. The predictive data of output variables were compared with the actual test data.

Results: The correct rate of treatment regimen such as photosensitizer dosage, laser power density, and irradiation time, and evaluation of the curative effect could reach 75% using BP-ANN of Matlab platform for PDT treatment of PWS.

Conclusion: BP-ANN algorithm can be used for the determination of therapeutic regimen such as the dosage of the photosensitizer, laser power density and irradiation duration, and prediction of the therapeutic effect in the PDT of the PWS. It provides an assistant treatment strategy for an experienced doctor and a treatment guidance for an inexperienced doctor, and finally provide a final decision making system for PDT treatment for PWS.

ePoster - PDT

E54

EXCESSIVE CUTANEOUS PHOTOTOXICITY FROM PHOTODYNAMIC THERAPY WITH AMINOLEVULINIC ACID

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Background: Photodynamic therapy with 5-aminolevulinic acid (ALA-PDT) is a safe and effective treatment option for a growing number of cutaneous conditions, including acne vulgaris, chronic photodamage, and actinic keratosis. Phototoxicity is a common self-limited adverse event following ALA-PDT, peaking at 1–2 hours post-irradiation and resolving within 1–2 weeks.

Study: We report a case of a 27-year-old male who experienced severe, prolonged phototoxicity due to significant sunlight exposure immediately following a single session of ALA-PDT for the treatment of acne vulgaris and photodamage.

Results: Contrary to posttreatment instructions, the patient subsequently exposed the treated areas to sunlight for 5 hours, leading to intense erythema, extensive desquamation, and a painful sterile pustular eruption.

Conclusion: The need to avoid all contact with sunlight, remaining indoors at least 6 feet away from windows during daylight hours, for 2 days posttreatment should be clearly stressed during the pre-treatment informed consent process in order to avert this preventable severe adverse event.

ePoster - PDT

E55

CLEARANCE OF PAPULOPUSTULAR ROSACEA WITH PHOTODYNAMIC THERAPY USING COMBINATION LIGHT SOURCES AND PRE-INCUBATION NONABLATIVE FRACTIONATED LASER RESURFACING

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Background: Papulopustular rosacea is an inflammatory subtype of rosacea characterized by centrofacial persistent to episodic papules and pustules with background erythema. It usually affects middle-aged men and women and can impair their quality of life. Anti-inflammatory topical medications and second-generation tetracycline oral antibiotics have generally been the mainstay of therapy. Laser and light therapies can also be used to target existing erythema, telangiectasias, and inflammatory lesions. ALA-PDT (photodynamic therapy with aminolevulinic acid) is a more recent treatment option for papulopustular rosacea.

Study: Given that ALA-PDT can significantly improve the inflammatory component rosacea and pre-treatment non-ablative fractionated laser resurfacing (NAFL) enhances transcutaneous delivery of topical ALA, we treated a patient with recalcitrant papulopustular rosacea with ALA-PDT using pre-treatment NAFL.

Results: ALA-PDT using pre-treatment NAFL and combination light sources led to complete resolution of inflammatory lesions and improvement in background erythema following two sessions 3 months apart.

Conclusion: This case highlights a novel, alternative approach to rosacea treatment that may be useful for patients refractory to more conventional treatments.

ePoster - PDT

E56

INCORPORATION OF THE METHYLENE BLUE PHOTOSENSITIZER IN THE PRESENCE OF GLUCOSE IN STRAINS OF CANDIDA ALBICANS WITH MULTIDRUG EFFLUX SYSTEMS

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Background: Infectious diseases are responsible for 60% of deaths in developing countries. Candida albicans cause severe infection in immunocompromised patients and the commonly used treatments have not been effective against microbial resistance. Photodynamic therapy (PDT) is a new promising strategy to microbial inactivation based on the use of photosensitizer (PS) in the presence of oxygen and activation by light to form reactive oxygen species. C. albicans has glucose sensors which could facilitate the entrance of the PS. The objective of this study was to evaluate the role of glucose in the photodynamic inactivation of C. albicans.

Study: C. albicans ATCC 10231, YEM 12, YEM 13, YEM 14, and YEM 15 were aerobically grown on Sabouraud agar and incubated at 30°C for 24 hours. Microbial inoculants were divided into 4 groups with and without glucose: Control; Only irradiation; PS toxicity and PDT groups with three irradiation times. After going through the treatments, the colony-forming units were counted and the data were subjected to statistical analysis (ANOVA) and Tukey test. To measure the concentration of MB, fluorescence spectroscopy and flow cytometry were used.

Results: We observed that yeast with overexpression of Major Facilitator Superfamily membrane pore tend to accumulate more MB in its cytoplasm, whereas strains that overexpress ABC pumps demonstrated the greater survival against the photodynamic challenge.

Conclusion: PDT is an efficient strategy against C. albicans and the presence of glucose can intervene in the photodynamic effect. The presence of MB in the intracellular region of the yeast predisposes to greater photodynamic inactivation, however, its germicidal capacity is related to the type and characteristics of the microbial.

ePoster - Photobiomodulation

E3

PHOTOBIOMODULATION IMPROVES CHRONIC PAIN: CASE REPORT ABOUT FRACTURE OF THE HUMERUS IN AN ELDERLY MAN

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Background: The occurrence of trauma in the elderly increases significantly upon the growth of this population. Every year approximately 650 thousand new elderlies are incorporated into the Brazilian population. Falls, common in the elderly, has been a factor of high mortality, in which fractures are the main consequence of functional impairment. The trauma in the elderly is considered a public health problem and presents relevant significance, since disabling outcomes may occur, injuries and chronic pain. It is estimated that proximal humeral injuries are common, accounting for 10% of fractures of the entire body and 70% of fractures in the humerus. This report aims to describe the evolution of Photobiomodulation performed in an elderly man patient with fracture of the humerus.

Study: The 85-year-old patient diagnosed with a consolidated humerus fracture sequel, presence of arthrosis, reporting very high pain, Visual Analogue Scale (VAS) = 9 for 3 years. The patient performed conventional physiotherapy from the date of the injury, but without significant pain improvement. Therefore, he went through a Photobiomodulation protocol and physiotherapeutic exercises. Light Emitting Diode (Bright Photomedicine, Brazil) of wavelength 850 nm, power 400 mw, time 300 s, Energy 120 J and LED Cluster size 10 cm^2 with continuous mode was used. The total treatment was 16 sessions, four times a week.

Results: Patient progressed with pain reduction (VAS = 2) since first Photobiomodulation application. Besides, the patient returned to his daily life activities.

Conclusion: Photobiomodulation showed to be a safe treatment, with no side effects in elderly patient with consolidated humerus fracture sequel.

ePoster - Photobiomodulation

E57

EFFECTS OF LOW-LEVEL LASER THERAPY ON GAIT ANALYSIS OF WISTAR RATS POST PERIPHERAL NERVE INJURY

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Background: Clinically, a peripheral nerve injury (PNI) is not life-threatening to the individual, however it may generate a negative impact on life due to the possibility of motor or sensitive disorders by incomplete regeneration. Low-level laser therapy (LLLT) has demonstrated positive effects on treatment of PNI, especially on time and quality of neuromuscular repair. To analyze the effects of LLLT on the functionality of Wistar rats post crush injury of sciatic nerve (SN). The objective of this study is to analyze the effects of LLLT irradiation on nervous and muscle repair after crush injury of the sciatic nerve.

Study: A total of 85 Wistar rats were used, randomly divided into five groups: Control, Injury (crush of SN), Injury + LLLTn (LLLT on PNI area), Injury + LLLTm (LLLT on muscle area), and Injury + LLLTnm (LLLT both in PNI area and muscle area). The laser treatment

was initiated 2 h after PNI with LLLT (780 nm, 0.04 cm^2, 1 W/cm^2, 3.2 J) on PNI area (20 J/cm^2, 0.8 J per point, 4 points), and/or on muscle area (10 J/cm^2, 0.4 J per point, 8 points). At the end of the experimental period, the gait analysis was performed using the sciatic functional index (SFI), tibial functional index (TFI) and peroneal functional index (PFI), data were subjected to statistical analysis (ANOVA/Tukey, $p < 0.05$).

Results: All injured groups (Injury, Injury + LLLTn, Injury + LLLTnm and Injury + LLLTm) in SFI, TFI, and PFI, after 1 week showed a decrease of gait functionality when compared to Control group. After 2 weeks, the Injury group showed a decrease of gait functionality when compared to Control group, moreover, the Injury + LLLTn group demonstrated an increase on gait functionality when compared to Injury group considering the TFI and PFI evaluation. After 3 and 4 weeks, there was no statistically significant difference between all groups.

Conclusion: LLLT increased the gait functionality analyzed by TFI and PFI 2 weeks post PNI.

ePoster - Photobiomodulation

E58

THE EFFECTS OF PHOTOBIOMODULATION IN ORAL SQUAMOUS CELLS CARCINOMA CELL LINES

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Background: The most common malignant tumor of the oral cavity is the oral squamous cell carcinoma (OSCC). The treatment of this tumor involves surgery, chemotherapy and/or radiotherapy. These therapies can cause mucositis which is an inflammatory disease in the oral and gastrointestinal mucosa. Treatments for mucositis are palliative and the low-level laser therapy (LLLT) has been reported to reduce oral mucositis successfully, although some controversy exist regarding the effects of this therapy on tumor cells that may remain in the mucosa after treatment. The aim of this study was to analyze the effect of LLLT (using recommended parameters for mucositis treatment) on the proliferation of cell lines derived from human tongue squamous cell carcinoma (SCC9, Luc4, CA1).

Study: The cultures were irradiated with laser InGaAlP diode (660 nm) and GaAlAs diode (780 nm) (MM Optics) and plated (5×103 cells/well) in 96 well plate. Non-irradiated cells were used as control. Three independent experiments were performed in triplicate. After 3 and 5 days the cultures were evaluated by neutral red assay.

Results: Laser irradiation (780 nm, 70 mW, 4 J/cm^2, and 660 nm, 70 mW, 4 J/cm^2) did not increase the proliferation of SCC9 and Luc4 cell lines when compared to non-irradiated cell lines. CA1 cells irradiated with red laser showed a slightly increase in the proliferation rate in relation to non-irradiated cell on day 3, although no significant difference was observed.

Conclusion: The use of LLLT in the dosimetric parameters recommended for mucositis treatment and in the experimental conditions and periods evaluated here, was not able to increase the proliferation of the OSCC cell lines, suggesting that this therapy may be considered in the future as an alternative tool for mucositis treatment in head and neck patients.

ePoster - Photobiomodulation

E59

L.A.S.E.R PRINCIPLES AND A SYSTEMATIC REVIEW OF RECENT ADVANCES IN BURNS AND PLASTIC SURGERY

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Background: In 1900, Max Planck proposed that light consists of discrete bundles of energy, 1905 Einstein refined the quantum hypothesis giving the name photon to the quantum of light energy. It was not till 1958 when Townes and Schawlow worked on this theory and developed the principle of the LASER. A LASER beam is created when electrons of a medium are made to change energy status. Depending of the change of energy status this could result in either spontaneous emission or stimulated emission. The produced light has unique characteristics that will differentiate it from other light; monochromatic, coherence, collimation, and of focused intensity. Common medical laser based on their medium, gas; argon, carbon dioxide, Excimer. Solid; Nd:YAG, KTP, Alexandrite, Ruby.

Study: Pubmed (US National Library of Medicine, National Institutes of Health) search performed. All searches were limited to publication dates 01/01/2012–01/01/2017.

Results: PRIMSA 2009 Flow chart, this yielded 732 studies, 87 were eligible for review.

Conclusion: Discussion: Carbon Dioxide laser has been used with photodynamic therapy for the successful treatment of BCC, and has shown equivalent cure rates to surgery, with a low recurrence rate <3%. It has been suggested by a case study that there may be associated metaplastic changes to areas treated with laser, which could suggest the need for further biopsy in cases of local recurrence. In burns, the use of ablative fractional carbon dioxide laser therapy and pulsed dye laser therapy has shown significant lasting improvement of hypertrophic scarring. As a result, a substantial drop on the Vancouver scar scale. In the field of scar management and rejuvenation, the use of both CO_2 and Nd:YAG as ablative fractional laser and non-ablative, have demonstrated superior results in scar management, and skin

tightening through stimulation of collagen production. Multiple recent studies have reported the use of diode lasers in aesthetics for use in lipoplasty, lipolysis, and treatment of vascular/pigmented lesions in aesthetically sensitive areas. Laser technology continues to rapidly advance, and is niche market in a multitude of surgical specialties.

ePoster - Photobiomodulation

E60

EVALUATION OF SENSORY-MOTOR RESPONSE TO LOW-LEVEL LASER THERAPY FOR THE TREATMENT OF SPINAL INJURIES

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Background: Spinal cord injuries have become increasingly frequent due mainly to the increase in urban violence. The growing number of automobile collisions and violence-related events merits particular attention, as such occurrences can lead to death or disability stemming from a spinal injury. According to the American Spinal Injury Association (ASIA), a spinal cord injury can be either complete or partial and leads to a reduction in or loss of motor, sensory or anatomic function due to the impairment of neuronal elements within the spinal canal. Unfortunately, injured neurons of the central nervous system are unable to regenerate following a spinal injury and spinal cord regeneration is therefore a major challenge to researchers in the fields of neuroscience and neurology. According to McDonald et al., the best treatment for a spinal injury is that which both diminishes the repercussions of the injury and stimulates the repair process. Low-level laser therapy (LLLT) has proven to be a possible option for the stimulation of the repair process in the central nervous system.

Study: A randomized, controlled, clinical trial. The volunteers were assigned randomly to a control group or treatment group. Evaluations were conducted before and after the intervention using electromyography of the myotome corresponding to the injured spinal nerve root. The treatment group received LLLT according to the protocol outlined below: Wavelength of 808 nm, Twelve sessions (three per week over four weeks), 983 J/cm^2 per session, with a treatment area of 4.72 W/cm^2 and total radiant energy of 25 J. The MIF questionnaire (Measure of Functional Independence) and WHOQOL-BREF were applied before and after the laser intervention. The data were tested for normality by the Kolmogorov–Smirnov and not being parametric Kruskal–Wallis test was applied for comparison between groups and a Wilcoxon test for comparison between before and after in the same group. The level of significance used in all tests was $p < 0.05$.

Results: There was no significant difference between laser and control in any of the questionnaires when analyzed post intervention. There was significance in the laser group when applied questionnaire MIF because before the score was 106.50 [94.00–111.00] and then became 111.00 [104.00–114.25] ($p = 0.02$). These are values of median [interquartile range].

Conclusion: Although still partial data, we conclude that the laser has shown to be a promising tool for use in patients with spinal cord.

ePoster - Photobiomodulation

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LOW-TEMPERATURE AGEING OF TRANSPARENT NANOCRYSTALLINE YTTRIA-STABILIZED-ZIRCONIA CALVARIUM PROTHESIS

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Background: Optically transparent ceramics can be used to replace regions of the skull. Transparent cranial implants enable direct visibility of the brain without additional craniotomies, and can both deliver and collect light from the brain repeatedly. Transparent nanocrystalline yttria-stabilized-zirconia (YSZ) calvarium prosthesis have transformative potential: Facilitating the optically based study of neural circuits that underlie behaviour and cognition and enabling laser-based diagnostics/therapy of neurological disorders and brain pathologies. Low-temperature ageing affects the transparency of implants due to microstructurally crystal transformation (from a cubic to a monoclinic phase) caused by water infiltration through the surface. The volumetric expansion due to this conversion results in microcracks on the ceramic surface.

Study: The experiments utilized YSZ ceramic samples containing 6 and 8 mol% yttria. The ageing simulation was conducted in a steam bath at a 134°C temperature (using a pressure vessel and thermostated oil bath ± 0.4°C) under 2 bar. The later monoclinic content then was measured by an X-ray diffraction (XRD) technique and was calculated from the modified Garvie and Nicholson equation.

Results: Comparing the XRD results after 100 hours of 6YSZ and 8YSZ ageing process shows changes in the 6YSZ surface crystal structure whereas it shows stability of the 8YSZ sample. At the initial stage of the ageing process (up to 15 hours), the monoclinic fraction remains close to 0%. However, longer experiments show that the first modified grain propagates and transforms other grains with microcracks forming around them. Then, conical spots cover the entire surface which results in saturation of the monoclinic content. Lastly, after saturation of the surface, the cracks proceed inside the ceramic, in the bulk of the material.

Conclusion: Future directions of this experiment include optical studies of ageing effects on implants such as polarization and transparency in different wavelength.

ePoster - Photobiomodulation

E62

THERMOGRAPHY AND REDUCTION OF ULCER IN DIABETIC FOOT AFTER PHOTOBIOMODULATION: CASE REPORT

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Background: Approximately 11% of the population over 40 has diabetes mellitus (DM), totaling 415 million diabetics in Brazil and the world. Due to chronic neuropathy, some patients end up developing severe, infected skin lesions, dehiscence and amputations. There is a huge effort to establish new supporting methods for treating these diabetic lesions. Photobiomodulation (PBM) has shown promising advances in the cicatrization of chronic lesions, particularly in regards to diabetic foot issues. We find in our regular clinic various evaluation methods which demonstrate the cicatrization process of lesions treated with lasers; these methods include photographic records and the monitoring of skin surface temperature. Then, the objective of this study is to verify, via thermography and reduction area, lesion evolution in diabetic foot after PBM.
Study: This is a case report, male patient, H.H., 59-years old, DM type II, diabetic foot history of 1 year conventional outpatient treatment, with an open lesion after late transmetatarsal amputation of the left foot. The proposed treatment consisted of cleaning the wound, followed by irradiation with 660 nm laser, 100 mW, 4 J, 40 s (DMC, Brazil) once a week, applied by point with 1 cm between the points in the edge of the wound. After all the radiations, thermographic images and photographs were taken, ImageJ software (public domain) was used to measure the areas.
Results: On the first day of PBM the average lesion temperature was 34.8°C and an area of 26.52 cm^2. On the 7th day of laser application the average temperature of the ulcer was 32.6°C and the area equal to 15.60 cm^2. After the 14th application temperature was reduced to 31.6°C with an area of 12.43 cm^2. After 28 days of PBM the average temperature was 30.7°C and an area of 10.78 cm^2; reducing to 4.41 cm^2 and 79.57% of the area cicatrized after 96 days of treatment.
Conclusion: Clinically there was an improvement in pain and inflammation, corroborating the reduction in temperature and lesion size. More patients are being monitored so as to conduct a randomized controlled trial of temperature variations and lesion area in diabetic ulcers.

ePoster - Photobiomodulation

E63

EFFECT OF LOW-LEVEL LASER THERAPY ON THE MITOCHONDRIAL ACTIVITY OF ORAL SQUAMOUS CELL CARCINOMA CELL LINES

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Background: The oral squamous cell carcinoma (OSCC) represents 95% of the tumors of oral cavity. The treatment options include surgery, chemotherapy and/or radiotherapy and are associated with several side effects, as mucositis, which is characterized by inflammatory lesions of oral and gastrointestinal mucosa that causes a lot of pain to the patient, compromising the continuity of the treatment. To minimize these effects and to prevent mucositis, low-level laser therapy (LLLT) has been used in many hospitals and is also indicated as an important tool to prevent and treat this disease. However, the use of LLLT in head and neck cancer patients is still controversial, once it can promote the proliferation of malignant cells that may be remained after surgery, chemotherapy and/or radiotherapy. The aim of this study was to evaluate the effect of the LLLT on the proliferation of cell lines derived from human tongue squamous cell carcinoma (SCC9, Luc4, and Ca1).
Study: The cells were cultured in medium DMEM/F12 with fetal bovine serum (10%), hydrocortisone (400 ng/mL) and RM supplement. Cell lines were irradiated with two dosimetric parameters (780 nm, 70 mW, 4 J/cm^2; 660 nm, 70 mW, 4 J/cm^2) and plated (10^3 cells/well) in 96 well plates. Non-irradiated cells were used control. Three independent experiments were performed in triplicate. After 3 and 5 days, cells were evaluated by MTT assay.
Results: Laser irradiation (both parameters tested) did not increase the mitochondrial activity of the irradiated cell lines when compared to non-irradiated cells.
Conclusion: In the dosimetric parameters evaluated here, LLLT was not able to increase mitochondrial activity of OSCC cell lines, indicating that depending on the energy density, LLLT may not have a biostimulation effect on malignant cells.

ePoster - Photobiomodulation

E64

ADJUVANT TREATMENT WITH LOW-LEVEL LASER THERAPY IMPROVES BRONCHIAL ASTHMA IN YOUNG PATIENT: CASE REPORT

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Background: Bronchial Asthma is a chronic disease characterized by recurrent attacks of breathlessness and wheezing, due to narrowing of the airways and reduced airflow into and out of the lungs. According to World Health Organization estimates 235 million people suffer from asthma. Asthma is not just a public health problem for high income countries, it occurs in all countries

regardless of level of development. Over 80% of asthma deaths occur in low and lower-middle income countries. Asthma is under-diagnosed and under-treated, creating a substantial burden to individuals and families and possibly restricting individuals' activities for a lifetime. Recent studies show that low-level laser therapy (LLLT) has an important anti-inflammatory action in acute lung inflammation, showing that it may controls bronchial hyperresponsiveness in rats. The aim was to evaluate LLLT response in a patient with bronchial asthma.

Study: This is a cross-sectional case report of young patient, 27-year-old, diagnosed with bronchial asthma for at least 3 years, using medicines. Diode Laser (MMOptics, Brazil) of wavelength 660 nm, power 35 mw, fluency 26.3 J/cm^2 and beam spot size 0.03 cm^2 with continuous mode was used. Thirteen points around the mouth and nose were irradiated for 30 seconds each point. The total treatment was 10 sessions, once a week. The number of total and differential cells in the induced sputum and blood, as well as lung function and peak expiratory flow were evaluated before and after laser treatment.

Results: There was a reduction in the eosinophils migration to the lung and increase of spirometry parameters, demonstrating by peak expiratory flow and forced expiratory volume at timed intervals of 0.5, 1.0 (FEV1).

Conclusion: There was an expressive improvement in the clinical signs and symptoms of bronchial asthma in this patient post LLLT as evidenced by lung function and blood count.

ePoster - Photobiomodulation

E65

EFFECTS OF PHOTOBIOMODULATION ON GENE EXPRESSION OF IL-6 IN SKELETAL MUSCLE REPAIR

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Background: A growing body of evidence suggest that photobiomodulation contribute to skeletal muscle repair by reducing inflammatory acute response, mainly due to the regulation of cytokines produced by macrophages. Muscle regeneration is regulated by growth factors and cytokines that regulate migration, proliferation and differentiation of myoblast and satellite cells. However, the effects of PBM in the mRNA expression of inflammatory cytokines in skeletal muscle are still unclear. The aim of this study was to analyze the effect of photobiomodulation on gene expression of IL-6 in skeletal muscle repair.

Study: This study received approval from the local ethics committee (process number 0017/2014). Fifteen male Wistar rats were divided into 3 groups (n = 5): control, injury alone, injury + PBM 660 nm (70 mW, 8 J). Cryoinjury consisted of two applications of metal rod cooled in liquid nitrogen to the ventral surface of the tibialis anterior (TA) muscle. PBM treatment was performed daily and after 7 days, TA was removed to investigate IL-6 gene expression by qRT-PCR. Total RNA was extracted using Trizol and reverse transcribed to single-stranded DNA using specific kits according to manufacturer's instructions. qPCR was performed in ABI PRISM 7500 and was used specific primers for IL6 and GAPDH genes.

Results: In injury and injury + PBM 660 nm groups, IL-6 mRNA expression levels were increased in relation to injury group, although no significant difference was found ($p > 0.05$).

Conclusion: The PBM with red laser therapy, in the dosimetric parameters evaluated here, was not associated with a decrease in IL-6 mRNA expression in skeletal muscle after 7 days of injury. Possibly, PBM may act in the modulation of cytokines gene expression during the initial steps of acute inflammation.

ePoster - Photobiomodulation

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AEROBIC TRAINING AND LOW INTENSITY LASER THERAPY 660 nm: PROMOTE PROTECTION FUNCTIONAL CAPACITY AND AUTONOMIC SYSTEM IN EXPERIMENTAL MONOARTHRITIS CHRONIC

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Background: The inflammatory profile chronically altered caused by monoarthritis (MA), which is a single joint inflammation that impairs movement and cardiac autonomic function. The Low Intensity Laser Therapy (LILT) and Aerobic Training (AT) promote analgesia, regeneration and systemic adaptations, that contribute to protection of the musculoskeletal and cardiovascular systems. Aim: Analyze the responses of non-invasive therapies in the rehabilitation of chronic experimental MA knee rat.

Study: A total of 25 Male Wistar rats (280 g) were intra-articular injection of zymosan (1 mg) in the right knee, MA mimic. Divided into groups; control (C); MA (MA) MA + AT (MT), MA + LILT (ML), and MA + TA + LILT (MTL). Treatment was performed using LILT (InGaAlP = 660 nm/TWIN-Laser-MMOptics), 20 second contact the knee and 2 times a week, before the AT treadmill with moderate intensity (70% of maximal exercise test [MET], 0.8 km/h, 50 min), 5 times a week. Groups C and MA sedentary the equipment turned off. Duration 2 months. After this period was analyzed functional capacity (MET); the articular capsule using histology and cellularity. The Heart Rate Variability, through the implantation of catheters in the carotid artery, which was connected to a signal transducer (Instrumental Kent, USA).

Results: The MET for functional capacity was significant (MT: 1.76 ± 0.05 km/h and MTL: 1.85 ± 0.09 km/h) *vs.* (MA: 0.95 ± 0.05 km/h). Histological analysis revealed differences between MTL *vs.* MA. Leukocyte influx was

significant difference (MT: $41 \pm 17.9 \times 10$–4/ml and MTL: $31.2 \pm 9.7 \times 10$–4/ml) *vs.* (MA: $253.2 \pm 70.7 \times 10$–4/ml). Heart Rate revealed significant (MT: 324.87 ± 15 bpm and MTL: 328.53 ± 19) *vs.* (MA 386.05 ± 29 bpm). Variance Pulse range revealed significant (MT 96.2 ± 6.4 ms and MTL 108.9 ± 29.0 ms) *vs.* (MA, 39.1 ± 7.6 ms). Blood Pressure not significant.

Conclusion: There was a reduction in the local inflammatory profile, increased functional capacity and improvement in resting heart rate and variance of the pulse interval; contributing the function of the cardiovascular system and movement.

ePoster - Photobiomodulation

E67

EFFECTS OF TREATMENT USING LED ON THE GAIT FUNCTIONALITY AFTER PERIPHERAL NERVE INJURY OF WISTAR RATS

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Background: The treatment with irradiation using Light Emitting Diode (LED) has demonstrated positive effects on the nervous tissue repair after peripheral nerve injury (PNI), however there is little description in the literature regarding the effect on muscle tissue. Objective: To analyze the effects of LED irradiation on nervous and muscle repair after crush injury of the sciatic nerve (NI).

Study: A total of 85 Wistar rats were randomly divided into five groups: Control; Injury; Injury + LEDn (LED in the area of PNI); Injury + LEDmm (LED muscle); Injury + LEDn + LEDmm (LED in the area of the PNI and in the tibialis anterior muscle). The LED irradiation was performed using the following parameters: LEDn consisted of four points each for 20 s using an energy density of $0.8\,J/cm^2$ and LEDmm consisted on 8 points each for 10 s using an energy density of $0.4\,J/cm^2$. For both, the length wavelength was 850 nm, the area of the beam was $1\,cm^2$ and the power density and total energy were $0.04\,W/cm^2$ 3.21 J, respectively. At the end of the experimental period, the gait analysis was performed using the sciatic functional index (SFI).

Results: After 1 week, all the injured groups presented a decrease in functionality compared to the control group, however, all LED groups showed an increase in functionality over the injury group. After 2 weeks, the injury + LEDn and injury + LEDnm presented an increase in SFI with values similar to control group while the Injury and injury + LEDmm groups showed a decrease in gait functionality when compared to control group. In 3 and 4 weeks, there was no statistically significant difference between groups.

Conclusion: LED increased the functionality of gait assessed by SFI after 1 and 2 weeks following PNI when it is used on nerve region associated or not with muscle region.

ePoster - Photobiomodulation

E68

PHOTOBIOMODULATION EFFECT ON MYOCUTANEOUS FLAP: EVALUATION OF TWO DIFFERENTS WAYS OF APPLICATION IN RATS

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Background: Mastectomy is adopted as a treatment in most cases of breast cancer and for breast reconstruction one of the most used methods is the Transverse Rectus Abdominis Myocutaneous flap (TRAM). The Photobiomodulation is an anti-inflammatory and healing agent.

Study: Check the viability of the TRAM flap after application of LLLT in rats. Specific: To compare two methods of application of LLLT, one intraoperatively and other postoperative. A total of 15 rats were divided into three groups, and G1 (control): TRAM flap, G2: TRAM flap + LBI Postoperative and G3: TRAM flap + LBI Intraoperative. The laser parameters were: CW Diodo Laser (MMoptics, Brazil) 660 nm wavelenght, power = 15 mW, spot area = $0.04\,cm^2$, fluence = $7.5\,J/cm^2$, total dose = 0.30 J, irradiation time = 20 s. The laser was applied perpendicularly to the flap at a single irradiation onto vascular pedicle area (VPA) in contact mode for G2, during days: 0(POI), 1st VPA, 2nd VPA, 3nd VPA, 4th VPA. In G3: intraop. onto the omentum area + outside of superior border + contralateral area – and after the other applications as same as the previous group. Days 0 (Intraop. + POI), 1st VPA, 2nd VPA, 4th VPA.

Results: G1 had a necrotic area of 42.40% percentage, G2: 25.62% and G3: 9.96%.

Conclusion: The photomodulation on the TRAM flap, with the parameters used in this study provided an increase in retail viability. The use of laser therapy during the intraoperative period shower an important decrease of the complications, inclusive comparing to the use of laser only postoperatively, with statistical significance ($p < 0.05$).

ePoster - Photobiomodulation

E69

PHOTOBIOMODULATION ON ULCER HEALING AFTER CALCANEAL TENOTOMY SURGERY ON PATIENT WITH PERIPHERAL ARTERIAL OBSTRUCTIVE DISEASE (PAOD): CASE REPORT

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Background: Peripheral Arterial Obstructive Disease (PAOD) occurs predominantly due to systemic atherosclerotic phenomena that cause arterial blockages and is associated with a high risk of cardiovascular morbidity and mortality. The risk factors most often assessed in the literature were hypertension, diabetes, smoking, history of cardiovascular disease and age. Objective: To examine the effects of photobiomodulation on ulcer healing after tenotomy surgery of the calcaneus in a patient with PAOD.
Study: This is a case report: DAF, 78, widow, with hypertension, resident of the city of São Paulo/Brazil, 4 years of treatment at the local health clinic, of an exudative lesion in the posterior region of the right leg. On 21 March 2016 calcaneal tenotomy surgery was performed after the angiographic examination showed the absence of blood flow below the popliteal artery. Photobiomodulation started on 26 April 2016 and consisted of cleaning the wound followed by laser irradiation (DMC, Brazil, 660 nm, 100 mW, 4 J, 40 s) once per week. Mode of application consisted of application every 1 cm along the edges of the lesion, followed by an occlusive dressing (BSN Medical, Brazil), cotton-wool compress and closing with a crepe bandage.
Results: There was a gradual reduction of the lesion: Initial area of 129.79–14.01 cm^2 (89.2%); perimeter of 70.46–30.29 cm^2 and reduction of local temperature of 28.9–26.6°C after 22 applications, report of absence of pain using the Numeric Pain Rating Scale (NPRS), and the suspension of oral analgesics after the third application.
Conclusion: This case report suggests that laser photobiomodulation promotes better local analgesia and accelerates the ulcer healing process in a patient with PAOD.

ePoster - Photobiomodulation

E70

PHOTOBIOMODULATION ON ULCER CICATRIZATION AFTER PARTIAL AMPUTATION OF LEFT FOOT TOES IN PATIENT WITH TYPE 2 DIABETES MELLITUS: CASE REPORT

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Background: The International Diabetes Federation (IDF) estimates that there are 415 million people with diabetes mellitus (DM) in the world, as of 2015. One of the most frequent complications of diabetes is non-traumatic lower extremity amputation (NTLEA). In Brazil, Ministry of Health data (2016) showed that 80% of NTLEAs are due to DM complications. Since the 90's, positive results have been reported in regards to the introduction of photobiomodulation in wound cicatrization, which could minimize such amputations. Objective: To examine the effects of photobiomodulation on the cicatrization of ulcers in a diabetic foot.
Study: This is a case report: Patient DMS, 67, widow, with hypertension, resident of the city of São Paulo/Brazil, in outpatient treatment of DM. In February 2016, the 4th and 5th toes were amputated and in April 2016 the 3rd toe was amputated and fasciotomy performed. Photobiomodulation started on 03 May 2016 and consisted of cleaning the wound followed by laser irradiation (DMC, Brazil, 660 nm, 100 mW, 4 J, 40 s) once per week. Mode of application consisted of application every 1 cm along the edges of the lesion, followed by an occlusive dressing (BSN Medical, Brazil), cotton-wool compress and closing with a crepe bandage.
Results: There was total lesion closure after 10 applications, the initial area was 23.20 cm^2 with a perimeter of 24.86 cm^2 and local temperature of 31.7°C decreased to 29°C, report of absence of pain, using the Numeric Pain Rating Scale (NPRS), after the third application. During treatment, capillary glucose test results were monitored and remained above 250 mg/dl, with glycated hemoglobin of 15%.
Conclusion: The case report suggests that laser photobiomodulation promotes a better local analgesia and accelerates the ulcer cicatrization process in diabetic feet, even if presenting decompensated DM.

ePoster - Resurfacing

E71

RESULTS OF THE 755 nm PICOSECOND LASER WITH DIFFRACTIVE LENS ARRAY: A EUROPEAN PERSPECTIVE OF SKIN REVITALIZATION ON NORMAL SKIN AND OF A POST-LYELL PATIENT

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Background: The picosecond laser at 755 nm using a diffractive lens array is well reported for skin revitalization with improvement in pigment, wrinkles and scarring. Minimal post treatment or adverse effects have been documented suggesting potential benefit for the improvement of visual effects of skin post disease.
Study: A total of 56 subjects were treated with the 755 nm picosecond laser using an additional diffractive lens array. Treatment was administered every 3–4 weeks for three treatments. Treatment parameters were between 3,500 and 4,500 pulses per full face with a 6 mm spot size, at 0.71 J/cm^2. Patients were assessed for satisfaction for improvement in pigmentation, toning and texture. A single female patient, skin type V, who presented 4-years post Lyell syndrome was also treated to investigate if improvement in the residual dyspigmentation and topological unevenness left from bullae formation could be achieved. This patient had been refused other treatment options for fear of potential negative outcome on this skin type. Six treatments were given at 1 month intervals.
Results: Patients demonstrated progressive improvement in pigment, skin tone, and texture. Visual effects post treatment are minimal, typically erythema was experienced for 2–3 hours but resolved completely after this time. The Lyell patient achieved good evenness of

pigmentation and improvement to the significant bump and depression profile of the epidermis.
Conclusion: Patient satisfaction after this treatment is extremely good, the experience of this practice suggests that clinical outcome combined with low incidence of visual effects post treatment ensures patients are highly likely to continue with regular maintenance treatments. Patient satisfaction for the Lyell patient was extremely high with excellent visual improvement of the side effects left from her previous disease and with no adverse effects to this higher skin type.

ePoster - Resurfacing

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SAFETY AND EFFICACY OF 755 nm ALEXANDRITE PICOSECOND LASER (PICOSURE) FOR THE TREATMENT OF ACNE SCARS IN ASIANS

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Background: Patients with skin type IV are at a higher risk for complications from laser resurfacing. The 755 nm Picosecond laser has been reported to be effective in tattoo removal. The focus lens array of 755 nm picosecond laser can be used for non-ablative skin rejuvenation. This study aims to determine the safety and efficacy of 755 nm alexandrite picosecond laser in the treatment of acne scars among asians.
Study: A single center clinical trial was done on 20 Asian patients, ages 22–45 yrs of age, male and females, with Fitzpatrick skin type IV with moderate to severe acne scars. Standardized photographs and Visia skin analysis were done every visit. Patients underwent three sessions with 1 month interval of Picosure laser treatment using the focused lens array. Topical anesthetic was applied for at least 30 minutes and parameters used were 8 mm spot size, 0.4 J/cm, pulse rate of 5 Hz and a total of four passes. Assessments were made by trained physicians 1 month after the first treatment and 1 month after the third treatment. Any adverse effect were documented.
Results: A total of 20 patients completed the study. Paired t-test was done on the percentile measurement of skin texture using the Visia. Results showed statistically significant increase in the percentile rank of Visia readings from baseline to after 1 month after the last treatment. Photographs also showed improvement in the appearance of acne scars in as little as three treatments with this technology. Downtime was minimal with patients experiencing transient facial erythema and no vesiculation, exfoliation, crusting and hypopigmentation or post inflammatory hyperpigmentation. No complications noted.
Conclusion: 755 nm picosecond laser using focused lens array can significantly improve moderate to severe acne scarring and is safe for Asian skin.

ePoster - Resurfacing

E73

REJUVENATION OF THE MALE SCALP USING 1,927 nm NON-ABLATIVE FRACTIONAL THULIUM FIBER LASER

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Background: The male scalp often exhibits extensive photodamage as a result of androgenic alopecia and exposure to ultraviolet radiation. This photodamage presents as solar lentigines, fine rhytides, and keratoses, and can prematurely age a patient. Improvement in the cosmetic appearance of the scalp has been reported as a side benefit of photodynamic therapy for the treatment of actinic keratoses, but there is limited data that directly addresses rejuvenation of the scalp. The 1,927 nm non-ablative fractional thulium fiber laser induces superficial epidermal resurfacing to a maximum depth of 200–300 μm, making it uniquely suited for targeting epidermal hyperpigmentation and keratoses. In this case series, we discuss the first reported successful treatment of photodamage on the scalp in four male patients using this device.
Study: Four male patients with Fitzpatrick skin types II–III and extensive photodamage on the scalp underwent one treatment using the fractional non-ablative 1,927 nm thulium fiber laser with maximal settings of 20 mJ, treatment level 11, density 70%, and 8 passes.
Results: At 2 weeks post-procedure, all patients had a 60–90% improvement in dyspigmentation, lentigines, and keratoses. No adverse events were observed and the patients tolerated the procedure well.
Conclusion: This case series is the first report in the literature to suggest that the 1,927 nm non-ablative fractional thulium fiber laser can be safely utilized with an aggressive high fluence and high density treatment approach to produce significant clearance of photodamage of the scalp in a single treatment.

ePoster - Resurfacing

E74

CLINICAL EVALUATION OF THE SAFETY AND EFFICACY OF A NOVEL HOME USE DEVICE WITH RF & LED

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Background: The aging process is often associated with undesirable effects on facial skin such as thinning of the epidermis and the subcutaneous layer, which leads to skin redundancy and laxity, reduction of skin strength and elasticity (elastosis) and increased wrinkling. RF and LED are widely used clinically proven technologies for skin rejuvenation.

Study: The objective of the study is to evaluate the safety, efficacy, and usage compliance of a novel home-use device, utilizing RF and LED energy, for self-treatment of periorbital wrinkles and improvement of skin appearance. Thirty-three subjects were enrolled in this study, and performed 21 treatment sessions every other day, over a period of 6 weeks. In addition, two maintenance treatments were performed 1 and 2 months following treatment end. Treatment was conducted on the periorbital areas according to the device user manual. Each subject served as his/her own control, while comparing results before treatment, and 3 months following treatment end.
Results: Thirty subjects completed this study. The results of a blinded, independent photographs assessment of three dermatologists demonstrated an average reduction of 1.49 Fitzpatrick scores comparing baseline to 3-month follow-up ($p < 0.001$). Analysis revealed improvement (downgrade of at least 1 score according to the Fitzpatrick Wrinkle scale) in almost all subjects. No unexpected adverse events were detected or reported during the study, and the treatment was associated with mild to no pain. Post treatment erythema was detected in all subjects, and disappeared within 1 hour without any intervention. In some subjects, post treatment edema (hyperemia) was detected. All cases of edema were resolved within 24 hours. Data obtained by satisfactory questionnaires indicated on high satisfaction of the users with the device operation, ease of treatments, safety, and wrinkles reduction. Usability evaluation concluded that the device is easy to operate and the instructions for use are comprehendible and suitable for the average potential user.
Conclusion: The novel home-device offers a safe and effective in-home non-invasive technique to improve the appearance of age-related periorbital wrinkles.

ePoster - Resurfacing

E75

A SINGLE TREATMENT OF MELASMA USING DRUG DELIVERY WITH CO_2 FRACTIONAL LASER AND A TOPICAL CREAM CONTAINING HYDROQUINONE 4%, TRETINOIN 0.05%, FLUOCINOLONE ACETONIDE 0.01%

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Background: Melasma is a chronic condition that causes hyperpigmentation of facial skin.
Study: Thirty females with Melasma were recruited from dermatology clinics. All patients signed an informed consent form. Photographs were taken before the treatment and a topical anesthetic cream was applied for half an hour. A CO_2 Fractional laser was used to treat the entire face at a fluence of 25–35 and a density of 10–15. Immediately after the laser treatment, face was cleansed and a topical cream containing Hydroquinone 4%, Tretinoin 0.05%, Fluocinolone Acetonide 0.01% was applied and massaged into the skin for several minutes. The cream was left on the skin and patients were instructed not to wash the face for four hours. They were advised to apply Aquaphor ointment for 3–4 days and use facial sunblock. Patients were seen a week after the treatment and advised to restart the topical cream every night. Patients were evaluated 1, 3, and 6 months after the treatment.
Results: All subjects showed improvement varying from 25–90%. None of the patients developed infection, scarring, or hypopigmentation. Some subjects had persistent erythema for up to a month after treatment, which resolved when topical cream containing Hydroquinone 4%, Tretinoin 0.05%, Fluocinolone Acetonide 0.01% application was changed from every night to three nights a week.
Conclusion: A single CO_2 Fractional Laser and a topical cream containing Hydroquinone 4%, Tretinoin 0.05%, Fluocinolone Acetonide 0.01% using drug delivery protocol to treat Melasma is effective for the follow up period described. The safety of intradermal application of topical cream containing Hydroquinone 4%, Tretinoin 0.05%, Fluocinolone Acetonide 0.01% remains unknown.

ePoster - Resurfacing

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SUCCESSFUL TREATMENT OF A MAJOCCHI GRANULOMA SCAR WITH COMBINED PULSED DYE LASER, PICOSECOND 1,064 nm Nd:YAG LASER, AND FRACTIONATED NONABLATIVE 1,550 nm LASER

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Background: Infectious processes, particularly deep fungal infections, have the potential to leave behind permanent, disfiguring, and painful scars, with limited treatments available. These scars may have multiple components including telangiectasia, hyperpigmentation, hypopigmentation, atrophy, and hypertrophy, and may be best served by a multimodal approach with several lasers. Our objective in this case report is to demonstrate that safe and successful treatment of postinfectious scarring can be accomplished by a multimodal treatment approach with pulsed-dye laser, picosecond 1,064 nm Nd:YAG laser, and fractionated non-ablative 1,550 nm erbium laser.
Study/Results: A 14-year-old girl presented for laser consultation after completing treatment of a deep fungal infection (Majocchi granuloma) of the right lower extremity. The anterolateral right shin was encompassed by a large scar consisting of numerous grouped firm pink-brown papules superiorly, and clusters of brown-grey atrophic plaques inferiorly. The patient was treated every 5 weeks for a total of three sessions with a 595 nm pulsed-dye laser with the following laser parameters: fluence of 7.25 J/cm^2, pulse duration of 6 milliseconds, spot size of 5 mm, and cryogen spray cooling of 20/30. Next, the hyperpigmented areas were treated with picosecond 1,064 nm Nd:YAG laser with the following parameters: Fluence of 2.0 J/cm2, spot size of 5 mm, and

pulse repetition rate of 3. Finally, the entire scar was treated with fractionated nonablative 1,550 nm erbium laser with the following settings: energy level of 70 mJ, 14% coverage, 4 passes.

Conclusion: Post-infectious scars can prove difficult to treat. In this case report, we demonstrate that safe and successful treatment of postinfectious scarring can be accomplished by a multimodal treatment approach with pulsed dye laser, picosecond Nd:YAG 1,064 nm fractional laser, and fractionated non-ablative 1,550 nm erbium laser. We should continue to identify novel treatment strategies for the spectrum of diverse scars so that we can better treat this patient population.

ePoster - Resurfacing

E77

COMPREHENSIVE NON-ABLATIVE LASER SKIN REJUVENATION USING A NOVEL 650 MICROSECOND PULSED Nd:YAG 1,064 nm LASER

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Background: This study was conducted to evaluate a novel Nd:YAG 1,064 nm laser with 650-microsecond pulse duration to perform comprehensive non-ablative skin rejuvenation, to improve texture and tightening but also to clear erythema, spider veins, pigmented conditions and active acne. Normally the treatment of this range of conditions requires 3 or 4 different types of lasers. The objective was to evaluate whether a single laser with a single wavelength can produce a similar result.

Study: Seventy-three subjects with skin types I–VI and ages 15–77 were treated an average of 3.5 times each, with a treatment interval of 3–4 weeks. Treatment areas included the face, neck, hands, and chest. No other therapies were combined. All subjects were not using Accutane or other photosensitizing medications. Treatments were performed using a novel Nd:YAG 1,064 nm laser with 650-microsecond pulse. No anesthetics, cooling, or gels were used, as the laser does not require any numbing or skin cooling. Laser energy was applied an average of four passes at fluences from 21 to 41 joules/cm^2. As a second step in the case of spider veins, acne and pigmented areas, higher fluences in the range of 64–255 joules/cm^2 were applied.

Results: The laser treatment was well tolerated without any anesthesia or any form of skin cooling. No scarring, purpura, hypo, or hyperpigmentation was observed. Most patients reported noticeable improvement in at least 2 or 3 of the targeted conditions. Of the 73 subjects, 80% rated their satisfaction as Medium or High while 20% rated it as Low.

Conclusion: This study shows that a 650-microsecond pulsed Nd:YAG 1,064 nm laser can be safe and effective in performing comprehensive non-ablative skin rejuvenation without the use of any type of anesthesia or cooling.

ePoster - Resurfacing

E78

COMBINATION OPTIMIZED PULSED LIGHT AND FRACTIONAL NON-ABLATIVE LASER FOR THE TREATMENT OF PHOTODAMAGE, RHYTIDES, AND VASCULAR CONDITIONS

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Background: Combination laser treatments have been shown to effectively maximize treatment outcomes while minimizing overall treatment times, parameters, and downtimes. The combined optimized pulsed light and the fractional non-ablative laser therapies have shown a unique synergy for the improvement of photodamage, textural irregularities, rhytides, and vascular conditions. We evaluated the safety and efficacy of this combined therapy for overall skin revitalization.

Study: Twenty-six patients (1 male and 25 female) were enrolled. All subjects received a full face treatment with both the optimized pulsed light and the fractional non-ablative laser. For the optimized pulsed light, patients were treated at 10 ms pulse duration and a fluence level dependent on their skin melanin index. Immediately post OPL, patients were treated with one pass a 1,540 nm fractional laser handpiece directed to the deep dermis (double pulsed, 15 ms pulse duration, 45–55 J/cm^2 fluence) followed by two passes with a fractional 1,540 nm handpiece directed to the mid to superficial dermis (15 ms pulse duration and 32–36 J/cm^2 fluence). Each patient received one treatment with follow up photographs at 1 and 3 months post treatment.

Results: All patients with baseline pigmentation, vascularity and, or wrinkles/textural irregularities demonstrated visual improvement post combination optimized pulsed light and fractional non-ablative laser. No adverse events were noted.

Conclusion: The combination of an optimized pulsed light source and a fractional non-ablative laser in a single treatment session has proven to be safe and effective for overall skin revitalization at lower parameters then when done individually.

ePoster - Resurfacing

E79

TREATMENT OF DÉCOLLETAGE PHOTOAGING WITH MICRONEEDLING FRACTIONAL RADIOFREQUENCY

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Background: Lasers and light-based treatments have been frequently used to improve the appearance of dermatoheliosis, however their use can be limited on the chest, due to the

increased risk of dyspigmentation and/or scarring. Microneedling fractional radiofrequency (MRF) devices deliver radiofrequency energy at specified depths to the dermal layer, while minimizing damage to the epidermis. To our knowledge, no studies have characterized the effect of MRF on the décolletage. This study will investigate the efficacy and safety of a specific MRF device on moderate to severe décolletage rhytides.

Study: This study was a 6-week prospective study consisting of 14 female patients older than the age of 18, with no previous history of treatments of the décolletage, and a baseline Fabi/Bolton Chest Wrinkle Scale of 3, 4, or 5. All patients received three total MRF treatments with a MRF device at weeks 0, 3, and 6. Topical anesthesia was applied prior to each treatment. An external cooling apparatus (Zimmer) was used during treatments for improved comfort and safety. Patients were instructed to use a broad-spectrum sunscreen with an SPF $\geq$ 30 over the treatment area throughout the study. Both clinical and photographic evaluations of the décolletage were performed at each study visit and at week 12. Efficacy was assessed using the Fabi/Bolton Chest Wrinkle Scale, and safety was evaluated by monitoring for adverse events.

Results: Eighty-six percent of patients were satisfied with improvement in the appearance of their rhytides. At least five patients had improved $\geq$1 level on the Fabi/Bolton Chest Wrinkle Scale after initial two treatments. No significant adverse effects were noted during or after the procedure other than transient erythema and edema of treated areas.

Conclusion: MRF may provide an alternative and safer approach to improving rhytides of on the décolletage. Additional studies may be beneficial to determine the long-term efficacy of therapy.

ePoster - Resurfacing

E80

ABLATIVE RESURFACING WITH A 2,940 nm Er:YAG LASER FOR THE TREATMENT OF RHINOPHYMA

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Background: Rhinophyma is an end-stage of Rosacea whereby the sebaceous glands and fibrous tissue of the nose enlarge over time, often dramatically. This condition has profound functional and psycho-social impact on patients. Medical therapy yields minimal improvement to rhinophyma. Surgical options in the past have included cryosurgery, dermabrasion, heated (Shaw) scalpels, electrosurgery, and tangential excision, but bleeding and the inability to precisely shape the nose has limited them all. In addition, the sebaceous tissue offers very little resistance to instruments like heated scalpels, and with a profoundly misshapen nose, it is very easy to remove more tissue than desired and yield suboptimal results. Ablative laser resurfacing with a 10,600 nm CO_2 debulks well, but it too is limited by a lack of precision and an overlying char that minimized healing. Ablative laser resurfacing with a 2,940 nm Erbium YAG (Er:YAG) provides excellent debulking and contouring of the dysmorphic nose by targeting both collagen and water as the target chromophores. We present a case to discuss how we use an Er:YAG ablative laser to optimize results.

Study: A 61-year-old man presented with a 3-year history of progressive phymatous growth of his nose. He had significant functional impairment, with the deformity making it difficult to eat or drink. Moreover, his nasal vestibules had begun to collapse with the weight of overgrowth, inhibiting his breathing. The sebaceous overgrowth encompassed the bilateral nasal ala, nasal tip, and extended up onto the nasal dorsum. After a series of nerve blocks were given, a 2,940 nm Er:YAG laser was employed. Utilizing a 4 mm spot size, fluence of 25 J/cm$_2$ (100 microns ablate/100 microns coag), 7 Hz frequency, stacked pulses were delivered to more finely contour the nose.

Results: Ablative lasers, targeting water as the chromphore, work well with rhinophyma given the high water content of the proliferative sebaceous glands in the phymatous nose. The 10,600 nm CO_2 laser targets that water and as such debulks well. However, fine contouring is difficult given the robust tissue reaction. Collagen is not absorbed by the CO_2 laser. Without the fine control, the CO_2 laser does not provide a significant improvement over older surgical modalities, despite its ability to debulk and provide hemostasis. Moreover, given the depth of penetration, the char created by the CO_2 laser inhibits healing following the procedure and leads to more prolonged downtime. The Er:YAG ablative laser allows for both extensive debulking and finer contouring of the phymatous nose. The 2,940 nm Er:YAG laser is absorbed directly by collagen as well, in addition to water. As such, targeting both the water in the sebaceous glands and the collagen in the fibrous overgrowth, the ablation can be precisely controlled as the collagen itself is vaporized. The contour and shape can thus be easily recreated layer by layer. Unlike with the CO_2 laser, the Er:YAG yields a minimal char when using the 100 micron coag setting, thus providing hemostasis while minimizing the tissue damage that so prolongs healing with the CO_2. By targeting collagen in addition to water with the 2,940 nm Er:YAG, and employing the coag settings, you can precisely shape the nose while minimizing the bleeding much more easily and controlled than with older modalities. This method allows you to progressively and incrementally mold the nose into the desired contour.

Conclusion: In conclusion, we report this combination of ablative lasers can yield excellent results for the treatment of rhinophyma.

ePoster - Resurfacing

E82

CUTANEOUS HISTOLOGIES SEEN WITH FRACTIONAL PICOSECOND 532 nm, 1,064 nm, 755 nm AND CORRELATION WITH LASER INTERACTION MODELING OF THE ABSORBING CHROMOPHORES

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Background: This study was designed to prospectively study the histological changes induced by fractional 532 nm, 1,064 nm and 755 nm at 24 hours after treatment. Histological findings can be correlated with modeling of laser interaction with the primary competing chromophores. Our other paper in this section primarily describes the clinical features with these different fractional optics.

Study: Eight female patients were treated on their backs with the three fractional wavelengths at three different energies. MI from 11 to 95 (skin types I–VI) were studied with histologies obtained 24 hours after treatment of three passes with each wavelength. A total of 3.5 mm punch biopsies were taken from each side, formalin fixed and examined with hematoxylin and eosin staining.

Results: Localized areas of epidermal damage, epidermal vacuole formation and dermal hemorrhage was seen with fractional 532 and 1064 nm. Reproducible epidermal vacuole formation was seen with fractional 755 nm radiation. Epidermal vacuole formation is predicated on thermionic emission of seed electrons from melanin. The calculated threshold fluence for epidermal vacuole formation is lowest for 532 nm radiation, higher for 755 nm, and highest for 1,064 nm. Dermal hemorrhage is associated with heating of blood vessels. At the threshold fluence for epidermal vacuole formation, calculated blood temperature rise is lowest for 755 nm radiation, higher for 1,064 nm, and highest for 532 nm.

Conclusion: Fractional 755 nm produced selective epidermal injury resulting from the absorption of laser light by melanin. Fractional 532 and 1,064 nm did result in localized areas of epidermal injury which appeared similar to the vacuoles seen with 755 nm. However, dermal hemorrhage was observed with 532 and 1,064 nm suggesting that there was significant absorption by hemoglobin and melanin. The histology observations are correlated with modeling results. At the threshold fluence for epidermal vacuole formation, exposure to 532 nm radiation will lead to hemorrhage, there is small hemorrhage avoidance margin for exposure to 1,064 nm, and larger margin for 755 nm.

ePoster - Scars

E83

PERIORAL SCAR & CONTRACTURE RESPONSE TO MULTIMODAL APPROACH

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Background: Picosecond laser treatment combined with pulsed dye lasers and intralesional triamcinolone combined with 5-fluorouracil for the treatment of perioral contracture and scar secondary to burn scars has not been reported in the literature. Techniques to improve function of this area necessary for speech and nutrition were sought using this multimodal approach.

Study: A 62-year-old woman, Fitzpatrick skin type 2 presented to our office 3 months after undergoing an ablative laser treatment with subsequent perioral scarring and contraction. The patient reported difficulty fully opening her mouth and was understandably devastated by the visible scars around her mouth. The patient underwent monthly treatment using a combination approach: picosecond 755 nm laser, pulsed dye laser and intralesional triamcinolone and 5-fluorouracil. A 61-year-old woman, Fitzpatrick skin type 2 presented to our office 3 months after having a chemical peel on her face with subsequent scarring. Lastly, a 53-year-old woman, Fitzpatrick skin type 2, presented to our office 5 months after a chemical peel and dermabrasion with perioral scarring. Both patients were treated with a combination approach using pulsed dye laser and intralesional triamcinolone and 5-fluorouracil with improvement.

Results: All patients responded to laser and intralesional therapy. Most significantly, the 62-year-old patient was able to fully open her mouth and regain full function of this area after treatment.

Conclusion: Perioral contracture is a serious medical sequelae to burn scars. Treatment with a combination approach has demonstrated to be a safe and effective therapeutic modality in this setting.

ePoster - Scars

E84

AESTHETIC AND FUNCTIONAL IMPROVEMENT OF RADIATION DERMATITIS WITH NON-INSULATED MICRONEEDLE FRACTIONAL RADIOFREQUENCY

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Background: Radiation dermatitis is a skin change secondary to exposure to radiation that may be aesthetically and functionally displeasing and negatively impact patients' quality-of-life and adherence to radiotherapy. There are limited published effective treatments of radiation dermatitis. We present a case of a patient with radiation dermatitis who achieved aesthetic and functional improvement after two treatments of microneedle fractional radiofrequency (RF).

Study: A 66-year-old Caucasian man presented with a firm plaque on the left neck 18-months after undergoing radiotherapy for treatment of laryngeal cancer. He noted tenderness upon palpation, limited range of motion, and poor aesthetic appearance of the area. On physical examination, there was an atrophic, erythematous, hypo- and hyper-pigmented firm plaque on the left neck. A biopsy from untreated lesional skin demonstrated homogenization of papillary dermal collagen and scattered fibroblasts, some of which had stellate or atypical contours. Two treatments of microneedle fractional RF was performed 2 months apart

with identical parameters. After infiltration anesthesia with 6 cc of 1% lidocaine with 1:100,000 epinephrine was applied, the site was treated with microneedle fractional RF using the 24 non-insulated tips (penetration depth of 3,000 microns) with the RF handpiece (InMode Aesthetic Solutions, Irvine, CA). One pass with energy of 30 mJ/tip was applied in single pulse.

Results: Three months after the second treatment, the patient noted "softer texture that feels less fibrotic" and increased neck range of motion both in the horizontal and vertical plane. On clinical exam, the treated area more closely matched the surrounding uninvolved skin with respect to color (less poikilodermatous), texture, and firmness. A biopsy from treated skin demonstrated relative normalization of papillary dermal collagen.

Conclusion: Microneedle fractional RF improved the aesthetic and functional aspects associated with radiation dermatitis. We hypothesize that microneedle fractional RF achieved these results due in part to collagen and extracellular matrix remodeling.

ePoster - Scars

E85

COMPARISON OF CO_2 LASER EXCISION WITH ADJUVANT PHOTODYNAMIC THERAPY AND RADIATION IN TREATMENT OF RECALCITRANT KELOIDS: A RETROSPECTIVE REVIEW

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Background: Keloids are abnormal proliferations that form secondary to the pathological excess of growth factors during early wound healing. These benign tumors are notoriously difficult to treat, with high recurrence rates despite numerous treatment modalities. CO_2 laser excision has been demonstrated in several studies to be a safe, efficacious treatment for keloids. Recently, surgical excision with adjuvant external beam radiation therapy (XRT) has been identified as a promising treatment that inhibits keloid angiogenesis and fibroplasia. Photodynamic therapy (PDT) has also been shown *in vitro* to induce apoptosis of keloid fibroblasts. This study aims to compare CO_2 laser excision with adjuvant photodynamic and XRT therapies in treatment of keloids.

Study: A retrospective chart review was performed of all Cleveland Clinic Department of Dermatology patients with diagnosis of keloid who received treatment with CO_2 laser excision from August 2012 to August 2016.

Results: Fifty-four patients from ages 15–72 were included in the study. 38.9% were male and 61.1% were female. 91.7% were African-American, 5.6% were Caucasian and 3.7% were Asian. Keloids occurred most frequently on the ear lobe (59.2%), followed by mandible (9.3%), and chest (3.7%). 48.1% of patients had failed three or more conventional treatments (intralesional kenalog, surgical excision, pulse-dye laser). All patients underwent excision with ablative CO_2 laser (200–300 mJ, 5–28 W, 20–88.8 pulse/sec). Three patients received PDT red light (repeated twice weekly for 4 weeks) and eight patients received XRT (1,500–2,100 Grays in three fractions of 7–9 meV electrons over 3 days) immediately following excision. Patients were followed for an average of 25.5 months, though 31.5% of patients were lost to follow up. The recurrence rate among patients treated with CO_2 laser excision with XRT was 25%, compared to 37% of patients treated with CO_2 laser excision alone, and 75% of patients treated with CO_2 laser excision with PDT. Complications included pain and infection, which occurred slightly more among patients receiving CO_2 excision and XRT.

Conclusion: Preliminary data suggest that CO_2 excision with adjuvant XRT is a promising treatment for recalcitrant keloids.

ePoster - Scars

E86

THE USE OF LASERS IN THE TREATMENT OF NON-ATROPHIC SCARS: A COMPARISON OF LIGHT AND LASER THERAPIES IN THE TREATMENT OF CUTANEOUS SCARS

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Background: Scarring is the unavoidable consequence of injury to the skin. Treatment of scars remains a challenge despite the various treatment options available. Within the past decade, laser and light therapy (LLT) has become widely used to treat scars. The purpose of this systematic review and meta-analysis is to compare the efficacy of various LLT modalities in the treatment of non-atrophic scars.

Study: A literature review was conducted on studies published through March 2016. A meta-analysis of the studies that met the eligibility criteria was performed in order to determine the response rate of linear scars, hypertrophic scars (HTS), and keloids, following treatment with various LLT modalities.

Results: Twenty-eight studies met the eligibility criteria. The overall response rate for LLT was 0.65 (95% C.I. 0.53; 0.75) for linear scars, 0.61 (95% C.I. 0.45; 0.75) for HTS, 0.81 (95% C.I. 0.48–0.95) for keloid scars. There was no significant difference in response rate between fractional Er:Glass lasers, CO_2 lasers, and PDL in the treatment of linear scars. Fractional Er:Glass and CO_2 lasers yielded comparable response rates for HTS, PDL yielded a significantly lower response rate. Of the studies assessing each respective scar characteristic, 100% showed improvement in texture, 83.3% showed improvement in thickness, 76.9% showed improvement in pliability, 44.4% showed improvement in erythema, and 41.7% showed improvement in pigmentation.

Conclusion: This study is the first meta-analysis to compare the efficacy of LLT modalities in the treatment of non-atrophic scars. Despite numerous studies investigating treatment of non-atrophic with LLT that have been published, poor methodology, insufficient reporting, and

lack of universal outcome measures makes determining evidence-based guidelines particularly challenging. This highlights the need for high-quality RCTs with Level 1 evidence and follow-up times of at least 6 months to determine the role of LLT in scar treatment.

ePoster - Scars

E87

THE EFFECTIVENESS OF EARLY COMBINED FRACTIONAL CO_2 AND PULSED DYE LASER TREATMENT AFTER SCAR REVISION

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Background: Scars are one of the important complications of the wound healing process that cause physical, psychological, and cosmetic effect on the patients. Scar revision and laser treatment have been used over the past century for the improvement of many different types of scars. The purpose of this study is to evaluate the effectiveness of early combined carbon dioxide ablative fractional laser (AFL) and the pulsed dye laser (PDL) after scar revision.

Study: Fourteen patients underwent scar revision were enrolled for this study. All patients were treated with combined a 10,600 nm AFL and 595 nm PDL. The laser treatments were performed 2 weeks after scar revision surgery, which is the early remodeling phase, at 4 weeks intervals. Four treatments were performed. Vancouver Scar Scale (VSS) scores were evaluated before treatment and 5 months after final laser treatment.

Results: Each VSS scores presented statistically significant improvements except height. There were no adverse complications such as wound disruption, hyperpigmentation, and hypopigmentation during the follow up periods.

Conclusion: This study shows that early combined ablative fractional CO_2 and pulse dye laser treatments after scar revision are an effective and safe method to minimize scar formation.

ePoster - Scars

E88

A NOVEL USE OF NON-ABLATIVE FRACTIONAL LASER RESURFACING WITH COMBINATION WAVELENGTHS OF 1,550 nm AND 1,927 nm FOR A LONGSTANDING THERMAL BURN SCAR

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Background: Thermal burn scars are common management conundrums for use of lasers in dermatology. They are among the worst scars seen in medicine that can affect the deep dermis, leading to significant physical and cosmetic impairment (i.e., unappealing textural changes and contractures). This case demonstrates the value of non-ablative fractional laser resurfacing (NAFR) with a combination of wavelengths, both the 1,550 and 1,927 nm, as a treatment for a severe thermal burn scar. Of particular interest is the use of non-ablative laser resurfacing with the 1,927 nm, which is not well established for management of scars.

Study: A 27-year-old African-American female presented for treatment of a scar on her right lower leg and foot that resulted from a thermal burn occurring 26 years prior. The patient had a previous skin grafting at the site. The patient underwent three treatments with a NAFR thulium laser (Solta Medical, Hayward, CA).

Results: The patient was first treated with the 1,927 nm wavelength alone. In comparison the 1,550 nm and the 1,927 nm wavelengths were utilized at the second and third sessions. Settings utilized for the 1,927 nm laser were as follows: Energy of 10 mJ, treatment level 4 and 8 passes. While settings for the 1,550 nm laser were: Energy of 40 mJ, treatment level 6 and 8 passes. The treatment interval was 4 to 6 weeks apart for a total of three treatments. After the third treatment, the patient illustrated greater than 75% improvement in texture, erythema, and pigmentation of the scar. In addition, there was a functional gain of the right foot range of motion shown by a 15-degree improvement in dorsiflexion. Treatments were well tolerated with no patient reported or clinically observed adverse events. Typically, fractionated ablative lasers have been used to treat scars, but they have more side effects.

Conclusion: Ablative fractional resurfacing has been utilized extensively for the management of burn scars. NAFR use in scar management has increased but there still is a paucity of data in the management of burn scars. A majority of the literature described the use of 1,540/1,550 nm wavelength NAFR. The 1,927 nm wavelength with its epidermal penetration (200 μm) offers superior results for the superficial irregularities and dyspigmentation within burn scars. This case illustrates the effectiveness of the combination of the 1,550 and 1,927 nm NAFR, in treatment of epidermal pathology (1,927 nm) and aberrant dermal collagen causing textural changes (1,550 nm). However, future well designed prospective studies are needed to further evaluate the effectiveness of 1,550 and 1,927 nm NAFR *vs.* 1,550 nm NAFR alone, in burn scars.

ePoster - Scars

E89

COMBINATION APPROACH TO THE MANAGEMENT OF TRAUMATIC TATTOOS AND SCARRING AFTER A MOTOR VEHICLE ACCIDENT

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Background: Catastrophic scarring and dyspigmentation after a motor vehicle accident presents multiple challenges with laser management of scars. Due to the variation in desired endpoints (e.g., erythema, texture, and dyspigmentation) different lasers modalities must be utilized for each specific need.
Study: A 24-year-old female presented after being struck by a car, resulting in asphalt tattoos, hypertrophic scars, and extensive scarring from medical management (e.g., tracheotomy scars, PEG tube). These scars on the lower extremities caused severe limitations in the range of motion.
Results: On clinical exam, there were scattered pink atrophic plaques and gray macules/patches on various areas of her body. Originally, recommendations for scar treatment were to use a combination of the pulsed dye laser (PDL) and non-ablative fractionated laser (NAFR) with two wavelengths 1,550/1,927 nm. For the erythema and the hypertrophic scarring, PDL and NAFR were utilized, respectively. Alternatively, asphalt tattoos were treated with Q-switched (QS) 1,064 nm Nd:YAG laser. Treatments intervals were 4–6 weeks with desired endpoints determined by patient and clinician. Thus far, the patient has had six PDL, five NAFR, and eight QS 1,064 nm Nd:YAG laser treatments. The patient noted 75% improvement in texture, range of motion (functionality), dyspigmentation, and erythema. Two non-treating dermatologists have reports 50–75% improvement. No adverse effects were seen on follow up.
Conclusion: This case illustrates the combination of different laser modalities to appropriately manage different facets of traumatic tattoos, post-surgical tattoos, and hypertrophic scarring after a motor vehicle accident. The case highlights the effectiveness of NAFR in the treatment of scars but also the novel use of the 1,927 nm wavelength for both functional and textural improvement.

ePoster - Scars

E90

TREATMENT OF HYPERTROPHIC SCARS WITH A 2,940 nm Er:YAG LASER

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Background: As the survival rate from acute trauma improves in recent years, a growing emphasis has been placed on the importance of reconstructive therapy to improve scarring in burn patients. In this prospective study, we evaluated the use of ablative fractional resurfacing for improvement of key attributes such as skin texture, dyschromia, vascularity, hypertrophy, and atrophic scarring in burn patients.
Study: Eleven subjects with hypertrophic scars from 3rd degree burns received three fractional laser treatments at 4-week intervals. Three blinded observers used a blended modified Manchester Vancouver Scar Study analog scar scale in evaluating randomized before-and-after (B&A) photographs of each treatment and histology taken at baseline and 3 months after the final treatment.
Results: Ablative fractional resurfacing resulted in an overall improvement in 100% of subjects as determined by blinded evaluators. Seventy-nine percent of patients achieved overall improvements scores of moderate-excellent (34–100%). Similarly, moderate to excellent improvements were seen 88% of the time for dyschromia, 76% for atrophy/hypertrophy, 86% for vascularity, and 70% for texture. The overall average improvement was a 2.27 out of 3.
Conclusion: This case series of 11 subjects supports the effectiveness of fractional ablative laser in treating multiple characteristics of scars. The laser treatments engender tissue remodeling and wound healing response that result in the formation of new healthy tissue with a normalized epidermal and dermal composition.

ePoster - Scars

E91

A COMBINED APPROACH TO TREATING HYPERTROPHIC BURN SCARS: THE USE OF PULSED DYE AND FRACTIONAL CO_2 LASERS

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Background: Treatment with pulsed dye laser therapy (PDL) and ablative fractional CO_2 laser therapy (AFCL) has the potential to greatly improve hypertrophic scarring in individuals who have sustained burn injuries. More specifically, recent research has demonstrated the success of using PDL to help reduce hyperemia and AFCL to improve scar texture and thickness. Although many burn care experts agree that combining the two lasers at a single procedure is beneficial, most published studies focus on the individual use of PDL and AFCL for scar treatment. Thus, this retrospective review details our experience using a combined laser therapy approach to treating hypertrophic burn scars.
Study: A retrospective before–after study of all patients with hypertrophic burn scars from January 2014 to May 2016 who were treated with PDL and AFCL at our institution was carried out. During combined procedures, PDL is always administered first and then followed by AFCL. Demographic variables were collected and analysed and overall outcome was measured using before–after Vancouver Scar Scale (VSS) scores.
Results: 80/127 cases were treated with both with both PDL and AFCL over 215 sessions. Laser settings were dependent on the scar and patient skin type. All patients were $\leq$18 years at the time of each laser procedure. In all cases, the combined laser therapy approach produced improvements in scarring. Before–after VSS scores decreased from 7.43 (SD, 12.7) to 6.15 (SD, 12.5) after a single treatment, to 5.29 (SD, 1.94) after two treatments. No complications were observed.
Conclusion: Combining PDL and AFCL is a safe and effective method for treating hypertrophic burn scars. By combining both lasers, clinicians can target different aspects of the scar (including colour and texture) in a single procedure as opposed to multiple procedures.

Moreover, the ability to improve multiple aspects of the scar at a single laser therapy session is highly beneficial for the patient. By combining treatments, clinicians may be able to reduce the overall number of laser treatment sessions required for each individual and use the additional procedure time to treat a greater number of patients.

ePoster - Skin Tightening

E92

MICRONEEDLE-BASED FRACTIONAL RADIOFREQUENCY TREATMENT FOR SUBMENTAL LAXITY

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Background: A previous multi-center clinical trial of a needle-based fractional radiofrequency (RF) treatment demonstrated significant improvement for facial and neck rhytides and laxity after a single intradermal treatment. We report on preliminary findings of subcutaneous treatment to the submental area, using this microneedle device.

Study: Subjects with submental and submandibular laxity were treated with a 7-paired microneedle bipolar RF cartridge, inserted at a 75 degree angle to the skin surface. Tumescent infiltrations were administered prior to treatment. Investigator and subject assessments of laxity were performed at 1, 3, and 6 months after treatment. Subjects also reported on overall improvement with treatment.

Results: Ten (10) subjects (6 females, 4 males with mean age 46 ± 12 years) with Fitzpatrick Skin Types II–IV underwent a single treatment. Investigator assessment for Alexiades–Armenakas Laxity Scale demonstrated that 80% (8/10), 89% (8/9), and 89% (8/9) of subjects experienced improvement. Subject assessments tended to be more favorable with 100% of subjects reporting improvement in laxity at all follow-ups. The majority of subjects (100, 90, and 100%) also reported some degree of improvement at the 1, 3, and 6-month follow-ups, respectively, for overall assessment of rhytides, skin tone and texture and reduction in double chin fat. Treatments were well tolerated with mild to moderate transient erythema (100%), edema (60%), and bruising (100%) following treatment that resolved without complications. No adverse events were reported.

Conclusion: Preliminary results from a single center support that microneedle-based fractional radiofrequency may have a beneficial effect on submental laxity. Improvement was observable at 1 month after treatment and was maintained at 6 months. Further studies are warranted to quantify improvement and optimize patient selection.

ePoster - Skin Tightening

E93

MULTISOURCE FOCUSED RF WITH CONCENTRIC ELECTRODES FOR SKIN TIGHTENING OF HARD-TO-REACH BODY AREAS

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Background: Patients' demand for non-invasive skin tightening and body contouring RF treatments has grown dramatically over the last years. The latest generation of multisource RF systems which uses six independent RF generators simultaneously, have been shown to allow deeper heat penetration with less surface heating and pain. A new handpiece, emitting multisource RF through six concentric electrodes, further enhances heat penetration to the tissue and allows the treatment of hard to reach body areas such as jaw line, upper hands, and knees. Thermal images using this new handpiece have shown the focused heat penetrates up to 7 mm, allowing collagen remodeling in the dermis and subcutaneous tissue.

Study: Ten patients enrolled in this pilot study. All subjects were treated with the focused, multisource RF handpiece. Treatment areas were the cheeks, jawlines, and submental areas. Treatment protocol included six weekly treatments. All patients were photographed before the first treatment and after the six treatment at a standard distance and illumination. The degree of improvement was blind-assessed by two uninvolved assessors. Subjective satisfaction was assessed by patients' questionnaire form.

Results: None of the patient had reported any pain during the treatments. No adverse events were reported during and after the treatments. B&A photos show improvement in skin laxity and texture as well as reduction of fat deposits in the cheeks and submental areas. Significant improvement was found in jawline contour line. Subjective questionnaires showed high patient satisfaction.

Conclusion: The current study examined the efficacy and safety of a new type of multisource RF delivery system. Targeted at the treatment of localized fat and skin laxity in hard-to-treat areas. The findings show that the treatment provides painless and effective contouring accompanied with improvement in skin texture and laxity.

ePoster - Skin Tightening

E94

ONABOTULINUMTOXINA TREATMENT OF MODERATE TO SEVERE GLABELLAR LINES IN CHINESE SUBJECTS AFTER LASER THERAPY: A PROSPECTIVE, OPEN-LABEL, NON-COMPARATIVE STUDY

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Background: Limited patient-reported outcomes (PROs) data following onabotulinumtoxinA treatment of facial rhytids are available, especially in Asians. The utility of onabotulinumtoxinA after laser therapy has not been described. Evaluate safety and efficacy of onabotulinumtoxinA for moderate to severe glabellar lines (GL) following laser therapy using validated PROs and scales.

Study: Eligible Chinese subjects ($n = 173$) were followed for 120 days following a single onabotulinumtoxinA (20 U) treatment for GL after recent laser therapy. Subject-completed PROs, including the Facial Lines Outcome-11 item (FLO-11) Questionnaire and the Facial Lines Satisfaction Questionnaire (FLSQ). Physicians and subjects assessed severity of GL at maximum frown and at rest using the Facial Wrinkle Scale with Asian Photonumeric Guide (FWS-A).

Results: Mean total FLO-11 scores increased from 47.7 (baseline) to 75.9 (Day 120) ($P < 0.0001$), with mean improvement of ≥ 2 grades for most FLO-11 items maintained to Day 120. The majority of subjects were mostly or very satisfied with treatment, based on the FLSQ. The percentage of subjects with ≥ 1-grade improvement in FWS-A (responders) at maximum frown based on subjects' and physicians' evaluations were 93.1% and 97.1%, respectively, at Day 30, and 72.3% and 81.5% at Day 120 ($P < 0.0001$ for all). Among subjects with moderate or severe GL at rest, more than 70% were FWS-A responders at Day 120. All AEs were mild or moderate; none were related to onabotulinumtoxinA.

Conclusion: A single onabotulinumtoxinA (20 U) treatment following laser therapy was safe and effective in correcting GL for up to 120 days, as evaluated independently with PROs and physician scales.

ePoster - Surgery

E95

IMPACT OF A LASER SERVICE LINE FOR BURN SCAR ON A DEDICATED BURN OR'S FLOW AND PRODUCTIVITY

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Background: Our group began performing erbium-YAG 2940 wavelength fractional resurfacing of burn scar with billing of a single CPT code 17108 in our Level I burn center's dedicated burn operating room (OR) in January, 2016. The impact of these procedures on the performance of a mature, dedicated burn OR is unknown.

Study: All burn OR cases performed between January 1, 2015 and December 31, 2015 served as a pre-laser (PRE-LSR) historical control. A post-intervention cohort of laser-only cases (LSR) performed between January 1, 2016 and August 17, 2016 was then identified. Exclusion criteria for LSR were laser operations combined with other burn procedures. PRE-LSR and LSR cases were retrospectively reviewed for OR component times, and work relative value units (wRVU) billed.

Results: Six hundred twenty-eight total burn OR cases were done in 2015 (PRE-LSR), while 488 total burn OR cases were done between January 1-August 17, 2016. Of these 488, 59 were LSR (12.1%). Calculated on a monthly basis, significantly more cases were done per day in the LSR era ($2.2 + 0.4$ cases/day) than PRE-LSR ($1.6 + 2.0$ cases/day) ($p < 0.0001$). The LSR group was significantly shorter than the PRE-LSR group for all OR component times (induction, prep, and procedure all $p < 0.0001$; transport out, $p = 0.01$; room turnover, $p = 0.006$). Aggregate OR component time was $79.2 + 33.4$ minutes for LSR and $157.5 + 65.0$ minutes for PRE-LSR ($p < 0.0001$). LSR yielded $6.9 + 3.2$ wRVU/hr while PRE-LSR generated $12.2 + 8.9$ wRVU/hr ($p < 0.0001$).

Conclusion: Despite significantly shorter OR component times and more cases being done per day, laser treatment of burn scar using a single 17108 CPT code cuts wRVUs generated per hour in a mature burn OR roughly in half. Given its apparent clinical benefit, providers need to investigate strategies to ensure the financial viability of a laser/burn scar service line.

ePoster - Surgery

E96

A LASER-INDUCED PULSED WATER JET FOR ESOPHAGEAL SUBMUCOSAL DISSECTION

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Background: A new surgical modality for performing an endoscopic submucosal dissection (ESD) was recently developed for en bloc resection of early esophagogastrointestinal cancer. Here, we investigated the usefulness of the laser-induced pulsed jet device in esophageal ESD with layer selective dissection in swine.

Study: Pulsed water jets were ejected from a stainless nozzle by accelerating saline using the energy of a pulsed Ho:YAG laser. The optimal conditions for dissection were evaluated by changing the laser energy from 0.33 to 1.5 J/pulse. The device was used for the part of submucosal dissection in ESD. Samples were collected after the procedure, and thereafter were histologically evaluated using a light microscope. Each layer of esophagus was evaluated by measuring the breaking strength.

Results: The optimal laser energy necessary for the submucosal dissection was 1.0 to 1.5 J/pulse. The submocosal layer of the esophagus was selectively dissected with the device while preserving small vessels, without injuring the muscular layer, and also keeping the surgical field clear. Histological specimens showed clear dissection at the submucosal layer without thermal injury. The mean static breaking strength of the submucosa (0.11 ± 0.04 MPa) was significantly lower than that of the mucosa (1.32 ± 0.18 MPa), and propria muscle (1.45 ± 0.16 MPa).

Conclusion: It could achieve mucosal, submucosal, and muscle layer selectivity owing to the varied breaking strengths. Endoscopic pulsed jet system is a useful alternative for a safe ESD with minimum tissue injury for achieving selective submucosal layer dissection.

ePoster - Tattoo / Hair / Pigment

E97

TREATMENT OF A NEVUS OF OTA IN A CAUCASIAN PATIENT WITH A PICOSECOND 755 nm ALEXANDRITE LASER

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Background: Nevi of Ota are most common in Asian patients, with an estimated incidence of 2 per 1,000 persons in the Japanese population. They are rare in Caucasian patients, and acquired variants are exceedingly uncommon. The picosecond 755 nm alexandrite laser has been shown to be effective at treating recalcitrant lesions in Asian patients but has not been described in Caucasian patients.

Study: A 69-year-old Caucasian male, Fitzpatrick skin type III presented with spreading hyperpigmentation on the left side of his face. He states that as a teenager he developed blue/gray discoloration around his left eye, presumably as a result of trauma from a hockey puck. This hyperpigmented area remained stable in size and appearance for the next 50 years. One year prior he noticed the hyperpigmentation was slowly expanding to his temple, forehead and lower cheek. On physical exam the patient was found to have a poorly demarcated, blue-grey hyperpigmented patch that was most pronounced periorbitally but extended inferiorly to the infraorbital triangle, as well as superiorly and laterally to the forehead and temple. A biopsy demonstrated increased pigmentation of basal keratinocytes and a subtle, superficial and mid-dermal proliferation of stellate melanocytes consistent with dermal melanocytosis. The patient was treated three times, at 1–2 month intervals with the picosecond 755 nm alexandrite laser Treatment parameters were 2.88–3.49 J/cm^2 with a 2.7 mm spot size in non-overlapping pulses.

Results: Improvement of hyperpigmentation was noticed after the first treatment, with continued improvement after the second and third treatments. The procedure was well tolerated with minimal and temporary side effects including post-treatment erythema.

Conclusion: The picosecond 755 nm alexandrite laser is safe and effective at treating Nevi of Ota in Caucasian patients.

ePoster - Tattoo / Hair / Pigment

E98

TATTOOS AND LASER HAIR REMOVAL: IS THERE A SAFETY MARGIN?

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Background: Laser-assisted hair removal procedures are on the rise in aesthetic surgery. The principle of laser use for hair removal is based on the concept of selective photothermolysis, where the chromophore melanin in the hair follicle is targeted resulting in selective thermal injury. Exogenous tattoo pigments have specific wavelength peaks of absorption depending on ink composition. The black tattoo in particular has an absorption spectrum analogous to melanin, and therefore can be heated during laser hair removal.

Study/Results: A 31-year-old woman presented with an ulcer on one part of a tattoo over her right lower leg. Ten days prior to presentation she underwent laser-assisted hair removal by a diode device (800 nm) where the cosmetician treated the skin area over the tattoo. She subsequently developed erythema, edema, and blistering followed by ulceration. The skin apart from the tattoo was completely normal. Another 58-year-old man underwent laser-assisted hair removal from his shoulders and back by a diode laser (800 nm), during which the handpiece window (9×9 mm) was kept just at the edges of his right and left arms tattoos. He subsequently developed a second-degree burn on focal areas of both tattoos with partial loss of the tattoo pigment.

Conclusion: These two cases demonstrate that the use of laser devices requires profound knowledge of their mechanism of action. The tattoo-bearing area has an increased chromophore load which leads to absorption of excessive energy resulting in evaporation of the skin. Although in the second case the skin directly over the tattoo was not treated, skin burn could not be avoided. Therefore, taking into account the scattering of laser energy in the dermis and the reported spread of tattoo pigment, studies are needed to define a safety margin from the tattoo edge in order to minimize unwanted absorption of laser energy and consequential complications.

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E99

EFFECT OF RADIOFREQUENCY ENERGY IN HAIR REMOVAL IN SKIN TYPES V AND VI WHEN USED IN COMBINATION WITH THE ALEXANDRITE LASER

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Background: Hair removal with the 755 nm alexandrite laser has been utilized for many years. Although absorbed well by darker hairs, unfortunately, it also is absorbed well by higher Skin Types (ST), raising serious concern for undesired hypo- or hyperpigmentation. Radiofrequency energy (RF) has been added to both laser and IPL sources with the desire

to reduce light energies used and, therefore, reduce side effects. In this study, ST V–VI patients are treated with the alexandrite laser using low energies in combination with RF and compared to ST I–IV patients.

Study: Eight Skin Type V–VI and 13 ST I–IV patients were treated. The alexandrite laser was set at 10 mm, 4–10 J/cm^2, pulse durations 20–40 ms for ST V–VI and 8–18 J/cm^2 at 3–10 ms for ST I–IV, using higher energies and shorter pulse durations for lower ST. Simultaneously, the patients received bipolar RF at 17–30 J/cm^3. Treated areas included mainly the axillae and extremities. Each patient received four test areas treated four times varying the laser energy and RF in each quadrant. Hair counts were obtained by a blinded evaluator at 6 and 12 months post last treatment. Cutaneous effects were evaluated immediately post therapy and at follow-up.

Results: When evaluating all Skin Types, there was an average of over 70% hair reduction at 6 and 12 months at the higher laser/RF sites. For ST I–IV, hair reduction ranged from 40–70% depending on laser/RF energies. ST V–VI patients had similar reductions with all tested quadrants even while using significantly lower energies, except the lowest laser/RF quadrant which had less hair loss. Only transient perifollicular erythema and edema were seen including ST V–VI.

Conclusion: The addition of RF energy with the 755 nm laser has allowed for the application of less laser energy while maintaining significant hair loss. Darker Skin Types were safely treated using the alexandrite laser with RF energy.

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E100

SPLIT TATTOO COMPARISON OF TWO PICOSECOND LASER WITH DIFFERENT WAVELENGTHS FOR TATTOO REMOVAL

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Background: Picosecond lasers have been developed in recent years as a versatile complement to nanosecond Q-switched laser systems for the treatment of tattoo cover up and removal. Known to be safe and effective, nanosecond Q-switched laser tattoo treatments are often painful and requires often more than 20 treatments to achieve acceptable clearance. Picosecond lasers have been proven to safely and effectively treat multicolored tattoos.

Study: A total of 25 subjects were enrolled in a randomized safety and efficacy comparison study of two picosecond lasers which included a dual-wavelength (1,064 nm/532 nm), dual-pulse width, (750 ps, 2 ns) = LASER 1, and a dual wavelength (755 nm/532 nm) 750/550 ps pulse duration laser = LASER 2. Tattoos were divided equally into two portions. One portion was randomized to treatment using the LASER 1 system and the opposite portion was treated with the LASER 2 device. Subjects (11 males, 14 females) with Fitzpatrick Skin Type I–III were treated at a single center and received 2 to 7 treatments with each device, 4–6 weeks (±2 weeks) apart. Blinded assessment of baseline and 12 week post-treatment clinical photos was conducted using a five-point ordinal clearance scale representing percent improvement: $5 \geq 95\%$; $4 = 76–95\%$; $3 = 51–75\%$; $2 = 25–50\%$; $1 \leq 25\%$. At the end of the study the patient were asked which laser they prefer to finish treatment if needed.

Results: The majority (80%) of tattoos contained multiple ink colors including black, red, orange, yellow, green, blue, and white and were large (at least 2–3 "hands") in surface area. Twenty percent of tattoos contained mainly black pigment. Each blinded reviewer rated the amount of clearing following treatment with each of two laser systems. The data were analyzed by a repeated measures analysis of variance that included the effects of reviewer and device. The resulting mean scores for each device were 2.68 following treatment with the Laser 1 system and 2.49 following treatment with the Laser 2 device ($p = 0.056$). Patients with multicolor tattoos prefer a multimodal treatments with both systems. Hypo/Hyperpigmentation were somewhat more frequent with LASER 1 however the system seems to be more powerful and patient asks to be treated with this systems if high amount of ink was implanted in thick skin (shoulder//tramp stamp).

Conclusion: 2 ns LASER 1 were more painful than ps LASER. LASER 1 was the better Option for red and yellow but LASER 2 for green and blue. LASER 1 showed a slightly greater improvement in the statistical analysis but practically speaking, the clinical performance of LASER 1 & 2 appeared comparable (LASER 1 better eg in cases with a high amount of black ink particles deep implanted in the skin). Safety of both laser systems was evident. Treatment responses were mild, transient in nature and were common to both treatment modalities. Responses included erythema, edema, pinpoint bleeding, purpura, and sensitivity to touch. If blistering occurs it heals fast without scarring.

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E101

SUCCESSFUL TREATMENT OF NEVUS OF OTA IN A CAUCASIAN GIRL WITH Q-SWITCHED 755 nm ALEXANDRITE LASER

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Background: Nevus of Ota is a benign melanocytic lesion of the face, most commonly seen in Asian women and children, and very rarely in Caucasians. Approximately half of lesions appear at infancy, with the remainder peaking during adolescence. The nevus presents as unilateral blue-gray macules and patches along the first and second branches of the trigeminal nerve. Histopathology reveals dermal dendritic melanocytes between collagen bundles. Given the cosmetic appearance, these lesions cause significant psychosocial distress to patients. Treatment with topical hydroquinone, cryosurgery, and dermabrasion, are often unsuccessful given dermal location of pigment. With the use of selective photothermolysis,

pigment targeting lasers, such as Q-switched (QS) ruby, alexandrite, and ND:YAG have been successfully used to lighten, and often completely remove these lesions. Adverse effects are rare, but hypopigmentation, scarring, and recurrence should be considered. We report a case of Nevus of Ota in a Caucasian female, treated successfully with QS 755 nm alexandrite laser.

Study: A 12-year-old girl presented with a 3-year history of asymptomatic skin discoloration of the right face. On physical exam, the right temple, right infraorbital area, and right cheek showed light gray-brown macules in a more diffusely blue-gray patch, measuring 7.7×7.0 cm in size. Clinical presentation of Nevus of Ota was confirmed with histopathology. Given the cosmetic disfigurement, laser treatment was considered.

Results: Patient was successfully treated with Q-switched 755 nm alexandrite laser, with energy fluence of 5.0–5.5 J/cm^2, for a total of eight treatments with nearly complete resolution of the nevus. There were no adverse reactions.

Conclusion: Given the rarity of Nevus of Ota in the Caucasian population, it is important for dermatologists to be familiar with the diagnosis and successful use of Q-switched 755 nm alexandrite laser in this clinical setting.

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E102

UNSUSAL HYDROQUINONE HYPERPIGMENTATION AND RESPONSE TO TREATMENT WITH PICOSECOND LASER

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Background: Hydroquinone is a widely utilized for treatment of hyperpigmentation disorders of the skin. Although hydroquinone is one of the primary causes of exogenous ochronosis, other forms of paradoxical hyperpigmentation have not been reported. We report an unusual case of hydroquinone induced hyperpigmentation without evidence of ochronosis, treated successfully with picosecond laser.

Study: A 54-year-old man with no significant past medical history, presented with darkening of the skin on hands and face, following the use of topical hydroquinone for approximately 9 months.

Results: Biopsy of the skin revealed dermal melanin deposition (Image 1), with lack of ochre colored deposit typical of ochronosis. Iron staining and silver granules were absent. The melanin deposition pattern was suggestive of post-inflammatory hyperpigmentation (PIH) as well as minocycline hyperpigmentation, which can cause a melanin-only pigment deposition in a sun-exposed distribution. Patient's hands and face were treated with 6 picosecond laser treatments. He had significant improvement in pigmentation on both sites with minimal side effects.

Conclusion: This case report presents a unique form of hydroquinone paradoxical hyperpigmentation, resembling PIH changes on pathology. The mechanism behind this case is unclear, however is likely related to photosensitive dermal melanin deposition. Possible mechanism would be post inflammatory melanin production secondary to photosensitization by hydroquinone or its byproducts. Other possibility is PIH due to hydroquinone contact dermatitis, or a similar process to minocycline induced pigmentation. Picosecond lasers are used to remove blue and green tattoo pigment, however their use in drug induced pigmentation has not been well studied. This paper reports an unusual hydroquinone pigmentary changes similar to PIH or MIH, treated successfully with 6 Sessions of picosecond alexandrite laser. A biopsy may be necessary to distinguish such pigmentary changes from hydroquinone induced ochronosis, as this may affect treatment.

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E103

COMPARISON OF MELASMA TREATMENT PERFORMANCE IN RUBY, ALEXANDRITE AND Nd:YAG LASER

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Background: Melasma is a treatment-resistant and acquired pigmentary facial skin condition of uncertain etiology particularly prevalent in the older Asian female. Low-fluence 1,064 nm Q-switched Nd:YAG laser has been widely used for the treatment of melasma. A procedure called "laser toning" that uses a low-energy 1,064 nm Q-switched Nd:YAG laser was recently introduced for the treatment of melasma, demonstrating good results. A combination of low fluence Q-switched Nd:YAG laser with azelaic acid is a promising option for the treatment of melasma and needs to be further explored. Recently, low fluence collimated Q-switched Nd:YAG laser has drawn attention for the treatment of melasma. Repetitive subthreshold pulsed laser treatments at low fluence with the Nd:YAG laser is an effective modality for treating melasma. Q-switched 1,064 nm Nd:YAG laser toning offered superior results in the treatment of melasma in the Japanese skin type compared with the Q-switched ruby laser. Lower-energy QS Nd:YAG and QS alexandrite laser can be used to treat patients with melasma safely and effectively. In our study, we have compared the therapeutic efficacy of low fluence Q-switched Nd:YAG laser, Q-switched ruby laser, and Alexandrite laser treatment of melasma in three study groups.

Study: Eighteen Korean patients diagnosed as melasma were included. These patients were randomly divided in three groups (Group A = 6 patients of melasma treated with low-fluence Q-switched Nd:YAG laser at 2 weeks intervals, Group B = 6 patients of melasma treated with ruby laser at 2 weeks intervals, Group C = 6 patients of melasma treated with alexandrite laser at 2 weeks intervals). Study period and follow-up period was of 12 weeks each. Effects to treatment was assessed using melasma area with skin brightness. Nd:YAG and

alexandrite laser used in one equipment (Bison Medical, Seoul, Korea). ruby laser was used another equipment (Bison Medical, Seoul, Korea).

Results: In case of ruby laser treatment, mean skin brightness before laser treatment was 141.2 and that of after laser treatment was 146.6. Mean skin brightness of alexandrite laser treatment was 148.1 and that of after laser treatment was 165.0. Mean skin brightness of Nd:YAG laser treatment was 119.9 and that of after laser treatment was 127.8. But all of these difference was not significant statistically. Difference of minimum skin brightness of ruby laser and Nd:YAG laser, Standard deviation of skin brightness of alexandrite laser were significant statistically ($P < 0.05$). Mean skin brightness difference of alexandrite laser was 16.9 and that of Nd:YAG laser was 7.9, and that of ruby laser was 5.5. And this differences were significant statistically ($P = 0.020$). Maximum skin brightness difference of these three lasers were from 3.0 to 29.4, and this difference was significant statistically ($P = 0.008$).

Conclusion: Ruby, alexandrite, and Nd:YAG laser were effective to melisma treatment. Among those lasers, alexandrite laser's performance of melisma treatment was superior than other lasers in ruby laser and Nd:YAG laser. As the laser treatment for melasma, standard deviation of skin brightness were decreased, and it means skin color improved to even distribution by laser irradiation.

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E104

EVALUATION OF 755 nm PICOSECOND ALEXANDRITE LASER FOR NEVUS OF OTA IN CHINESE

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Background: The 755 nm picosecond laser system has been shown to be effective on the removal of Nevus of Ota. Nevus of Ota is a benign dermal pigmented condition which seen as blue–gray patches on the faces of darker skin type, especially Asians. The purpose of this study was to evaluate the efficacy and safety of 755 nm picosecond alexandrite laser in the treatment of Nevus of Ota in Chinese.

Study: Twenty subjects diagnosed Nevus of Ota with Skin Types III–IV were enrolled into study. A 755 nm picosecond alexandrite laser system was used to treat all patients with fluence between 4.07 and 6.37 J/cm^2. The treatment intervals varies from 3 to 6 months. Baseline and follow-up pictures were taken and then evaluated independently by two dermatologists. Clinical improvement and adverse events were assessed.

Results: One patient has received 4 Txs, three patients have received 3 Txs, and 16 patients have received 2 Txs. More than 75% clearance was achieved in four patients with 1 Tx, 51–75% in four patients with 1 Tx, and less than 50% in 12 patients with 1 or 2 Txs. One patient with hyperpigmentation after one treatment was observed. No other adverse events were observed in other patients.

Conclusion: The 755 nm picosecond alexandrite laser showed significant improvement in Chinese Nevus of Ota patients over three or fewer treatments with minimal adverse events.

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E105

NITROUS OXIDE ADMINISTRATION AS ANALGESIA FOR LASER TATTOO REMOVAL

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Background: Laser Tattoo removal continues to represent a growing field. Nearly four-in-ten Americans have at least one tattoo and about half of those with a tattoo have a least one more. According to a 2016 Harris poll, 23% of individuals with a tattoo regret getting a tattoo. This number has risen significantly since 2012 when 14% of respondents noted regret. Numerous studies have shown an increase in the number of tattoo removal treatments. Currently most providers offer either topical analgesia or injected local anesthetic. Reducing the procedural pain of tattoo removal will lead to a more pleasant experience and encourage people with tattoo regret to undergo treatment rather than live with an unwanted tattoo. Nitrous Oxide has been used for years to provide quick and safe anesthesia for minor procedures. This study was used to measure it's effectiveness in reducing discomfort during laser tattoo removal.

Study: From July 2014 through September 2014 patients were surveyed immediately after laser tattoo removal. Procedures were performed at a single location using a Q-switched YAG laser and/or a Q-switched Ruby Laser. Patients were asked to rate pain level on a 1–10 scale as experienced during the procedure and then immediately after the procedure. Analgesia was provided for all patients, but different methods were used. Analgesia types used included EMLA cream alone, Lidocaine 1% with 1:100,000 epinephrine injections (LI) alone, EMLA and LI, Nitrous oxide, Nitrous oxide with LI and Nitrous oxide with EMLA and LI. A total of 23 patients underwent a total of 41 procedures. Other data collected included and post-procedure side effects including nausea, vomiting, anxiety, headache, and dry throat. Additionally the survey asked patients if they used ibuprofen or acetaminophen prior to the treatment. Treatment duration was recorded, along with size of the tattoo being treated.

Results: Data was analyzed to find the mean for pain level for each category of analgesia. Results show that EMLA only is the least effective form of analgesia with an average pain rating of 9.1 during treatment. Treatments using LI showed a significant reduction on the pain scale dropping to 5.4. Interestingly, the use of EMLA and LI

injections was rated to be more painful than LI alone (6.8 compared to 5.4). Finally, the use of Nitrous oxide with or without additional analgesia showed the greatest reduction in both procedural pain and post-procedure pain. Pure nitrous actually resulted in lower pain score than use of nitrous oxide with the combination of LI and EMLA (2.6 compared to 3.6) Average treatment time for non-nitrous cases was 4 minutes. Cases involving nitrous oxide administration were significantly longer, ranging from 15 to 35 minutes with an average of 27 minutes. Three patients out of the 12 patients who had treatments with nitrous oxide noted anxiety. This was the only noted side effect with no reported cases of nausea, vomiting, headache, or dry throat.

Conclusion: Reducing the procedural pain of tattoo removal will lead to a more pleasant experience and encourage people with tattoo regret to undergo treatment rather than live with an unwanted tattoo. Our survey showed EMLA alone provides relatively little analgesia and should not be considered adequate for most patients. The addition of LI substantially reduced pain whether used with or without EMLA, but pain scale is still rated over 5 for these forms of analgesia. The addition of nitrous oxide further reduced pain score. It is interesting that patients using nitrous without LI reported less pain (2.6) than those with (3.6). This could be a result of our small sample size (only three patients used NO without LI), or that the injections with the lidocaine stimulated the patient despite the nitrous oxide. NO may show most benefit in larger tattoos, including full sleeve or larger back tattoo where lidocaine dosing would be an issue. Treatment time was notably longer with nitrous oxide and this must be considered from a financial standpoint. Additionally, many offices use physician extenders for tattoo treatments, and with nitrous oxide administration our office uses only physicians. Still, the low complication rate, and the ability for patients to drive themselves after treatment make offering nitrous oxide a reasonable approach in patients with larger tattoos, poor pain tolerance, or anxiety related to the process.

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TREATMENT OF BENIGN PIGMENTED LESIONS WITH LONG-PULSED ALEXANDRITE LASER IS STILL A VIABLE TREATMENT OPTION

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Background: Reports of long-pulsed 755 nm alexandrite laser treatment of benign pigmented cutaneous lesions (BPCL) began surfacing in the literature around the year 2000. More recently, most case reports and reviews in the literature for treatment of BPCL have focused on using picosecond or quality-switched nanosecond lasers for treatment. This presentation details our clinic's experience that the long-pulsed alexandrite laser still is a viable treatment option for BPCL treatment.

Study: The four types of BPCL in this case series were seborrheic keratoses, a solar lentigo, a Becker's nevus, and a congenital melanocytic nevus. All four BPCL types were each treated with the long pulsed 755 nm alexandrite laser (Gentlease) with settings of 6 mm spot size, 70–75 J/cm^2, a pulse width of 1.5 ms, and dynamic cooling device (DCD) of 20/20. Topical numbing was used in all cases. Additionally, infiltration with lidocaine was used for the congenital melanocytic nevus. Adjunctive inhaled nitrous oxide was used for the patient with the Becker's nevus.

Results: The seborrheic keratoses and solar lentigo responded with a single treatment. The Becker's nevus and congenital melanocytic nevus required multiple treatments spaced at least 6 weeks apart. Complications of scarring were not noted. Some hypopigmentation was noted with multiple treatments of the Becker's nevus. The long pulsed alexandrite laser is useful for treatment of BPCL because it can target the deeper melanocytes, especially those in and around the hair follicle.

Conclusion: The long pulsed 755 nm alexandrite laser remains a viable treatment option in the treatment of BPCL including those instances where Q-switched or nanosecond lasers were not successful. The long pulsed 755 nm alexandrite laser should be considered first-line treatment in certain instances.

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E107

FRACTIONATED ABLATIVE ERBIUM AS AN ADJUNCTIVE TREATMENT FOR STUBBORN TATTOO INK

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Background: The interest in ornamental tattoo removal has increased along with their increased prevalence. More and more, consumers are insisting on tattoo ink removal without scarring or dyspigmentation. Our clinic's experience is that the risk of dyspigmentation and scarring increases when higher fluences of the Q-switched or picosecond lasers are required to remove stubborn tattoo ink. For cases of tattoos with difficult to remove ink, one treatment option is to use an ablative erbium laser prior to treatment with the dedicated tattoo removal laser.

Study: Fractionated ablative erbium was used prior to treatment of tattoos with either a Q-switched or picosecond laser. Two different methods were used to deliver fractionated Er:YAG pulses: One method employed a device to deliver columns of Er:YAG using a fixed fractional handpiece using settings of 7 mm, 22.8 J/cm^2, long pulse. The second method deliver individual columns spaced several millimeters apart using either an Er:YAG laser with settings of 2 mm, 14 J/cm^2, long pulse, or the a combination Er:YAG/CO_2 laser with settings of 0.1 mm (defocused to 1–2 mm), 0.1–0.6 J/cm^2, and a pulse width of 250 ms.

Results: Pretreatment of tattoos with fractionated ablative erbium helped fade stubborn tattoo ink better than

using a dedicated tattoo removal laser alone. The microcolumns created by the fractional erbium treatment allows the gases created with the Q-switched or picosecond laser treatment to escape and several effective passes with the tattoo treatment laser are therefore possible. Furthermore, the presence of the fractionated columns, minimizes the risk of bullae formation allowing for a safer increase in fluence.

Conclusion: Fractionated erbium lasers are a useful adjunct for removal of tattoo ink. Higher fluences and multiple passes can be used with the tattoo removal laser and the risk of bullae, scarring, and dyspigmentation from these higher fluences is minimized.

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E108

USE OF THE 532 nm Q-SWITCHED NEODYMIUM-DOPED YTTRIUM ALUMINIUM GARNET LASER FOR THE TREATMENT OF RECALCITRANT RE-REPIGMENTATION IN VITILIGO

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Background: Vitiligo is a disorder characterized by the development of depigmented patches and macules. Patients with extensive involvement may opt for depigmentation with monobenzyl ether of hydroquinone. However, after depigmentation, a subset of patients note significantly darker repigmentation that is resistant to treatment with MBH. Here, we present a vitiligo patient with recalcitrant repigmentation after depigmentation with MBH that was responsive to treatment with the 532 nm Q-switched neodymium-doped yttrium aluminium garnet (Nd:YAG) laser.

Study: The patient was treated with two sessions of the 532 nm Q-switched Nd:YAG to hyperpigmented areas on the face and ears. Laser settings used were a fluence of 3.4–3.5 J/cm^2, a frequency of 5, and a spot size of 4. The intermediate endpoint was immediate whitening of the skin. The second session occurred approximately 15 weeks after the initial session. The patient tolerated the treatment well and did not report any adverse events. He was prescribed 30% MBH after the second treatment session for daily use along with counseling on rigorous photoprotection.

Results: At the time of initial treatment, the patient had hyperpigmented patches covering approximately 40% of his face, mainly involving the bilateral temples, upper-mid cheeks, and periorbital regions. Fifteen weeks after the first session with the 532 nm Q-switched Nd:YAG, hyperpigmented patches remained on only 10% of the face; mainly the periorbital region and temples. Slight improvement was documented 6 weeks after the second treatment, with hyperpigmented patches noted on approximately 5% of the face.

Conclusion: Treatment with the 532 nm Q-switched Nd:YAG is a viable treatment option for vitiligo patients who have undergone depigmentation with subsequent development of hyperpigmented repigmentation that is refractory to treatment with MBH.

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E109

A SPLIT-FACE COMPARISON OF QUASI-LONG PULSED ALEXANDDRITE 755 nm LASER *VERSUS* COMBINATION QUASI-LONG PULSED ALEXANDRITE 755 nm AND LONG PULSED Nd:YAG 10,64 nm LASER FOR MELASMA

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Background: Melasma is a common acquired pigmentary disorder. The pathogenesis of melasma is complex and not well understood. Both quasi-long-pulsed Alexandrite and long-pulsed Nd:YAG 1,064 nm lasers have been proposed as one of the laser treatments for non-invasive photorejuvenation with additional favorable results on pigmentary lesions. (1) The long-pulsed Nd:YAG laser also improves facial telangiectasia and facial flushing which may have a therapeutic effect on the vascular etiology of melasma. However, there are no reports assessing the effects of quasi-long-pulsed Alexandrite 755 nm laser combined with or without long-pulsed Nd:YAG 1,064 nm laser for treatment of melasma in Asian skin. Objectives: To evaluate the efficacy and safety of quasi-long-pulsed Alexandrite 755 nm laser and quasi-long-pulsed Alexandrite combined with long-pulsed Nd:YAG 1,064 nm laser in Asian melasma patients.

Study: Eighteen patients with mixed-type and dermal melasma on both cheeks were enrolled to receive six weekly laser sessions. One side of the face was randomly assigned to receive six quasi-long-pulsed Alexandrite 755 nm laser while and the other side was treated with quasi-long- pulsed Alexandrite alternating with long-pulsed Nd:YAG 1,064 nm treatments (three sessions each). Patients were evaluated at baseline, every treatments, 2, 4 weeks after the last treatment. Outcome assessments included; colorimeter, Visioscan measurement of skin surface change, standardized clinical photographs obtained from VISIA, modified Melasma Area and Severity Index score (mMASI), patients' satisfaction score and adverse effects.

Results: All 18 patients completed the six laser treatments. There were seventeen females and one male with skin type IV–V, mean age of 47.61 ± 9.26 years. Their melasma can be classified into five dermal and 13 mixed-type melasma with the median disease duration of 9.6 years (1–29 years). After six treatments the skin lightness index in Alexandrite alternating with Nd:YAG 1,064 nm side and Alexandrite side increased with statistically significance ($p < 0.01$ and $p = 0.02$, respectively). At 1-month follow-up, mMASI score demonstrated slight improvement. Alexandrite alternating with Nd:YAG 1,064 nm achieved more improvement than Alexandrite

monotherapy (12.7% and 9%, respectively). Average roughness improved significantly for both Alexandrite alternating with Nd:YAG 1,064 nm and Alexandrite monotherapy ($p < 0.01$ and $p = 0.02$, respectively). However, most of the patients had graded the clinical result as minimal to no improvement in melasma (0–25%). No serious adverse effects were found.

Conclusion: Quasi-long pulsed alexandrite 755 nm laser with or without long-pulsed Nd:YAG 1,064 nm gave minimal improvement of dermal and mixed-type melasma.

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E110

CLEAN SLATE PROGRAM

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Background: Tattoos are common in our society; however, they can represent more than cultural tradition and art. Tattoos have been identified as indicators for harmful social affiliations (i.e., gang involvement), exposure to harmful settings (e.g., prison, jail), or a propensity for risk-taking (e.g., illicit drug use). The Federal Bureau of Investigation has noted that even when harmful social ties have been severed, community re-entry may be jeopardized because of the presence of tattoos. The Clean Slate Program aims to provide FREE laser tattoo removal for individuals that have visible tattoos with criminal justice histories or those who may be at risk for entering the criminal justice system.

The Clean Slate Program aims to provide funding and resources for dermatology physicians and residents at the University of California San Diego (UCSD) to undergo the training necessary to use medical laser equipment for tattoo removal, patient evaluation, and aftercare. This is a voluntary community outreach and global health program performed by the UCSD faculty and residents.

Study: This is an ongoing community service and global health project. Funding provided for an alexandrite Q-switched laser (Syneron-Candela, Wayland, MA) and supplies for each laser tattoo removal session. Patients eligible for laser tattoo removal must have a tattoo in a visible region; be able to provide informed consent for tattoo removal; be referred by San Diego County Probation or Federal Probation and plan to reside in San Diego for at least 1 year during the removal process to ensure continuity of care. Patients are offered monthly treatments by UCSD dermatology faculty and residents. Surveys performed during each treatment visit to evaluate social and economic changes in the patients' lives.

Results: The Clean Slate Program has conducted 39 tattoo removal sessions thus far. Most of the participants (87.5%) reported that participating in the Clean Slate Program may have a positive impact on their next court presentation. Effective attendance has fluctuated between 27% and 67%, with an average no-show rate of 51.3%.

Conclusion: The Clean Slate Program has eliminated economic barriers to laser tattoo removal for criminal justice populations on probation. The Clean Slate Program has provided an excellent environment for UCSD faculty and residents to be trained in laser tattoo removal and participate in a meaningful community and global health project.

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COMBINATION THERAPY FOR THE TREATMENT OF EXOGENOUS OCHRONOSIS

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Background: Ochronosis is the dermal deposition of pigmented fibers resulting in hyperpigmentation on the sun-exposed areas on the face and neck. Exogenous Ochronosis (EO) has been described as an uncommon entity, and classically results after topical hydroquinone use. EO is notoriously difficult to treat, and previously studied treatments have included retinoic acid, non-hydroquinone bleaching agents, cryotherapy, TCA, tetracyclines, antimalarial agents, corticosteroids, photoprotection, and discontinuation of the offending agent. In addition, several laser modalities have been utilized including CO_2, Q-switched ruby, Q-switched alexandrite, Nd:YAG, IPL, and Er:YAG. These treatments have been used in isolation and in different combinations with varying degrees of success.

Study: A 74-year-old female presented to clinic for evaluation of worsening dark patches on her cheeks. She reported a history of melasma and hydroquinone use for numerous years. On initial evaluation, a biopsy was performed to confirm the diagnosis of exogenous ochronosis. She subsequently underwent an initial test period, followed by several laser treatments in succession. She was treated with a combination of Q-switched Nd:YAG 1,064 nm, Q-switched alexandrite 755 nm, and Fractional CO_2, in 1–4 month intervals, 24 times over the past 5 years. Primary laser end points included purpura and hyperpigmentation. Treatment was supplemented with photo-protection and abstinence from hydroquinone. Improvement was evaluated based on pre-procedural, immediate, and delayed procedural photographs in accordance with the Dogliotti and Leibowitz EO severity scale.

Results: The patient showed progressive improvement following each combination laser treatment. Immediate post-procedural photographs revealed varying degrees of erythema, hyperpigmentation, and purport at higher fluency levels. Ultimately, her severity index was reduced from a II–III to less than I. Subjectively, the patient felt that she had a complete response to treatment.

Conclusion: We report the first case of exogenous ochronosis successfully treated with a combination of CO_2, Q-switched Nd:YAG, and alexandrite laser.

ePoster - Tattoo / Hair / Pigment

E112

SAFETY AND EFFICACY OF PICOSECOND Nd:YAG LASER FOR TREATMENT OF PEDIATRIC CONGENITAL MELANOCYTIC NEVI

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Background: Although picosecond (PS) Nd:YAG has been predominantly studied for tattoo removal, it is proving to be safe and effective treatment for a variety of pigmentary disorders. Medium sized congenital melanocytic nevi (CMN) are a common concern in pediatric dermatology. Surgical excision remains the first line treatment, but largely undesirable due to risks of general anesthesia and postoperative scarring. Non-invasive options with more acceptable cosmetic outcomes are frequently desired in this age group. Q-switched (QS) pigment lasers, in particular, QS ruby have been the most extensively studied for treatment of CMN, though residual dermal pigment, large number of treatments (mean 8–10), and post inflammatory hypopigmentation pose caveats. We describe the first report of a pediatric CMN successfully treated with picosecond Nd:YAG laser.

Study: A 15-year-old male with a medium sized CMN on the chest (8×10 cm) was treated with a single pass of 1,064 nm Nd:YAG (3 mm spot size, 5.5 J) and a single pass of 532 nm Nd:YAG (3 mm spot size, 2.8 J). Treatments were spaced 1–2 months apart. Local anesthesia was achieved with 3:7 dilution of 1% lidocaine with normal saline.

Results: An overall 60% improvement in pigment was achieved after three treatment sessions. The patient tolerated the procedure with no complications. No adverse events such as blistering and post inflammatory hypopigmentation were observed. Pigmentary clearance remains stable at 6 month follow up.

Conclusion: Our results demonstrate a novel clinical application for picosecond Nd:YAG laser in the treatment of pediatric CMN. It serves as a valuable addition to a dermatologist's therapeutic armamentarium for small to medium CMN in cosmetically sensitive areas where surgical scars are unacceptable. Larger studies and longer follow-up is required to optimize parameters and determine longevity of pigmentary clearance.

ePoster - Tattoo / Hair / Pigment

E113

SUCCESSFUL TREATMENT OF LICHEN PLANUS PIGMENTOSUS HYPERPIGMENTATION WITH ALEXANDRITE 755 nm LASER

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Background: Lichen planus pigmentosus is a rare inflammatory, idiopathic disorder, resulting in cosmetically disfiguring grey-brown hyperpigmentation of the skin. While difficult to treat, small case series and case reports have shown some clinical response to topical tacrolimus and/or neodymium:yttrium-aluminum-garnet 1,064 nm laser. As very few successful treatments have been described in the literature, we tested three different light and laser modalities in treating lichen planus pigmentosus hyperpigmentation.

Study: A 62-year-old female was diagnosed with likely lichen planus pigmentosus. While topical corticosteroids, azelaic acid, hydroquinone, and glycolic peels were not effective, treatment with tacrolimus 0.1% ointment decreased the background inflammation and erythema. However, as the hyperpigmentation persisted, test spots were treated with Q-switched Alexandrite 755 nm laser, fractionated CO_2 10,600 nm laser, and intense pulsed light.

Results: Of the tested lasers, Alexandrite laser resulted in clinical lightening of the hyperpigmentation. In contrast, fractionated CO_2 laser resulted in erythema without other benefits, and no appreciable benefits were observed from intense pulsed light.

Conclusion: Given the improvement observed, we recommend Alexandrite laser as a potential treatment tool for lichen planus pigmentosus hyperpigmentation, over fractionated CO_2 or intense pulsed light. Further exploration with different laser treatment modalities may provide other options for this rare disorder.

ePoster - Vascular Lesions

E114

CAN ECCHYMOSES RESOLVE IN 24 HOURS?

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Background: Cutaneous echymoses represents a potential social impairment due to cosmetical concerns, mainly in those patients with extensive hematomas affecting noncovered areas. Therefore, the effective and safe treatment of echymoses would have an emotionally, socially, and even economically positive impact. The objective of this study was to describe the effectivenes and security of PDL as a potential treatment of echymoses of any origin and in any localization.

Study: Prospective study in which patients with cutaneous echymoses of any origin were included for treatment with PDL. Different settings were used during laser sessions: 10 mm; 7–8 J/cm^2 0.5–6 ms. Only certain parts of the echymoses were treated and the rest was left as control. Response was measured at day 1 and 7 post-treatment by two blinded observers, considering the variation in the intensity of the hematoma in as subjective scale from 0 to 4. *In vitro* and histological examinatios were also performed.

Results: In total, 20 patients were included. Most of the cases were echymoses due to trauma or surgical procedures. Best results were found among patients with severe hematomas (ranged as 4 initially), with most of the clearing completely. Worst response were found when

treating mild hematomas in which PDL had no effect or even worsening. Histological evaluation showed resolution of extraluminal red cells after PDL.
Conclusion: PDL seems to be an effective, safe and fast solution for severe cutaneous hematomas.

ePoster - Vascular Lesions

E115

THE EXPERIENCE OF A LARGE GROUP LASER PRACTICE TREATING VASCULAR LESIONS AROUND THE EYE

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Background: Laser therapy represents an important modality for treating vascular lesions around the eye, especially given surgical options in this area are limited by functional boundaries and free margins. Unfortunately, many laser practitioners are fearful of treating in this area and potentially exposing the retina to the deleterious effect of the wavelengths involved. This large series was compiled to demonstrate the safety of using vascular lasers around the eye when appropriate precautions are taken.
Study: This was a retrospective chart review of patients of all ages treated in our practice over the last 15 years for a variety of vascular lesions around the eye including infantile hemangioma, capillary malformation, and reticular veins. Wavelengths used included 532, 595, and 1,064 nm. All procedures were performed without general anesthesia. Stainless steel contact lenses were placed when treatment was performed close to the eyelid margin. Treatment within the orbital rim was avoided when the 1,064 nm wavelength was used.
Results: Five hundred and sixty-four patients were identified. Ages spanned from one day old to 85 years old. There were 34 cases of infantile hemangioma, 522 cases of capillary malformation, and eight cases of periorbital reticular veins. All were treated with topical or no anesthesia. Eye shields were used in 70% of cases. There were no ocular complications.
Conclusion: Treatment of vascular lesions around the eye with wavelengths of 532, 595, and 1,064 nm is safe when performed by experienced laser surgeons and when appropriate precautions are taken, including corneal shields when necessary and avoiding longer wavelengths within the orbital rim. In this large series of 564 patients, there was not a single ocular complication.

ePoster - Vascular Lesions

E116

IPL *VS.* PULSED DYE LASER IN TREATMENT OF FACIAL ERYTHEMA

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Background: Lasers and non-coherent intense pulse light sources effectively treat vascular lesions. Intense pulsed light (IPL), a nonablative treatment for photo rejuvenation, uses a flashlamp which emits noncoherent light between 400 and 1,400 nm. The light may be filtered in order to target a specific chromophore. The pulsed dye laser (PDL) has become the facial vasculature standard of care with wavelengths at 595 nm. This device can be used with both purpuric and more cosmetically elegant non-purpuric parameters.
Study: The objective of this study is to evaluate the clinical outcomes of facial erythema following two treatments of PDL on non-purpuric settings compared to IPL with a 560 filter. Fifteen subjects, Fitzpatrick skin types I–III, with bilateral facial erythema were enrolled. A split-face study was conducted where subjects' right half of the face was treated with non-purpuric settings using PDL with fluence set at 7 J/cm^2 with a 6 msec pulse duration with anesthesia provided by air cooling. The left half of the face was treated with IPL using a 560 nm filter at 20 J/cm^2 with a pulse duration of 30 msec with contact cooling set at 20°C. The subjects had a repeat treatment at day 30 using the same protocol, and were evaluated 90 days after the second treatment. Post-treatment photos were evaluated by a blinded non-treating physician.
Results: Equivalent reduction in facial erythema was noted with both the IPL and the PDL after two treatments at 90 days post-treatment evaluation.
Conclusion: Traditionally, the standard of care for energy based treatment of facial erythema has been PDL. Our study demonstrates that multiple energy based devices may be successfully employed. IPL therapy has equal efficacy to non-purpuric settings of PDL in the treatment of facial erythema.

ePoster - Vascular Lesions

E117

TO TEST OR NOT TO TEST: A STUDY EXAMINING THE RETURN RATES OF ROSACEA PATIENTS WITH PULSED DYE LASER

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Background: Pulsed dye laser (PDL) is a treatment option for patients with erythematotelangiectatic rosacea. Oftentimes, treatment with the PDL is considered cosmetic. Test spots allow patients to experience the procedure on a small area prior to further treatment. We sought to formally investigate whether use of a no charge test spot influenced return rate for further PDL treatment. We hypothesized that use of a test spot would increase patient return rate for further PDL therapy.
Study: Data were obtained retrospectively for rosacea patients seen at the University of Minnesota Health between June 2015 and November 2016 using ICD-10 codes (L 71-Roscea, L 71.1-Rhinophyma, L 71.8-Other rosacea, and L7 71.9-Rosacea, unspecified). Patients were then stratified to the test spot group or the direct treatment group.

Results: Sixty charts were identified, and 26 (43.3%) patients initially received a PDL test area free of charge. Amongst these 26 patients, 8 (30.8%) returned for further PDL treatment. Thirty-four (56.7%) patients did not receive the PDL test spot, only direct PDL treatment of at least one area of the face. Sixteen (47.1%) of those who received direct treatment returned for further treatments. Thus, patients who received the test spot laser treatment had a lower return rate compared to those who did not. This difference was not statistically significant (Fisher's exact test $p = 0.2883$).

Conclusion: Factors which may have contributed to the decreased return rate include: The cost of PDL treatment, discomfort associated with treatment, and not achieving expected results with the test area. Drawbacks of this study include variable test spot side and settings. Implementation of a post-PDL treatment questionnaire may aid in identifying factors which influence PDL treatment return rates.

ePoster - Vascular Lesions

E118

TREATMENT OF EXTENSIVE NODULAR HEMANGIOMAS BY ALEXANDRITE LASER

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Background: A 54-year-old woman with anticoagulant therapy consult for painful vulvar hemorrhagic lesions growing for 1 month. On examining, the lesions appeared as multiple purple nodules progressively increasing. The lesions are developed on the labia majora, with an extension at the pubic region. A biopsy confirms the angiomatous nature of the lesions. Two tests were done: One with pulsed dye laser (pam7 mm 12 j 3 ms) the other with alexandrite laser (pam6 mm 100 j 40 ms).

Study: The evaluation of the results is carried out on day 21. Lesions tested Alexandrite appear significantly improved than those treated with pulsed dye laser. An extensive treatment of all labia external injuries was then produced with Alexandrite laser. During the treatment non-ulcerated lesions turn white immediately after the pulse while ulcerated lesions increased bleeding. Healing requires a fortnight. The control consultation found an improvement of 80% of the hemangiomas.

Results: Relative to pulsed dye laser alexandrite has most advantages: High penetration, thermal effect, and selective absorption in the spectrum of hemoglobin [1]. Multi-resistant angioma treatments have been reported with alexandrite laser [2] with a scar risk [3] due to low vascular specificity. But this wavelength may be very useful in the presence of thick angiomatous lesions as some venous angioma. Low penetration of 595 nm pulsed dye laser does not allow, to induce a sufficient heat diffusion into the entire thickness vascular lights of nodular hemangiomas.

Conclusion: Although suites have been particularly restrictive (time scarring and bleeding suites) the result obtained with the laser Alexandrite long pulse appears as the good solution in the treatment of these nodular hemangiomas. More than the aesthetic motivation, the functional benefit is related here with the rapid disappearance of hemorrhagic and ulcerated lesions and the absence of disabling scars.

ePoster - Vascular Lesions

E119

PULSED DYE LASER TREATMENT OF A LIMB PORT-WINE STAIN BIRTHMARK IN A 6-WEEK-OLD INFANT

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Background: Port-wine stain (PWS) birthmarks are congenital vascular malformations for which pulsed dye laser (PDL) is considered the gold standard. However, multiple treatments are required and complete resolution is often not achieved; PWS of the extremity are particularly recalcitrant. Studies have shown that a delay in treatment results in a higher proportion of patients who develop hypertrophy and nodularity within lesions that become more resistant to therapy. It has been well-established that early treatment of facial PWS leads to more efficacious lightening. Our objective in this case report is to demonstrate that safe and successful PDL treatment of PWS can be initiated within weeks of birth, for more enhanced lightening of the birthmark on the upper extremity.

Study/Results: Case presentation: A 4-week-old female presented with an extensive left arm cutaneous capillary vascular malformation, extending to the chest, shoulder and back. The patient was treated beginning at 6 weeks of age with a 595 nm pulsed-dye laser every 4–6 weeks with the following laser parameters: Fluence of 7–7.25 J/cm^2, pulse duration of 1.5 milliseconds, spot size of 10 mm, and cryogen spray cooling of 30/30. No scarring or skin textural changes occurred. She was treated beginning at 6 weeks without general anesthesia, and at the age of 6 months continued treatments covering a greater surface area under general anesthesia, with near-complete clearance of the vascular lesion. Of note, the use of general anesthesia to allow for higher fluence and treatment area, has demonstrated no detrimental effect on cognitive scores in treated pediatric patients.

Conclusion: Port-wine stain birthmarks of the extremities are particularly resistant to therapy. It has been well-established that early treatment of facial PWS is safe and leads to more efficacious clearance. This case of a 6-week-old patient treated with PDL, demonstrates that these methods can be extrapolated to more recalcitrant port-wine stain birthmarks of the extremities.

ePoster - Vascular Lesions

E120

LASER TREATMENT OF INFANTILE HEMANGIOMAS

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Background: Infantile hemangiomas (IH) are the most common benign soft tissue tumor of infancy and childhood. Many patients seek early treatment to halt progression of the tumor growth and accelerate regression to achieve quick resolution with good cosmetic outcomes. Treatment strategies vary depending on the stage and severity of the lesion. In particular, pulsed dye laser (PDL) treatment is widely used as mono or adjunctive therapy in treatment of complicated IHs, for example, ulcerated lesions.
Study: We reviewed the literature on the treatment strategies for IH and share our experience in laser treatment of IH. We refer to a retrospective study conducted from 2003–2007 on 23 patients with IH treated with 595 nm PDL. Fifteen were treated with short-pulse duration of 1.5–3 milliseconds while 8 were treated long-pulse duration of 10 milliseconds. A moderately high fluence of 10.5–14.5 J/cm^2 with 7 mm spot size was used for both.
Results: The short-pulse duration group needed lesser number of treatment sessions ($n = 8$) compared to the long-pulse duration group ($n = 9$). For both, more treatment sessions were required for clearing mixed ($n = 13$) compared to superficial IHs ($n = 10$). The cutaneous side effects also last longer for the short-pulse duration group (1 week) compared to long-pulse duration group (2 days).
Conclusion: The 595 nm PDL laser therapy has been most widely utilized owing to its efficacy, good safety profile, and remains an appropriate treatment for rapidly growing IH in exposed locations at early presentation. A moderately high fluence with long-pulse duration is especially useful in treating superficial hemangiomas. It carries smaller risk of epidermal burn, blistering, purpura, post-inflammatory pigment changes, and scarring in darker skin types compared to treatment with short-pulsed duration. Combination treatment with the 1,064 nm ND-YAG laser, oral propranolol and even corticosteroids remains an option of treatment especially in cases of deep, large and functionally threatening IH.

ePoster - Vascular Lesions

E121

COMPARISON OF EFFICACY BETWEEN LONG-PULSED Nd:YAG LASER AND PULSED DYE LASER TO TREAT ROSACEA ASSOCIATED NASAL TELANGIECTASIA

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Background: Rosacea is characterized by erythema on face, especially erythema and linear telangiectasia on the nose. Currently, various vascular lasers are used for treatment, and among them, are long-pulsed Nd:YAG (LPNY) and pulsed dye laser (PDL).This study compared the efficacy of LPNY and PDL in treating rosacea associated nasal telangiectasia.
Study: Patients with rosacea who showed erythema and telangiectasia on the nose were included. Each patient was treated with PDL on the left side of the nasal bridge, and LPNY on the right side, three times with 4-week intervals. At the end of the treatment, two independent dermatologists evaluated overall treatment response compared with baseline.
Results: The physician's assessment of treatment concluded that good improvement was seen in 6 PDL and 7 LPNY patients, and excellent improvement 5 PDL and 4 LPNY patients. There was no significant difference ($p = 0.62$, 95% CI) between the groups. Overall improvement was similar, however, LPNY induced a greater response in thick, dilated vessels, while erythema with mild telangiectasia was more responsive to PDL.
Conclusion: Both LPNY and PDL are effective and safe in treating rosacea associated nasal telangiectasia. Appropriate choice of laser types according to severity of telangiectasia could lead to more effective treatment.

ePoster - Vascular Lesions

E122

COMBINATION THERAPY FOR THE TREATMENT OF COMPLEX VASCULAR LESIONS

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Background: Complex vascular lesions include capillary and venous malformations of the head and neck. These entities have provided treatment challenges to dermatologists and laser surgeons for many years. Much of our current knowledge regarding treatment of these lesions have come from studies using vascular lasers, particularly pulsed dye lasers, which have become the standard of care in these patients. More recently, several studies have emerged highlighting the importance of combination therapies in these patients. These have included the use of vascular lasers in combination with immunomodulatory medications including oral and topical Sirolimus, as well as topical Imiquimod. Where there is a paucity of data, however, is in how multiple lasers and topical medications can be used in combination with other procedurally destructive measures to successfully treat these lesions.
Study: We report four patients presenting with complex vascular lesions, each treated with a combination of laser and other modalities. Case 1 is a 49-year-old male with a nodular port wine stain on his right face. He had a series of 10 combination treatments with debulking with Electrosurgery and Erbium:YAG, followed by combination KTP 532/1,064 nm, PDL 595 nm, and CO_2, and topical sirolimus. Case 2 is a 43-year-old male with a nodular venous malformation treated with 2 combinations of CO_2, KTP 532/1,064 nm, and topical sirolimus. Case 3 is a 69-year-old female with a complex venous malformation of the tongue treated with a combination of Electrosurgery, Erbium:YAG, CO_2, PDL 595 nm. Case 4 is a 35-year-old male with a submucosal capillary malformation of the tongue treated with a combination of PDL and Ellman radiofrequency for debulking.
Results: Patients 1–4 achieved excellent responses to the above-mentioned combination modalities for treatment of complex vascular lesions. Objective scorer ratings, in

addition to patients' subjective determination of response rate, were used in this assessment.

Conclusion: A multitude of treatment options exist for complex vascular lesions. Our case series extends our current knowledge of how and in what situations these treatment options may be used in combination with successful responses.

ePoster - Vascular Lesions

E123

EFFECTIVE USE OF THE PULSED DYE LASER FOR NEUROGENIC ROSACEA

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Background: Neurogenic rosacea is a distinct clinical entity that presents with prominent erythema along with pain and burning complaints out of proportion to the clinical exam. Historically, these patients are very difficult to manage and they often fail traditional therapies such as topical and oral antibiotics, vasoactive agents and neuromodulators. However, little literature exists investigating the use of lasers for management of these patients. Herein, we present a series of two patients who experienced clinical benefit in response to 595 nm pulsed dye laser (PDL) therapy. Patient A, a 50-year-old Caucasian female with a history of intense, debilitating facial burning presented to our clinic. She experienced suboptimal clinical benefit with metronidazole cream, oral doxycycline, gabapentin, propranolol, prednisone, clonidine, nifedipine, broad-spectrum sunscreen, brimonidine tartrate and topical compounded ketamine and amitriptyline before undergoing three PDL treatments. Patient B was a 21-year-old Caucasian male with a 4-year history of neurogenic rosacea. He tried several medications and was acquiring benzodiazepines and cannabis from another source to dull intense, burning facial pain. He underwent three treatments with the PDL. Objective: To describe an effective and safe treatment modality for patients with neurogenic rosacea.

Study: Both patients to date have received three cycles of PDL at least 4 weeks apart with spot sizes ranging from 7 to 10 mm, 7 J/cm^2, 6 to 10 ms pulse duration, and cryogen cooling for 30 ms with 20 ms delay. Photos were obtained and compared before and after treatments. Both patients reported on the clinical effectiveness of their treatments.

Results: Photographs of both patients demonstrate marked improvement in erythema and decreased telangiectasias. Patient A reported overall decreased pain, burning, and redness. Patient B reported a 50% improvement in symptoms and 30% improvement in redness.

Conclusion: PDL may represent a safe, efficacious, and promising new treatment for patients with neurogenic rosacea.

ePoster - Women's Health

E124

FRACTIONAL CO_2 LASER FOR GENITAL HEALTH AFTER ONCOLOGICAL TREATMENTS

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Background: Fractional CO_2 laser is well known in dermatological use concerning photoaging and scars treatment. Its gynecological use is more recent but we already have some good level publications attesting improvement of histological and clinical signs of vulvovaginal atrophy in menopaused women. The aim of this study is to assess the efficacy of fractional CO_2 laser in the treatment of vulvovaginal atrophy secondary to oncologic therapies.

Study: This prospective study was conducted between September 2015 and March 2016 and included Patients who consulted for dryness or dyspareunia secondary to an onco-gynecological treatment. Cancer must be in remission since at least 1 year. Patients were treated intravaginally with 2 or 3 sessions of fractional CO_2 laser (Deka, Italy). Physician evaluated female urogenital health before and 1 month after each session using the Vaginal Health Index Score (VHIS). Quality of sexual life was evaluated by a French validated questionnaire, the Female Sexual Function Index. Symptoms like pain, dryness, burning and itching were assessed using a visual analog scale (VAS).

Results: Four patients were included. Two with a hormonal adjuvant therapy after a breast cancer and two having radiotherapy sequels after a cervical cancer. All patients had an improvement of their symptoms, of VHIS and of their sexual quality of life with an improvement of 35% of the FSFI score. Satisfaction level was between 85 and 95%.

ePoster - Basic Science

E125

CORNEAL PHOTOVITRIFICATION (CPV) – BASIC SCIENCE EXPERIMENTS

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Background: Corneal shape changes have previously been produced by lasers for corneal therapeutic and refractive applications. Corneal photovitrification (CPV) is a new procedure that produces corneal shape and biomechanical changes without deleterious corneal modifications such as tissue cutting, removal, puncture, ablation, disruption, or denaturation.

Study: Corneas of ex vivo porcine eyes were irradiated by CPV systems (Optimal Acuity Corporation) that delivered laser light through a sapphire applanation window under controlled CPV conditions. Corneal topography and aberrometry measurements of corneal shape and wavefront changes due to CPV were obtained using corneal

topography/aberrometry systems (Tracey Technologies). An atomic force microscope (Bruker AFM) and a confocal Raman microscope (Horiba) were used to measure modulus and hydration changes, respectively, due to CPV.

Results: Refractive power (spherical and cylindrical) changes up to five diopters, as well as lower and higher order aberration changes, were produced by CPV of intact corneas without epithelial or other corneal damage. Modulus increases up to 53 kPa and hydration reductions up to 40% were produced by CPV of corneal stromal tissue. The large modulus increase in corneal tissue causes a change from its naturally occurring gel-like viscoelastic state to a more glass-like (partly vitrified) elastic state, thereby producing shape, biomechanical, and hydration changes.

Conclusion: Controlled corneal photovitrification (CPV) can be used to produce corneal shape, biomechanical, and hydration changes.