

## 2016 ELECTRONIC POSTERS (ePoster)

## #E1

A CASE OF CONFLUENT AND RETICULATED PAPILLOMATOSIS TREATED WITH CO<sub>2</sub> FRACTIONAL LASER

Minsung Kim, Dongjin Kim, Yoonsoo Kim, Yeason Lee, Chanhoo Na, Bongseok Shin

Korean Dermatology Association, Gwangju, South Korea

Background/Study: Confluent and reticulated papillomatosis (CRP) was first known by Gougerot and Carteaud in 1927, and it starts as 1 to 2 mm sized asymptomatic brown papules on trunk clinically, and then progressed to confluent and reticulated patterns. Histopathologically, CRP is characterized by epidermal hyperkeratosis and papillomatosis, and hypogranulosis, focal acanthosis, epidermal atrophy, and basal layer hyperpigmentation can be seen. Proposed causes include the associations with endocrine imbalance and abnormal host response to *Pityrosporum orbiculare*, *Propionibacterium acne*, or other normal floras, but the exact causes is currently uncertain. There is no fundamental therapy for CRP, but a variety of topical and systemic treatment approaches, such as keratolytics, vitamin A analogue, anti-fungal agents, corticosteroid, and antimicrobials, have been reported. A 24-year-old male came to our clinic because he had asymptomatic multiple brown macules on his abdomen about 2 months ago. The skin lesions became wider gradually. He did not have any findings on his family history and past history. 10% KOH wet mount test on the skin lesions was non-specific, and histopathologic examinations showed hyperkeratosis, mild acanthosis, decrease of granular layer, and papillomatosis. Results/Conclusion: Based on the clinical and histopathologic findings, we diagnosed as CRP. His skin had an improvement of 80% after just one treatment using CO<sub>2</sub> fractional laser alone, and then he had a complete clearance of CRP after one more treatment. The authors experience a case of CRP that showed great improvement after CO<sub>2</sub> fractional laser treatment, and we think that CO<sub>2</sub> fractional laser can be considered as a new therapeutic method for CRP.

## #E2

## A COMPARISON STUDY OF DIFFERENT WAVELENGTHS AND COSMECEUTICALS IN THE COMBINATION TREATMENT OF FRACTIONAL LASER AND ANTIAGING COSMECEUTICALS

Boncheol Goo, Nark-Kyoung Rho, Kwang Ho Yoo Naeum Dermatology and Aesthetic Clinic; Leaders Clinic; Seoul, Korea; International St. Mary's Hospital, Incheon, Korea

Background: Different fractional lasers are used for drug delivery or combination treatment of cosmeceuticals. In combination use, different histologic characters of the channels can influence clinical outcomes. Study: 1550, 1927 and 2940 nm wavelengthed fractional lasers were treated on split face. For each subject one of the cosmeceuticals containing antiaging molecules L-ascorbic acid, retinol or tranexamic acid. Multi-spectral spectroscopy and Cutometer was used to check the parameter change for each session. For available subjects, longer observation with extended sessions were given for long term follow-up after break.

Results: The first phase with short-term follow-up showed a significant superiority in the group with 1927 nm and 2940 nm than 1550 nm treated. For side effects, 1927 nm showed less. In the second phase with longer follow-up, enrolled subjects showed more significant improvement in objective assessment with a prolonged maintenance of brightening effect and improved elasticity. L-ascorbic acid showed improvement in elasticity and brightness. Retinol showed improvement in wrinkle depth and size. Tranexamic acid showed brightening effect.

Conclusion: Fractional laser without coagulation showed more improvement when combined with cosmeceuticals for skin aging treatment.

## #E3

## A PRELIMINARY REPORT OF A PROSPECTIVE STUDY EVALUATING OUTCOMES OF BURN SCARS TREATED WITH LASER THERAPY

David Roggy, Rajiv Sood, Megan Jacobs, Madeline Zieger

Richard M. Fairbanks Burn Center, Indiana University, Indianapolis, IN

Background: Recently, laser therapy has been added as a modality for scar modulation for our patients. In December 2014, we initiated a prospective IRB approved study to evaluate the outcome of scars treated with fractional CO<sub>2</sub> laser therapy (FLT) utilizing objective and subjective tools. We report our preliminary data results on the patients that have all three treatments. To date, we have 22 subjects currently enrolled in the study. Six patients (4 adults; 2 children) have completed all three treatments. Study: The study entailed a series of three laser treatments minimally 4–6 weeks apart with scar measurements and POSAS form completion performed prior to each laser treatment and four weeks after the last FLT. The measurements of color, pliability, and scar thickness were measured with the Colorimeter, Cutometer, and ultrasound.

Results: There were no significant changes to Pliability or Color when measured with the Colorimeter and Cutometer. However, the investigators could palpate a difference in pliability and visualize a change in color of the treated areas. Also, in all of the Patient POSAS ratings, all subjects rated their scars to be closer in color to their normal skin and rated their scars felt more like their normal skin. Conclusion: In this small group, our early findings show that Patient POSAS score, Observer POSAS score, and measured skin density had statistically significant improvements following FLT. Pliability and Color when objectively measured with the Cutometer and Colorimeter are not significantly improved. However, the subjects and observers perceived the burn scars to have significantly improved.

## #E4

## ABDOMINAL FAT SURFACE REDUCTION MEASUREMENT USING COMPUTED TOMOGRAPHY: CASE STUDY

Takahiro Fujimoto, Junichiro Kubota

Clinic F, Chiyoda, Japan; Kubota Junichiro Clinic, Toshima, Japan

**Background:** Thanks to the growing demand for the non-invasive body shaping treatments, the pressure on the reliability of results of these therapies has increased. The physicians use different techniques to demonstrate the results; from circumferential measurements through caliper fat thickness measurement, to ultrasound measurements. All of these techniques have some limitations in terms of their accuracy and repeatability. Therefore, computed tomography (CT@Optima CT660 GE healthcare) has been proposed for real body fat area measurement in the slice over the umbilicus before, during and after the noninvasive treatment by contactless radiofrequency device (BTL Vanquish, BTL Industries Inc., Boston, MA).

**Study:** The aim of this case study was to demonstrate fat reduction after completing the treatment cycle with non-invasive contactless radiofrequency device using CT images. One patient was enrolled for this case report. The subcutaneous fat was stained using color differentiation and then the area in the image related to slice over umbilicus was measured. Also, images of the treated area and visceral fat surface area for supportive analysis were taken. Subject's weight was controlled. All these measurements were taken at the baseline, 4 and 10 weeks after the last treatment.

**Results:** According to CT scan image processing, the subject lost 4.9 cm<sup>2</sup> of subcutaneous fat while the change in weight and visceral fat area was insignificant. The results obtained from CT were also supported by results of circumferential measurement over umbilicus and clinical before and after photographs.

**Conclusion:** In this case study, the applicability of CT as a method for measurement of change in subcutaneous fat volume was proposed. In conclusion, the results from the computed tomography with the almost unchanged weight and visceral fat amount show the specificity of the treatment effect that is focused on the treated area only (subcutaneous fat layer in abdominal area) without any other change in the body composition usually accompanied with dieting.

## #E5

### AN "INSIDE" JOB: UNEXPECTED GEOMETRIC SKIN ULCERATIONS OVERLYING ORTHOPEDIC HARDWARE AFTER MULTIMODAL LASER SCAR REVISION

Katherine Ferris, Andrew Krakowski, Tuyet Nguyen

University of California, Irvine, CA; DermOne, LLC, West Conshohocken, PA; Rady Children's Hospital, San Diego, CA  
**Background:** As the treatment of hypertrophic scars becomes more widespread, laser surgeons face novel challenges. Several previous reports have illustrated the importance of evaluating scar thickness and intrascar topographic alterations. This case demonstrates a heretofore unreported outcome in which geometric skin ulcerations developed directly over orthopedic hardware in the setting of multimodal hypertrophic scar treatment using pulsed-dye laser and ablative fractional laser resurfacing.

**Study:** This is a case report in which the patient underwent one treatment using 595 nm PDL at 7.5 J/cm<sup>2</sup>, 1.5 ms pulse width and

7 mm spot size, followed by 10,600 nm CO<sub>2</sub> laser at 12.5 mJ, 10% density and non-overlapping stamping technique.

**Results:** Post-procedure, four discrete purpuric erosions developed within the treated area on the patient's ankle, which evolved into sharply-marginated frank ulcerations within 96 hours. Radiographic imaging revealed stainless steel pins from a

previous orthopedic procedure which correlated precisely in size and location to the worsening ulcerations. Gentle wound care with petrolatum-based ointment TID facilitated complete resolution of the ulcerations within two weeks, associated with decreased pruritus, dysesthesia and improved scar texture.

**Conclusion:** The geometric shape and distribution of the ulcerations implicate bulk heating of the steel screws placed during a previous orthopedic procedure. The ablative CO<sub>2</sub> laser settings correspond to an ablation depth of 0.375 mm, and a coagulation depth of 0.395 mm, while maximum depth of penetration of PDL laser is 1 mm. The clinical scar depth was 0.5 mm, and as such only the PDL could have reached the cutaneous tissue deeply enough to directly heat the screw heads and cause subsequent thermal damage. Additionally, enhanced purpura in the areas of the screw heads was noted immediately post-procedure, further supporting the role of PDL. Ideally, discussion of this outcome will alert laser surgeons to be aware of the potential risk of bulk heating when treating post-surgical scar patients.

## #E6

### ANALYSIS OF SINGLE vs STACKED FRACTIONAL CO<sub>2</sub> LASER PULSES IN A PORCINE SCAR MODEL

John Bailey, J. Kevin Bailey, Danielle Dunham, Britani Blackstone, Molly Baumann, Kevin McFarland, Dorothy Supp, Heather Powell  
 The Ohio State University, Columbus, OH; Shriners Hospitals for Children-Cincinnati, Cincinnati, OH

**Background:** The mechanism of the salutary effects of fractional CO<sub>2</sub> laser treatment is unknown. It has been hypothesized that depth of beam penetration is important to optimizing treatment outcomes. We assessed the effect of a single laser pulse vs 3

stacked

pulses on healing time and resulting inflammation.

**Study:** Burn scars in Red Duroc pigs were treated with fractional CO<sub>2</sub> laser (5% fractional coverage, 70.0mJ core setting, 396 J/cm<sup>2</sup> fluence) with a single laser pulse (n=8) or with

3 stacked laser pulses (n=8). Immediately prior to laser treatment and at 1 hour, 24 hours, 4 days, and 7 days after laser treatment, we measured transepidermal water loss (TEWL), erythema, histologic characteristics of laser injury, and inflammatory gene expression.

**Results:** Both single pulse and stacked pulse treatments increased scar erythema, which peaked at day 1 post-treatment and returned to baseline levels by day 7. TEWL, which reflects epidermal barrier function, increased one-hour post-treatment and remained significantly above baseline until day 7 in both treatment groups. Histologic sections showed that treatment with

3 stacked laser pulses resulted in deeper and slightly wider MTZs compared with a single laser pulse. Expression of TGF- $\beta$ 1, TGF- $\beta$ 3 and IL-6 was elevated above baseline in both single and triple pulse groups at one-hour post laser treatment, but returned to baseline 24 hours.

**Conclusion:** Stacking of three laser pulses resulted in slightly deeper and wider ablated cavities without an increase in coagulated tissue, delay in the return of barrier function or extend

the presence of inflammation or erythema compared to a single pulse treatment. Of particular interest, barrier function did not return to baseline until 7 days after treatment in either group, suggesting that stacked pulses may enhance the delivery of topical agents compared with a single pulse, without significantly slowing healing.

## #E7

## ANALYSIS OF THE EFFECTS OF LILT AND MAGNETIC FIELDS ON OSTEOBLASTS VIABILITY

Alessandro Deana, Ana Souza, Kristianne Fernandes, Raquel Mesquita-Ferrari, Vinicius Cardoso

UNINOVE, Sao Paulo, Brazil

Background: Although clinical protocols are not yet established, low intensity light therapy (LILT) has been successfully used for improving bone healing. Light beams are electromagnetic fields but it is impossible to separate its electric and the magnetic fields, thus it is also impossible to infer if its effect is due to electric or magnetic fields. This study aims to compare the influence of different electromagnetic fields (including light sources) on the viability of osteoblasts.

Study: Rat calvarial osteoblast-like cells (OSTEO-1 lineage) were cultured in were grown in Dulbecco's modified Eagle's medium (DMEM) supplemented with 10% fetal bovine serum (FBS) and a 1% antibiotic-antimycotic solution. Cells were irradiated with different light sources (laser and LED) at the red (660 nm) and infrared (808 nm laser and 850 nm LED) spectral regions with three radiant exposures (1, 5 and 10 J/cm<sup>2</sup>). In addition, one group of cells was exposed to a magnetic field (up to 0.2 T). Cell viability was evaluated 24 h after treatments using the MTT assay. Results: The analysis of variance of the experimental groups demonstrated lack of statistical significance for the different radiant exposures in all groups ( $p > 0.05$ ). Moreover, no statistically significant differences were found for the IR/Red spectral regions comparison. Nevertheless, the comparison of light source (Laser/LED) produces statistically different results ( $p < 0.0001$ ). The usage of magnetic field also lacks statistical differences with the control group.

Conclusion: These results suggest that LILT and magnetic field is incapable of improving OSTEO-1 healthy cells. Future studies will be conducted in order to determine the effect of LILT and of the magnetic on stressed cells.

## #E8

## ANTIMICROBIAL EFFECT OF PHOTODYNAMIC THERAPY ON CANDIDA BIOFILM

Alessandro Deana, Renato Prates, Aline Sousa, Luis Ferreira

UNINOVE, Sao Paulo, Brazil

Background: Candida albicans composes normal flora and it is found in the oral cavity and gastrointestinal tract. Sometimes it may become pathological, being the most common fungi pathogen. An adjuvant treatment for infections caused by candida is photodynamic therapy (PDT). PDT is based on the energy transfer from the photon to a photosensitizer, which generates reactive oxygen species. This study aims to investigate the PDT in biofilm of Candida.

Study: A biofilm of *C. albicans* (ATCC 10231) was grown on poly methyl methacrylate discs. Resin discs were previously impregnated with fetal bovine serum for cell adherence. The disks were washed to remove non-adherent cells and incubated with Yeast Nitrogen Base for 48 h. Two photosensitizers were tested: Methylene Blue (MB, 50  $\mu$ M) and Porphirin (10  $\mu$ M). The biofilms were placed in contact with the PS for 10 min before irradiation (PIT) and two LEDs were used, with peak wavelength at 660 nm and 640 nm for the MB and Porphirin, respectively. The irradiation duration varied: 120 s;

240 s; 480 s and 600 s (irradiation at target: 300 mW/cm<sup>2</sup>; radiant exposure 36; 72; 144 and 180 J/cm<sup>2</sup>, respectively). The cells were removed from the discs using a vortex, diluted, and the colony form units were accounted 24 h after incubation.

Results: Using Porphirin, PDT produced significant reduction of two logs of Candida in biofilm after only 2 min of irradiation ( $p \leq 0.0256$ ) but increasing of the irradiation time did not increase the amount of microbial inactivation. MB was also effective, but it required 10 min of irradiation to reduce one log ( $p \leq 0.0440$ ).

Conclusion: In conclusion, PDT reduced the biofilm of Candida using both photosensitizers, however the data suggest that the PS requires longer PIT to defuse in the biofilm and increases its efficiency.

## #E9

## CLINICAL EFFICACY AND PATIENT SATISFACTION IN LASER SCAR REVISION USING A 300-MICROSECOND PULSED Er:YAG 2940 nm LASER

Khalil Khatri, Boris Moiseev

Skin & Laser Surgery Center of New England, Nashua, NH; Cosmetic Clinic Sasha Ryazan, Russian Federation

Background: A 300-Microsecond Pulsed Er:YAG 2940 nm Laser at a fluence of 5 J/cm<sup>2</sup> allows ablation of scar tissue without causing much residual thermal damage. Based on the fact that Er: YAG laser is most effective in hydrated tissue, which corresponds to the early stages of formation of a scar (10–14 days after injury), we assumed that laser scar treatment would be most effective at this period.

Study: 11 male and 21 female subjects with skin type II–III were recruited. 25 subjects with scars post mechanical trauma, 6–acne scars, and 1–chemical burn. The subjects were divided into two groups, the first group (11) with scars in their early stages (about 14 days post trauma), and the second group (21) with scars more than a year old. No keloid scars were included. Treatment was performed with a 300-Microsecond Pulsed Er:YAG 2940 nm Laser (Aerolase, USA), spot size of 6 mm, a fluence of 5 J/cm<sup>2</sup>, and a rep rate of 1.5 HZ. Treatments were performed with 14-day interval. Total 114 treatments. Treatment was performed until a physical leveling of the scar was observed. Each subject had an average of 3.6 treatments.

Results: In the first group the physical leveling of the scar was observed immediately after the first treatment. Total 29 treatments for the group, an average of 2.6 treatments. In the second group total 85 treatments 4 treatments on average, and the physical leveling of the scar was noticed after the second treatment. 94% of the subjects completed the study. No complications observed. 30% rated the results as excellent, 50% as good, and 20% as satisfactory.

Conclusion: A 300-Microsecond Pulsed Er:YAG 2940 nm Laser is a safe and effective way to revise scars. Results are quicker and better with relatively fresh scars as compared to older scars.

## #E10

## CLINICAL EVALUATION A NEW SCANNING TECHNOLOGY USED IN CONJUNCTION WITH 810 nm LASER HAIR REMOVAL

David Goldberg, Neal Varughese, Amy Tank, Bradley Bloom

Skin Laser & Surgery Specialists of NY/NJ, New York, NY

Background: 810 nm diode lasers are commonly used to remove unwanted facial and body hair. A new 810 nm system using scanning technology has now become available. This study was undertaken to determine efficacy and ease of use of a new scanning 810 nm laser technology (DIOLAZETM, InMode, Irvine, CA). Study: Twenty-five subjects received 3 axilla treatments, 4-6 weeks apart with a scanning handpiece. Investigator photographic and clinical assessments (hair count) were evaluated at 3 follow up visits: 3, 6, and 12 months after the last treatment. Safety and ease of use was evaluated after each treatment and follow up sessions.

Results: The device showed a high efficacy in hair reduction. Patients reported mild pain, edema, and erythema after treatment. There were no reports of burning, pigmentation alteration, or localized infection after each treatment session. The novel scanning technology was ergonomically simpler to use than previous contact type laser hair removal devices.

Conclusion: Laser hair removal is a highly effective technique. Newer technologies are focused on patient comfort and ease of use. Scanning 810 nm laser hair removal is effective, safe and provider friendly.

## #E11

### CLINICAL EVALUATION AND *INVIVO* ANALYSIS OF THE PERFORMANCE OF A NOVEL FRACTIONAL INFRARED 1550 nm LASER SYSTEM INTENDED FOR TREATMENT OF SKIN REJUVENATION

Courtney Green, Courtney S. Green, J. Daniel Jensen, E. Victor Ross

Scripps Clinic, La Jolla, CA

Background: Through creation of "micro thermal zones," fractional laser modalities offer a favorable side-effect profile compared to their non-fractional counterparts. A study to demonstrate the safety and efficacy of the novel FRAX1550 (Ellipse Denmark) fractional 1550 nm laser device with a rolling mechanism deployment was performed. The micro-beam dimensions were 150 200 microns and pulse width was 20 ms. Outcome measures included changes in the appearance of aging facial skin with respect to skin texture, wrinkles, and pigmentation.

Study: Five female subjects between the ages of 44 and 71, with visible wrinkles and/or dyspigmentation were enrolled in the study. A pre-treatment assessment was performed with respect to wrinkles, skin texture, and pigmentation. The subjects then underwent test spot treatments with the 1550 nm "rolling" fractional laser that delivers about 100 spots/cm<sup>2</sup>. After one week, two full face treatments were performed four weeks apart at 40-60 mJ with 20% total surface coverage per treatment (the optimal settings determined from the test spots). A 5% lidocaine cream was applied 1 hour prior to treatment, and refrigerated air was applied during the entire laser procedure. Pain was reported on a 1-10 visual analogue scale. Follow-up visits at 1 and 3 months post treatment were scheduled for photographic assessments. Assessment of improvement in wrinkles, skin texture, and pigmentation was performed by the investigators and two blinded evaluators through use of a five-point scale where 1 represented worsened appearance and 4 signified findings were "very much improved." A Wilcoxon rank sum test was applied to test for statistical significance for all outcome measures at 1 and 3 months. Immediate post-treatment biopsy was performed on one patient with settings of 44 and 88 mJ per microbeam.

Results: All subjects demonstrated improvement in all monitored parameters. The mean improvement score across all 5 categories were: wrinkles 1.6, skin texture 1.8, and pigmentation 1.7. All score improvements were statistically significant. Treatments were well tolerated (mean pain score of 4.2) with no long term side effects. The most common side effect was erythema. Biopsy was performed on 1 patient immediately post-treatment and showed 800 micron penetration depth at a treatment level of 88 mJ and 400 microns at 44 mJ.

Conclusion: The novel Ellipse rolling fractional 1550 nm laser device offers improvement of aging facial skin with short downtime and minimal side effects. Further studies are needed to determine the optimal treatment parameters and durability of clinical results.

## #E12

### CLINICAL, BIOPHYSICAL, IMMUNOHISTOCHEMICAL, AND *INVIVO* REFLECTANCE CONFOCAL MICROSCOPY EVALUATION OF THE RESPONSE OF SUBJECTS WITH SENSITIVE SKIN TO HOME-USE FRACTIONAL NON-ABLATIVE PHOTOTHERMOLYSIS DEVICE

Natallia Eduarda Uzunbajakava, Renee J.H. Richters, Lisa Hoogedoorn, Natallia E. Uzunbajakava, Piet E.J. van Erp, Peter C.M. van de Kerkhof

Radboud umc, Nijmegen, Netherlands; Philips Electronics B.V., Eindhoven, Netherlands

Background: Fractional non-ablative photothermolysis is widely applied for skin treatment. In the Western world one out of two women and one out of three men reports having a Sensitive Skin (SS), characterized by stinging, burning or itching, sometimes accompanied by erythema or dryness. Perceptions are elicited by cosmetics, clothes, emotions, sun exposure, temperature changes, heat, and more. The aim of this study was to identify a potential link between self-reported symptoms of Sensitive Skin and objective physiological landmarks in response to fractional non-ablative fractional photothermolysis.

Study: Eight SS and eight non-sensitive (NSS) subjects were stimulated using fractional non-ablative home-use device applied in a single stroke on the buttock. Clinical-, in vivo biophysical-, biopsy-based (immune)histochemical-, and in vivo reflectance confocal microscopy (RCM) evaluation was performed at 0.5, 8, 24 and 72 hours after stimulation.

Results: The majority of SS subjects and none of the NSS subjects reported skin discomfort following stimulus. The number of mast cells was significantly lower in the SS subjects at 0.5 and 72 hours after stimulus. Immunohistochemical biomarkers revealed: vasodilatation, spongiosis, perilesional and interlesional keratinocyte proliferation, epidermal thickening, and perilesional abnormal keratinocyte differentiation. RCM imaging supports these findings.

Conclusion: This study was to our knowledge the first attempt to evaluate responses of Sensitive Skin subjects to fractional non-ablative photothermolysis. Key differences between SS and NSS subjects were mostly skin perceptions with minute differences in amount of mast cells. Immunohistochemical biomarkers revealed new insights on the effect of non-ablative fractional photothermolysis. RCM supports histological findings and could be used for non-invasive investigation of the skin following application of energy-based devices. Overall, non-ablative

fractional photothermolysis is a highly controlled thermal stimulus, only causing mild localized skin damage and inflammation, which appears of same extent in SS and NSS subjects.

### #E13

#### COMPARING THE 585/1064 nm MULTIPLEX LASER TO THE 585 nm PULSED DYE LASER IN THE TREATMENT OF SURGICAL SCARS

Adam Aldahan, Stephanie Mlacker, Vidhi Shah, Michael McLeod, Jennifer Ledon, Andrew Miner, Mohammed Alsaidan, Keyvan Nouri, Sahal Samarkandy

University of Miami, Miami, FL

Background: Surgical excision of skin lesions such as skin cancer often produces unsightly post-surgical scars that can have a profound effect on quality of life. Seamless wound closure and the use of topical agents can reduce the appearance of these scars, but results are highly variable and often suboptimal. Laser therapy used post-operatively have been shown to be beneficial by targeting blood vessels and reducing collagen formation. The most studied lasers seem to be pulsed dye lasers and fractional lasers (ablative and non-ablative).

Study: This study aims to determine the most effective laser for post-operative scar reduction by comparing two laser settings. We performed a single-blinded, randomized controlled trial involving light-skin surgical patients with closed wounds at least 3 cm in length. Three equal segments of each wound were each randomized into one of following interventions: 585 nm pulsed dye laser at 4 J/cm<sup>2</sup> with a 0.5 ms pulse duration, 585 nm pulsed dye laser with the same parameters followed by the 1064 nm Nd:YAG at 20 J/cm<sup>2</sup> with a 15 ms pulse duration, or no laser treatment (control). One pass of each laser was used with a 10 mm spot size and 10% overlap. Subjects received a total of three laser treatments separated by 4-week intervals. A blinded observer compared scar segments one month after the last treatment. Results: Ten patients completed treatment, eight males and two females. The average scar size was 4.9 cm with most on the trunk and extremities. Both laser treatments were more effective in reducing scar appearance compared to the control. There was no significant difference between the pulsed dye laser and the combination laser in reducing redness and thickness of the scar. Conclusion: The pulsed dye laser and the combination pulsed dye laser with Nd:YAG both produce satisfactory outcomes in patients with post-surgical scars.

### #E14

#### COMPARISON OF ANTIMICROBIAL PHOTODYNAMIC THERAPY AND Er,Cr:YSGG LASER ASSISTED PERIODONTAL POCKET THERAPY IN THE TREATMENT OF AGGRESSIVE PERIODONTITIS: A CLINICAL STUDY

Kirti Chawla, Mahesh Verma, Arundeeep Kaur

Maulana Azad Institute of Dental Sciences, New Delhi, India  
Background: Aggressive periodontitis is a rapidly progressing disease which affects the otherwise systemically healthy individuals. It is characterized by a marked episodic and rapid destruction of periodontal tissues that results in early tooth loss. It is a challenge for the periodontists to treat this disease as there are no established protocols and guidelines for the efficient control of

the disease. Photodynamic therapy (PDT) or Laser assisted pocket therapy could become new methods of antibacterial treatment and may be used as adjunct to conventional therapy for treating aggressive periodontitis. The study aims at finding a treatment modality that will be free of side-effects of currently used modalities for the treatment of aggressive periodontitis like systemic antibiotics.

Study: 15 patients with age between 18 to 35 years suffering from aggressive periodontitis were selected from the outpatient department of periodontics. Scaling and root Planing (SRP) was done. Two sites were selected based on the inclusion and exclusion criteria and then assigned randomly to different modalities of treatment: PDT or Er,Cr:YSGG Laser assisted pocket therapy and one site was chosen to act as control (SRP). Pocket Depth (PD) and Clinical Attachment level (CAL) were recorded at baseline,

3 months, 6 months and 9 months.

Results: Both the treatments yielded significant improvements in terms of decrease in PD and gain in CAL compared to baseline values ( $P < 0.05$ ). PDT and ELAPT showed significant improvement over SRP alone although there were no significant differences between the two groups (PDT and ELAPT) for PD reduction and CAL gain.

Conclusion: This study gives promising results for the treatment of aggressive periodontitis using photodynamic therapy (PDT) and Er,Cr:YSGG laser assisted pocket therapy (ELAPT) as an adjunct to SRP. The pilot study of the same was presented at 35th Annual Conference of ASLMS with sample size 5 and a follow up of 3 months.

### #E15

#### CONTACTLESS ABDOMINAL FAT REDUCTION WITH SELECTIVE RFTM EVALUATED BY MAGNETIC RESONANCE IMAGING (MRI): CASE STUDY

Jeanine Downie, Miroslav Kaspar

Montclair, NJ; Prague, Czech Republic

Background: Noninvasive body shaping methods seem to be an ascending part of the aesthetics market. As a result, the pressure to develop reliable methods for the collection and presentation of their results has also increased. The most used techniques currently include ultrasound measurements of fat thickness in the treated area, caliper measurements, bioimpedance-based scale measurements or circumferential tape measurements. Although these are the most used techniques, almost all of them have some limitations in reproducibility and/or accuracy. This study shows Magnetic Resonance Imaging (MRI) as the new method for the presentation of results in the body shaping industry.

Study: Six subjects were treated by a contactless selective radiofrequency device (BTL Vanquish ME, BTL Industries Inc., Boston, MA). The MRI fat thickness was measured at the baseline and at 4-weeks following the treatment. In addition to MRI images and measurements, digital photographs and anthropometric evaluations such as weight, abdominal circumference, and caliper fat thickness measurements were recorded. Abdominal fat thickness measurements from the MRI were performed from the same slices determined by the same tissue artefacts.

Results: The MRI fat thickness difference between the baseline measurement and follow up visit showed an average reduction of 5.36 mm as calculated from the data of 5 subjects. One subject dropped out of study due to non-study related issues. The results were statistically significant based on the Student's T-test evaluation.

Conclusion: Magnetic resonance imaging abdominal fat thickness measurements seems to be the best method for the evaluation of fat thickness reduction after non-invasive body shaping treatments. In this study, this method shows average fat thickness reduction of 5.36 mm while the weight of the subjects didn't change significantly. A large spot size measuring 1317 cm<sup>2</sup> (204 square inches) covers the abdomen flank to flank. The average thickness of 5.36 mm of the fat layer reduced under the applicator translates into significant cumulative circumferential reduction. The reduction was not related with dieting.

## #E16

### DESIGN AND TESTING OF A PORTABLE, INTRAMUSCULAR, PHASE-MODULATED, OPTICAL OXYGEN SENSOR

Antonio Ortega Martinez, Antonio Ortega-Martinez, Enoch Gutierrez-Herrera, Walfre Massacubussets General Hospital, Boston, MA; Universidad Nacional Autonoma de Mexico, Mexico

Background: The everyday routine of diving mammals implicates frequent and abrupt changes in oxygen levels. How these mammals manage oxygen stores can teach us how to deal with hypoxia, which is an issue of great clinical significance. Regular pulse oximeters are an inexpensive, mature technology but require calibration. In this work we present the design, construction and preliminary tests of a portable, minimally-invasive, calibration-free optical oxygen sensor designed for measuring oxygen consumption in muscle of free-diving mammals.

Study: The sensor was designed to implement a near-infrared, dual-wavelength, frequency-resolved method in reflectance mode: our prototype modulates laser light of 650 and 808 nm at 70 MHz. At these wavelengths, the shift in phase of the backscattered light from the tissue is a function of the absorption of blood, which in turn depends on oxygenation. The prototype delivers and collects light from tissue through fibers. The signal from the backscattered light is processed and stored by a microcontroller.

Results: For field deployment, the prototype operates with a 15 volts battery, fits in a 25 cm x 20 cm x 9 cm box, and weighs 800 grams. The probe was designed for medium to large size animals. The sensor works in highly scattering tissue, for which blood is the principal absorber. Preliminary tests on phantoms (Intralipid plus India ink) with the optical properties of tissue, as well as in an ex vivo rat muscle tissues, show that the sensor is able to quantify changes in absorption coefficient from 0.04 to 0.13 cm<sup>-1</sup>.

Conclusion: Initial testing shows that the oxygen sensor can measure changes in absorption similar to those reported for oxygenated tissues. Before field deployment, the sensor will next be tested in-vivo in the laboratory.

## #E17

### EARLY INTERVENTION WITH NON-ABLATIVE FRACTIONAL LASER TO REDUCE CUTANEOUS SCARRING A RANDOMIZED CONTROLLED TRIAL ON OPTIMAL TIMING AND DOSE-RESPONSE

Katrine Karmisholt, Merete Haedersdal, Emily Wenande, Daniel Thaysen-Petersen, Uwe Paasch

Bispebjerg Hospital, Copenhagen, Denmark; University of Leipzig, Leipzig, Denmark

Background: Preclinical and clinical studies suggest laser exposure during early wound healing phase may reduce scar formation. However, no standard treatment protocols exist on optimal timing and dosing. In a standard human model, we aimed to evaluate the potential of non-ablative fractional laser (NAFL) to improve scar formation towards normal skin appearance by applying laser exposure at various early time-points and using three different fluence levels.

Study: Standardized interventional wounds were performed on 16 healthy volunteers by taking 5 mm punch biopsies (10 in total per individual subject). Wounds were randomized to a single treatment with 1540 nm NAFL one day before, immediately after-, and two weeks after interventional wounds were performed. Three different dose levels were applied, using combined deep (range 30 mJ-70 mJ) and superficial NAFL (30 mJ-50 mJ). Untreated control samples were included. Primary endpoints were blinded clinical evaluations on Patient-Observer-Scar-Assessment-Scale (POSAS) and Visual-Analogue-Scale (VAS) at 3 months follow-up. Secondary endpoints were histological assessments and side effects, quantified by skin reflectance measurements of erythema % and pigmentation%.

Results: All volunteers completed the study. Compared to untreated controls, clinical assessment by POSAS showed significant improvement in scars treated with NAFL immediately after wounding, both in terms of pliability (fluence medium p ¼ 0.014, low p ¼ 0.045) and overall evaluation (medium p ¼ 0.045, low p ¼ 0.036.). VAS evaluation favored scars, treated before interventional wounding with medium dose NAFL (p ¼ 0.029, compared to untreated controls). Histology indicated benefit from pre-treatment with medium dose NAFL, leading to histological characteristics most similar to normal skin. High fluence NAFL induced granuloma formation, irrespective of time-point. No significant differences were noted in terms of erythema% and pigmentation% between NAFL-treated and untreated control scars at 3 months follow-up (p < 0.05).

Conclusion: Early intervention with NAFL possesses the potential to reduce scarring in a dose- and time-dependent manner. NAFL application before or immediately after wounding seems preferable.

## #E18

### EFFECT OF PHOTODYNAMIC THERAPY IN THE REDUCTION OF HALITOSIS IN PATIENTS WITH MULTIPLE SCLEROSIS

Marcela Leticia Leal Gonçalves, Sandra Kalil Bussadori,

Ana Carolina Costa da Mota, Yara Dadalti Fragoso, Kristianne Porta Santos Fernandes, Raquel Agnelli Mesquita Ferrari, Cristiane Miranda Franç, a

Nove de Julho University, São Paulo, Brazil; Universidade Metropolitana de Santos, São Paulo, Brazil

Background: Multiple sclerosis (MS) is a degenerative immune-mediated chronic disease of the central nervous system.

Halitosis is a change of breath that makes it unpleasant, and it can mean whether or not a pathological change. We have not found studies that establish a connection between these two conditions. Our objectives were to observe the presence of halitosis in patients with MS and determine whether treatment with Antimicrobial Photodynamic Therapy (aPDT) is effective against it.

Study: Twenty patients with MS, who went to the MS Reference Center, Universidade Metropolitana de Santos, were selected to

participate in the study. Oral ChromaTM was used before and after the treatment to determine the amount of sulfhydryde present in the patients' mouths. We performed one aPDT session with methylene blue as a photosensitizer, manipulated at a concentration of 0.005%, which was applied for 5 minutes in the patients' tongues. We irradiated 6 points in the tongue with a distance of 1 cm between points. The LASER THERAPY XT-EC1 was calibrated with wavelength of 660 nm, 9 J of energy and power of 100 mW for 90 seconds per point, fluency of 320 J/cm<sup>2</sup> and irradiance of 3537 mW/cm<sup>2</sup>. The aPDT was also accompanied by the scraping process with a tongue scraper. The data obtained before and after the treatment were not normal, so we used the Wilcoxon test to evaluate the two dependent samples. The significance was set at  $p \leq 0.05$ .

Results: Out of the 20 patients evaluated, 17 had halitosis (sulfhydryde;  $Y = 112$  ppb). There was a statistically significant difference between the results before and after the treatment ( $p \leq 0.0003$ ).

Conclusion: There is a high prevalence of halitosis in patients with MS, and the treatment with scraping and aPDT was efficient against it.

## #E19

### EFFECTIVE TREATMENT OF DRUG-INDUCED HYPERPIGMENTATION USING A PICOSECOND LASER

Silas Paras Soemantri, Markus Stuecker, Klaus Hoffmann

Ruhr University; St. Josef-Hospital, Bochum, Germany

Background: Well-known adverse reactions of several drugs are pigmentary disorders. The tetracycline class antibiotic minocycline which is commonly used for the treatment of acne and rosacea as well as the antiarrhythmic agent amiodarone are renowned for inducing skin discoloration. This adverse effect is particularly likely if the substances are taken in high doses over a prolonged period. Although the pigmented skin lesions are often reversible after discontinuation of the drug, they can even persist for a lifetime. While good results after treatment with different Q-switched lasers have been reported, no evaluation of the effectiveness of picosecond lasers has taken place yet.

Study: We report about two patients who presented with cutaneous hyperpigmentation. The first 72-year-old male patient developed blue-grey livid facial discoloration after daily intake of 200–400 mg amiodarone for 13 years. The second female patient, aged 55, noted a distinct black pigmentation which affected the face, sclera, teeth and nails after an acne-therapy for 7 years with 200 mg minocycline daily. After histopathologic evidence of drug-induced hyperpigmentation both patients were treated with a 755 nm alexandrite picosecond laser (spot size: 2.5 mm, fluence: 4.07 J/cm<sup>2</sup>,  $f = 10$  Hz).

Results: After one single treatment of the amiodarone-induced dyschromia with the alexandrite picosecond laser, the pigmentation resolved completely within four weeks. The cutaneous pigmentation after ingestion of minocycline showed a considerable brightening directly after the initial treatment. After three additional sessions at intervals of eight weeks a full remission could be achieved. Aside from slight erythema and swelling for a few days following the procedure, no further adverse effects could be observed.

Conclusion: These presented cases indicate that the therapy of drug-induced hyperpigmentation with a 755 nm alexandrite picosecond laser provides a safe, fast and highly efficient

treatment option. Especially patients who cannot withdraw safely from medication could benefit from this laser procedure.

## #E20

### EFFECTIVE TREATMENT OF EXOGENOUS OCHRONOSIS WITH Q-SWITCHED ALEXANDRITE LASER

Mayra Buainain de Castro Maymone, Mayra Maymone, Neelam Vashi

Boston University School of Medicine, Boston, MA

Background: Exogenous ochronosis is a rare, poorly understood entity thought to be a complication of long term use of high concentration hydroquinone creams. The treatment of exogenous ochronosis remains difficult with few effective options to help patients with this cosmetically bothersome condition. We describe a case of exogenous ochronosis of the malar area improved after treatment with Q-Switched Alexandrite Laser.

Study: A 45-year-old male, Fitzpatrick skin type IV presented with bluish-gray mottled pigmented patches on the bilateral malar and infraorbital regions for about 10 years. Patient reports long-term use of over-the-counter hydroquinone containing creams. Biopsy of the affected area revealed yellow-brown deposits in the dermis consistent with ochronosis. The patient received a total of 7 treatments (over the course of 1 year) with the 755 nm Q-Switched Alexandrite Laser (ALEXlaze, Candela Corporation, Wayland, MA). Areas were treated with a 3 mm spot size at an average fluence ranging from 4–9 J/cm<sup>2</sup>.

Results: Lightening of the hyperpigmented areas were noticed after the second treatment and continued improvement was observed during the following sessions.

Conclusion: Q-Switched Alexandrite Laser may provide satisfactory treatment for exogenous ochronosis for patients with lighter skin types (Fitzpatrick I–IV).

## #E21

### EFFECTS OF CRYOLIPOLYSIS ON SEX HORMONES

Sarah Sweeney, Elizabeth Geddes, Medhavi Jogi, Paul Friedman

University of Texas at Houston Medical School; Dermatology & Laser Surgery Center; Houston Thyroid and Endocrine Specialists, Houston, TX

Background: Excess fat is problematic from both a medical and cosmetic standpoint. Medically, it is the leading preventable risk factor for many illnesses, including coronary artery disease, cancer, and diabetes mellitus. Cosmetic concerns regarding excess subcutaneous fat have led to a substantial increase in various body sculpting techniques. Cryolipolysis (CoolSculpting, Zeltiq Aesthetics, Pleasanton, CA) is becoming an increasingly more common safe and effective method to reduce subcutaneous fat deposits. Traditionally, fat reduction and weight loss can be achieved through diet and exercise, however, there are hormonal factors that also influence this process. Sex steroids, specifically, free and total testosterone (T), are linked to body fat percentage and distribution. Low levels of these hormones have been associated with chronic medical problems as well as excess fat deposition. In males, this excess fat tends to accumulate centrally and can be both visceral and subcutaneous. Additionally, obese men may have elevated levels of estrogen secondary to peripheral conversion by the enzyme aromatase, thus further inhibiting

androgen synthesis via negative feedback on the hypothalamic-pituitary axis. Although large volume liposuction has been shown to increase HDL, decrease fasting insulin levels and increase insulin sensitivity, there has been no evidence to support a significant change in sex hormone levels. To our knowledge, no studies have been performed using CoolSculpting. Study: We present the case of an obese 34-year-old male with a history of idiopathic low Testosterone (T) and unwanted abdominal body fat.

After 6 sessions with CoolSculpting, his laboratory values showed a sustained normalization of both free and total T. Conclusion:

## #E22

EFFECTS OF NON-ABLATIVE FRACTIONAL ERBIUM GLASS LASER TREATMENT ON GENE REGULATION AND SKIN PHYSIOLOGY IN HUMAN THREE-DIMENSIONAL SKIN MODELS  
Jens Baron, Yvonne Marquardt, Timm Steiner, Frank Ho€lzle, Claudia Skazik-Voogt, Ruth Heise, Philipp Amann

RWTH Aachen University, Aachen, Germany

Background: Clinical experiences with non-ablative fractional erbium glass (Er:Glass) laser therapy have demonstrated promising results for dermal remodeling and for the indications of striae, surgical scars and acne scars. So far, molecular effects on human skin following treatment with these laser systems have not been elucidated. Our aim was to investigate laser-induced effects on skin physiology and morphology and to analyze molecular effects on gene regulation.

Study: Therefore, novel human three-dimensional (3D) organotypic skin models were developed and irradiated with non-ablative fractional Er:Glass laser systems enabling qRT-PCR, microarray, and histological studies at same and different time points.

Results: A decreased mRNA expression of matrix metalloproteinases (MMP) 3 and 9 was observed three days after treatment. MMP3 also remained downregulated on protein level, whereas the expression of other MMPs like MMP9 was recovered or even upregulated five days after irradiation. Inflammatory gene regulatory responses measured by the expression of chemokine (C-X-C motif) ligands (CXCL1, 2, 5, 6) and interleukin expression (IL8) were predominantly reduced. Epidermal differentiation markers like loricrin, filaggrin-1 and 2 were upregulated by both tested laser optics, indicating a potential epidermal involvement. These effects were also shown on protein level in the immunofluorescence analysis.

Conclusion: This novel standardized laser-treated human 3D skin model proves useful for monitoring time-dependent ex vivo effects of various laser systems on gene expression and human skin morphology. Our study revealed that Er:Glass laser-induced alterations of MMP and interleukin expression are possibly implicated in dermal remodeling, anti-inflammatory effects and increased epidermal differentiation. Our finding may have implications for further understanding of the molecular mechanism of Er:Glass laser induced effects on human skin.

## #E23

EFFICACY AND TOLERANCE OF CLEANSING WITH A SONIC BRUSH COMPARED TO MANUAL CLEANSING ON POST-IPL RECOVERY

Michael Gold, Shilpa Rapaka, Katherine Ortblad, Lauri Tadlock, Greg Peterson, Julie Binossee  
Bioscience Clinical Research Center, Nashville, TN; Pacific Bioscience Laboratories, Redmond, WA

Background: In-office procedures such as use of lasers and chemical peels require removal of residual makeup, sunscreen, and sebum/oils that can interfere with the efficacy of the procedure. A sonic brush for daily facial cleansing has proven effective in back-bar/in-office use for ensuring that residual makeup, oil, dirt, and debris are effectively and evenly removed from the skin prior to in-office procedures. While not only effective, the sonic brush is very gentle to the skin and has been effectively used on individuals with rosacea, seborrheic dermatitis, acne, and various other skin conditions. In this study, we investigate the use of the sonic brush post-use of Intense Pulsed Light (IPL) treatments. IPL is most commonly used for reducing brown spots and redness on the face, neck, and chest. IPL recovery time varies with initial redness and swelling within the first 24 hours followed by peeling and brown "micro-crust" regions that dissipates typically within 2 to 3 weeks. In an effort to expedite recovery time and improve short-term performance, we investigated the use of a sonic cleansing brush introduced 1 day after performing IPL. Assess the effect of a sonic skin care brush on IPL recovery time and appearance of skin within 2 weeks of IPL treatment.

Study: Ten women between the ages of 30 to 65 with uneven skin tone and moderate wrinkles were enrolled in this 2-week, split-face pilot study investigating the incorporation of a sonic skin care cleansing brush randomized to one side of their face vs manual cleansing beginning 24 hours post-IPL. Study participants were instructed to cleanse twice daily with a gentle cleanser and the sonic brush (with radiance brush head) on 1 side of their face for 30 seconds twice a day vs manual cleansing. Participants were additionally provided a moisturizer and sunscreen to use through the duration of the study. Participants returned to the clinic at 3, 7, 10, and 14 days for investigator assessments and complete questionnaires. Objective investigator assessments of wrinkles, smoothness, evenness of skin tone, radiance, and overall skin appearance were assessed using the Fitzpatrick 0-9 scale. Tolerance evaluations both objective investigator assessment (peeling, erythema, edema, and dryness) and subjective tolerance (burning, stinging, itching, and tingling) were graded using a 0-3 scale. Results: Following IPL treatment, the side of the face randomized to the sonic brush had greater improvements in objective measures of smoothness at 7, 10 and 14 days post IPL (Wilcoxon signed rank p ¼ 0.023, 0.010, and 0.046, respectively), evenness at days 10 and 14 (p ¼ 0.024 and 0.033), radiance at 7 and 10 days (p ¼ 0.034 and 0.028), and overall skin appearance at 7, and 10 days (p ¼ 0.014 and 0.024). The sonic brush was well tolerated at all visits with no differences in tolerance scores (objective and subjective) between the side cleansed with the sonic brush vs manual cleansing; all tolerance measures returned to 0 at day 14 for both cleansing methods.

Conclusion: One hundred percent of participants reported that sonic cleansing improved reduction of brown spots/micro-crusts.

## #E24

EVALUATION OF EFFICACY AND PATIENT SATISFACTION USING 2 DIFFERENT 755 nm LASER HAIR REMOVAL SYSTEMS

David Goldberg, Neal Varughese, Amy Tank, Bradley Bloom

Skin Laser & Surgery Specialists of NY/NJ, New York, NY



**Background:** Long-pulse 755 nm alexandrite lasers are commonly used to remove unwanted facial and body hair. The gold standard in 755 nm laser hair removal has been a cryogen based system. A new 755 nm laser uses contact sapphire cooling rather than cryogen cooling. The purpose of this study was to evaluate the efficacy and patient satisfaction using the 2 different 755 nm lasers using identical parameters except for their respective cooling technology.

**Study:** The study involved a single treatment session with thirty subjects. After dividing the desired treatment area in half, patients received a laser treatment with the cryogen cooling device (GentleLase, Syneron Candela) on one side and the contact cooling device (Excel HR, Cutera) on the other. Other parameters on both sides were identical (16 J/cm<sup>2</sup>, 18 mm spot, 3 msec pulses). Patients were asked to fill out a survey about the laser treatment and the device they preferred. Investigator photographic and clinical assessments as well as a patient survey were obtained at 3 months and 6 months.

**Results:** 100% of the subjects preferred the sapphire cooled device over the cryogen cooled device. Treatment results were identical. Subject preference was directly related to pain perception from the 2 different technologies.

**Conclusion:** 755 nm laser hair removal is highly efficacious. Discomfort during treatment may impact on patient preference and treatment compliance. 755 nm contact cooling technology was uniformly preferred when compared to cryogen cooling technology.

## #E25

### EVALUATION OF PERCUTANEOUS RADIOFREQUENCY FOR THE TREATMENT OF PLATYSMAL RELAXATION WITH CERVICAL NERVE ABLATION

Marie Stoddard, Ronald Moy, Jeffrey So, Daniel Rivlin

UCLA David Geffen School of Medicine; Keck School of Medicine at USC, Los Angeles, CA; Moy-Fincher-Chippis Facial Plastics and Dermatology, Beverly Hills, CA; Miami Beach Skin Center, Mount Sinai Medical Center, Miami Beach, FL

**Background:** Radiofrequency (RF) ablation for the use of platysmal relaxation is believed to be a safe procedure and minimally invasive. The primary objective of this study was to evaluate the safety and efficacy of percutaneous radiofrequency cervical nerve ablation in the treatment of platysmal band relaxation with and without neck RF skin tightening.

**Study:** This was an open-labeled, multi-centered, study that used the ThermiRF in the treatment of platysmal band relaxation, by cervical nerve ablation, and RF skin tightening of the medial-neck area of twenty females. All participants had mild to severe platysmal bands and skin laxity of the neck. Each subject underwent one treatment of either cervical nerve ablation only, or paired with a skin-tightening phase with the RF source (ThermiRF). The choice was dependent on the individual's degree of skin laxity and severity of platysmal bands. All subjects were evaluated for the degree of platysmal band relaxation, neck tissue tightening and overall appearance, which were based on photographic evaluation by a blinded investigator at 24 weeks following final RF treatment.

**Results:** In nineteen of twenty of the participants, a slight to significant improvement was found in the overall appearance of both platysmal bands and neck skin tightening at 24 weeks. In both groups, platysmal band relaxation was demonstrated by

week 4, but recurrence was noted by week 12, although not to the same degree as baseline. There was no significant difference in skin tightening between those undergoing platysmal band relaxation only and those undergoing platysmal band relaxation with the RF skin-tightening procedure.

**Conclusion:** The use of a RF skin-tightening device is both safe and effective for the treatment of platysmal bands and skin laxity. Despite platysmal band recurrence, there is potential to achieve permanent platysmal relaxation with this method of cervical nerve ablation.

## #E26

### FLUORESCING FATTY ACIDS IN LIVER AUTOFLUORESCENCE DIAGNOSIS

Anna Cleta Croce, Andrea Ferrigno, Clarissa Berardo, Laura Giuseppina Di Pasqua, Federica Corana, Giovanni Bottioli, Mariapia Vairetti

IGM-CNR; University of Pavia; University of Pavia, Centro Grandi Strumenti, Pavia, Italy

**Background:** Autofluorescence in hepatology is a promising in-situ, diagnostic tool to detect diseases in real time and support the selection of donor organs for transplantation. In this concern, we aimed to investigate lipids as new autofluorescence biomarkers of liver metabolic alterations, since the changes in their accumulation and composition and excessive fatty acid trafficking are manifestation of metabolic syndrome and risk of disorder progression. We therefore characterized the autofluorescence of two diet induced or genetic fatty liver models with established redox metabolism differences, focusing on fluorescing fatty acids.

**Study:** Fatty livers were from Wistar rats, administered with methionine/choline deficient diet (MCD-WI), or Zucker (fa/fa) rats (F-Zu). Micro- and spectrofluorometric analysis (366 nm excitation) were performed on cryostatic liver tissue sections and lipid extracts, and on fatty acids as pure compounds. The relative contribution of the different endogenous fluorophores to overall liver emission was estimated by a curve fitting analysis procedure. Parallel biochemical (total lipids) and mass spectrometry (fatty acids) analysis were performed to support autofluorescence data interpretation.

**Results:** Autofluorescence of NAD(P)H, flavin and lipofuscin-like lipopigments confirmed a higher oxidized state in MCD-WI than in L-Zu. Fluorescing fatty acids prevailed in Zucker than in Wistar rats, as confirmed by photobleaching results and oleic and arachidonic acid data from mass spectrometry. Nevertheless, normalization to the total lipid content indicated a relative higher fluorescent fatty acids in controls than in respective fatty livers, suggesting a different lipid turnover.

**Conclusion:** Fluorescing fatty acids are expected to improve the diagnostic applications of autofluorescence analysis in experimental hepatology, with promising perspectives for application in lipotoxicity and disease progression studies, liver metabolic monitoring in the setting-up of preservation strategies and selection of suitable donor organs for transplantation.

## #E27

### FOCUSED ULTRASOUND LIPOLYSIS FOR ABDOMINAL AND THIGH CIRCUMFERENCE REDUCTION IN ASIAN PATIENTS

SeungHee Kang, KyoungAe Jang, JaeHo Lee, JongHee Lee

Leaders Clinic; Samsung Medical Center, Gangnam-gu, Republic of Korea

Background: Non-invasive lipolysis procedures became popular recently, but there's no population based study on its efficacy in Asian people. In this study, we analyzed therapeutic efficacy of the focused ultrasound lipolysis on abdominal and thigh circumference reduction.

Study: Thirty-two and twenty-nine subjects were treated one time at the baseline by highly focused ultrasound lipolysis on their abdomen or thigh, respectively. Concomitant treatments on both sites were done in twelve patients. The largest circumference of abdomen or thigh and the girths of 4 and 8 centimeters above or under it were measured at the baseline, 1, 2, and 3 months after treatment. The mean value of these five measurements was considered as the circumference of the treatment site and compared using paired t-test.

Results: Fifty patients were included from January 2013 to December 2014 with only one male subject. A statistically significant circumference reduction was observed in abdomen treatment group after 3 months (3.252 cm,  $p = 0.0017$ , 95% CI 1.619–4.886 cm). Thigh treatment group also showed similar result (right thigh: 1.8 cm,  $p = 0.002$ , 95% CI 0.956–2.600 cm; left thigh: 2.1 cm,  $p = 0.002$ , 95% CI 1.091–3.100 cm). No life-threatening adverse effects were reported.

Conclusion: Non-invasive lipolysis with highly focused ultrasound device was effective for abdominal or thigh circumference reduction in Korean people. Moreover, only one treatment session was enough to maintain treatment effect for at least 3 months.

## #E28

### FUE IN VITILIGO

Rohan Anand, Niteen Dhepe

Skin City, Pune, India

Background: A patient, 11-year-old male presented in Skin City OPD with complaints of three white patches with leukotrichia on his scalp for 5 years which were non-progressive. One of patch was on right sidelock of about 6.5 x 4.5 cm and other two patches were over frontal forelock extending to midscalp of size about 6.5 x 4.5 cm and 2.5 x 4.5 cm respectively. He was treated with homeopathic, ayurvedic and allopathic medicine without success during his course of illness. We advised him follicular unit hair grafting and subsequent Excimer laser treatment. Our purpose was to evaluate the effectiveness of follicular unit hair grafting and Excimer laser in a patient with vitiligo which was not responding to any other treatment.

Study: Around 600 follicular units were grafted into vitiliginous areas of a patient. After 3 weeks of grafting weekly Excimer laser treatment was started. The response in the form of spreading pigmentation was evaluated periodically.

Results: Perifollicular repigmentation around the grafted hair was observed after 3rd sitting and more than 90% repigmentation after 11th sitting of Excimer treatment.

Conclusion: Follicular unit hair grafting and subsequent Excimer treatments appears to be an effective method for treating stable vitiligo with leukotrichia especially on hairy parts of the skin.

## #E29

### GET RID OF EYE BAGS INFERIOR CONJUNCTIVAL FORMIX APPROACH USING 2940 nm Er:YAG FRACTIONAL LASER DEVICE

Takahiro Fujimoto, Takuma Maeda, Hiroki Miyashita, Gen Furubayashi, Tomito Oji Clinic F, Chiyoda, Japan; Sapporo Le trois Beauty Clinic Vogue, Sapporo, Japan; The Cancer Institute Hospital of JFCR Koutou, Japan; The Cancer Institute Hospital of JFCR Koutoi, Japan; Shinjuku-ward, Japan

Background: Eye bags are the appearance of the lower eyelid fat pads. Cosmetic rejuvenation of the lower eyelid complex has evolved as our understanding of 3-dimensional midfacial aging and anatomy has become more sophisticated. Treating the lower eyelid as a single aesthetic unit leads to a more effective and natural-appearing rejuvenation.

Study: We have treated Inferior Conjunctival formix Approach Fractional Er:YAG procedure for lower eyelid, 36 to 64 years old 4 male and 36 female who had eye bags of lower eyelid. The Parameter of Er:YAG fractional laser were used in 4.5 J/cm<sup>2</sup>, 250 msec (Duration), 7 mm Spot, 2.0 Hz and 3 pass, 5 staking. We took pictures every day during the recovery time.

Results: These patients had successful repair of eye bags with no recurrences recorded on follow-up, which ranged from 6 months. Conclusion: This non-ablative 2940 nm Er:YAG laser treatment using Inferior Conjunctival formix Approach represents one of the safest and most effective treatments, however, additional follow-up studies should be performed to evaluate the long-term effect.

## #E30

### GLOMUVEOUS MALFORMATIONS: DUAL PDL-Nd:YAG LASER APPROACH

Oscar M. Moreno-Arrones, Natalia Jimenez, Emiliano Grillo, Bibiana Perez, Pablo Boixeda Hospital Universitario Ramon y Cajal, Madrid, Spain

Background: Glomuvenous malformations ("glomangiomas") are uncommon simple vascular malformations that might be present at birth or appear during childhood and have been classically classified as a subtype of venous malformations. Due to their unique clinical presentation, genetic and histology characteristics they are currently considered a separate entity. Sclerotherapy and surgery have been used in the past as treatments for this condition although with disappointing results in large glomangiomas. The aim of this study is to describe the clinical characteristics of our patients and to evaluate the efficacy and security of sequential laser treatment PDL-Nd:YAG.

Study: A retrospective study of fifteen patients with glomuvenous malformations treated with dual wavelength PDL-Nd:YAG was made at our hospital. Clinical results were evaluated by two dermatologists not involved in their treatment and by a subjective patient scale. Settings: 10 mm PDL 10 ms, 6 J/cm<sup>2</sup>, 1 second delay and Nd:YAG 15 ms, 30–70 J/cm<sup>2</sup> with air cooling (level 4).

Results: All the patients were significantly satisfied with the treatment. Major clinical improvement was achieved by the fifteen patients. Adverse events were rare and transient, only one patient had localized atrophic scarring after laser treatment. No recurrences of the lesions were observed during the follow-up.

Conclusion: Glomuvenous malformations usually require treatment for both clinical reasons (in order to relieve pain) and also, to improve aesthetics and functionality. Plaque-like glomuvenous malformations are a therapeutic challenge. Usually an individualized and multidisciplinary approach is needed in each patient. Although surgery is curative in small and localized lesions it may leave extensive scars in plaque-like glomangiomas. In addition, sclerotherapy and embolization offer a poor result in these subtype of glomuvenous malformation. In our experience;

laser treatment with dual wavelength PDL-Nd:YAG laser offers excellent clinical response with a low risk of adverse events.

### #E31

#### HYALURONIDASE AND STRAIN IMPROVE INK DIFFUSION THROUGH THE DERMIS: IMPLICATIONS FOR TATTOO REMOVAL

Richard Anderson, Nisrine Imad Kawa, William Farinelli, Anderson R. Rox

The American University of Beirut, Beirut; Wellman Center for Photomedicine Boston, MA

Background: Nanosecond or picosecond laser treatments release some tattoo ink from the dermis, but typically many treatments are required for tattoo removal. Increasing the mobility of tattoo ink particles could potentially improve efficacy. Hyaluronidase greatly increases drug mobility after intradermal injection, but has not been examined for its potential to increase tattoo ink mobility. OBJECTIVE: To evaluate the effect of hyaluronidase and other factors that may increase tattoo ink diffusion through human dermis.

Study: Dermis from discarded human surgical skin samples was mounted in groups of Franz chambers, with the dermis separating saline-filled donor and recipient compartments. Mild hydrostatic fluid pressure was applied to the donor side, then the rate and volume of trans-dermal fluid transport measured, with and without addition of hyaluronidase. In some samples, India ink was applied to the donor side. The effect of dermal strain (stretching) was studied by comparing transport with vs without a fine metal mesh present, which prevented movement (strain) of the dermis under the pressure applied.

Results: Without hyaluronidase or strain, there was very slow transport of fluid through human dermis, and no transport of tattoo ink. The addition of hyaluronidase or strain alone had minor effect, but the combination of hyaluronidase and strain greatly increased fluid flow through dermis ( $p \leq 0.003$ ). The combination of hyaluronidase and strain also allowed tattoo ink to flow into dermis ( $p \leq 0.029$ ). Under these conditions, tattoo ink was observed to flow into the dermis in a non-uniform pattern resembling channels. Without strain, hyaluronidase alone had little or no effect on tattoo ink transport.

Conclusion: The combination of hyaluronidase and strain significantly increases fluid and tattoo ink transport in human dermis. Hyaluronidase digests dermal hyaluronic acid, a major jelly-like component of dermis. Strain partially opens spaces between collagen and elastin fibers of the dermal extracellular matrix. This study suggests that hyaluronidase plus strain following laser treatment, may improve laser tattoo removal.

### #E32

#### LASER DEBRIDEMENT OF CHRONIC WOUNDS

Robert Bowen, Ginna Treadwell, Erica Elford

WVU Healthcare, Martinsburg, WV; Sciton, Palo Alto, CA

Background: Chronic wounds such as venous ulcers and diabetic foot ulcers occur when the healing cascade becomes stalled in the inflammatory stage. Weekly sharp debridement with scalpel or curette is the gold standard for removing biofilm and fibrin and restarting the healing cascade. The cobblestone nature of granulation tissue limits removal of biofilm and fibrin from the 'valleys' of this tissue without injuring healthy granulation tissue. Venous ulcers are typically painful and may be difficult to debride

without general anesthesia or sedation. The wavelength of the Er: YAG laser (2940) is at the peak of the absorption spectrum of water and is capable of vaporizing tissue with minimal adjacent thermal injury. This study was undertaken to determine safety and efficacy of Er:YAG laser for debridement of chronic wounds. Study: 20 consenting patients presenting to the wound center with venous(12) and diabetic(8) ulcers were randomized to be treated weekly with either laser or sharp debridement along with all other usual and customary care. Photographs were taken before and after debridement and evaluated by 3 blinded observers for % of wound surface debrided. Patients scored the treatment for pain on a 10 point scale.

Results: Venous ulcers-% of surface debrided: laser  $\frac{1}{4}$  82.5p/ 5.5, sharp  $\frac{1}{4}$  56.4p/ 8.6  $P < .05$ ; pain score: laser  $\frac{1}{4}$  3.4p/ 1.2, sharp  $\frac{1}{4}$  5.9p/ 1.2  $P < .05$  Diabetic ulcers-% of surface debrided: laser  $\frac{1}{4}$  80.5p/ 3.0, sharp  $\frac{1}{4}$  61.8p/ 9.0  $P < .05$ ; pain score: laser  $\frac{1}{4}$  1.25p/ 0.83, sharp  $\frac{1}{4}$  1.0p/ 1.1  $P > .05$ .

Conclusion: Er:YAG laser debridement resulted in a significant increase in % of the surface debrided in both venous and diabetic ulcers. Er:YAG laser debridement resulted in significant decrease in pain for debridement of venous ulcers but not for diabetic ulcers. Investigation to determine whether this improvement correlates with decreased time to heal such wounds is warranted.

### #E33

#### LASER-ASSISTED DRUG DELIVERY

Lisa Zaleski-Larsen, Sabrina Fabi

Cosmetic Laser Dermatology, San Diego, CA

Background: Laser assisted drug delivery (LADD) is an evolving new therapy with many possible applications as a highly targeted customizable method for distribution of drugs within the skin. LADD offers the advantages of accessibility, noninvasiveness, compliance, safety, and effectiveness. Our objective is to review the available literature regarding laser assisted drug delivery.

Study: A Medline search was performed on laser assisted drug delivery from 1989 to 2015, and the results are summarized.

Practical applications of these procedures are also discussed.

Results: Reports of the use of ablative, non-ablative, and fractional lasers as a means to increase cutaneous permeation of the topical application of medications and cosmeceuticals were found. The focus of the review is to demonstrate the variety of topical treatments that have been utilized with the LADD method and the multitude of future studies needed to fully characterize the best application of this evolving technology.

Conclusion: We provide the most comprehensive review in the literature to date on laser assisted drug delivery. Further studies are needed to fully evaluate the safety, dosing, side effects, and results.

### #E34

#### LEARNING FROM THE SUN FOR PBM PURPOSES: WHY INTENSITY REALLY MATTERS

Daniel Barolet, Micheal Hamblin

McGill University, Montreal, Canada; Wellman Lab, Boston, MA

Background/Study: It has been proposed that the sun's IR-A wavelengths might be deleterious to human skin and that sunscreens, in addition to their desired effect to protect against UV-B and UV-A, should also protect against IR-A (and perhaps even visible light). Several studies have shown that NIR may damage skin collagen content via an increase in MMP-1 activity in

the same manner as is known for UVR. Unfortunately, the artificial NIR light sources used in such studies were not representative of solar irradiance. Actually IR-A may be more beneficial than deleterious when the skin is exposed to the appropriate irradiance/dose of IR-A radiation, similar to the daily sun exposure received by people in real life. Copying mother nature (biomimicry) by the use of PBM is therefore meaningful. Results: In vitro. A reduction of MMP-1 levels was measured in vitro in HRS (Human Reconstructed Skin) after 805 nm IR LED treatments using parameters which were within the sun's IRA spectrum. For MMP levels, a cyclic pattern of alternating highs and lows was observed in response to 11 consecutive treatments (T1-T11). In vivo. Prior to exposure to UVB, a test subject was pre-treated with multiple wavelengths (405-970 nm) at 30 mW/cm<sup>2</sup>. The results showed a superior reduction of UVB-induced erythema in favor of the NIR end of the spectrum. The best wavelength (970 nm) was then chosen and tested on n ¼ 5 patients showing sub-MED SPF-like effects.

Conclusion: Irradiances in the range of tens of mW/cm<sup>2</sup> are likely to be protective and overall beneficial to the skin, while irradiances in the range of hundreds of mW/cm<sup>2</sup> are likely to be damaging and overall deleterious to the skin. As a result, IR-A appears to be the solution, not the problem. It does more good than bad for the skin. It is essentially a question of intensity and how we can learn from the sun.

## #E35

### LIFTING THREADS AND MFU-V COMBINATION TREATMENT

Gabriela Casabona, Nilceo Michalany  
Sao Paulo, Brazil

Background: Rejuvenation treatment procedures have changed along over the past years, from a dermatologic point of view. Since the contribution of skin, bone structure, fat and muscle is well known in the aging process, the combination of technologies, fillers and threads has grown in order to achieve a more natural, efficient and non or minimally invasive youthful appearance. This study was undertaken to confirm that the combination of microfocused ultrasound with visualization (MFU-V) (Ulthera R), and lifting threads is safe and also to show a greater neocollagenesis in the combination of both. Study: Three rectangles of 5 x 10 cm of fresh pig skin were used to pass one kind of threads each: 1- Poli L lactic acid thread, 2- Polietilene thread and 3- Poliamide thread in an horizontal plane parallel to the dermis in various depths. MFU-V were applied on top immediately after, 60 lines of each transducer. The tissue was submitted to pathology. In order to evaluate the behavior of threads and heat one piece of each thread were submerged into 42C, 65C and 100C water and observed after 1,2,3 min under the microscope to see if there were any difference in the thread structure. And a 34-year-old patient who had threads put in the lower abdomen for skin repositioning after pregnancy underwent an MFU-V treatment in the periumbellicus area and after 3 months had a dermolipectomy. The skin of the abdomen was sent to pathology and the areas of threads and MFU-V and only MFU-V were compared to see the neocollagenesis behavior.

Results: The pig skin biopsies were stained with H&E and showed no significant differences in the appearance or structure of the threads. The heat study showed that only in the 65C 3 minute and 100C 1-3 minutes group changes in the superficial thread structure could be seen. The abdomen skin biopsies were stained

with H&E, Verhoeff and Masson and showed a much more dense neocollagen and elastin formation without any inflammation or foreign body reaction. There were no significant differences in the poli-lactic acid absorbable thread structure after MFU-V application in vivo.

Conclusion: Clinicians are concerned about combining those procedures (threads and MFU-V treatments) because theoretically the heating process could start a dense inflammatory response and potentially lead to a foreign body reaction, or the thread could change in appearance and structure. We suggest, through these findings, that no granuloma, or histologic changes in the threads structure were seen after exposure to MFU-V and that the combination of MFU-V and poli-L-Lactic threads can stimulated a greater and more dense collagen and elastin formation.

## #E36

### LIGHT ABSORPTION SPECTRUM OF RETINAL PIGMENTED EPITHELIUM

Esther Cuerda, Maria Angustias Palomar,  
Rafael Linares, Gema Diaz, Christian  
Hammer, Friedrich Paulsen

Alcorcon, Spain; Erlangen-Nurnberg, Denmark

Background: The retinal pigmented epithelium (RPE) is the outermost layer of the retina and was shown to have important physiological functions, including the maintenance of structure and functionality of the photoreceptors and the blood retinal barrier. Damage to the transport system of RPE cells is involved in a number of retinal diseases like macular degeneration, e.g. ARPE-19 is a commercially available human RPE cell line used for in vitro studies because it shares structural and functional characteristics with RPE cells in vivo. As exposure to certain wavelengths of light had been demonstrated to elicit protective effects in various cells and tissues, previously, we focused on the determination of the absorption spectrum of ARPE-19 cells, to find a lead as to which wavelengths may potentially have protective effects on these cells.

Study: The aim of our study was to determine the light absorption curve of ARPE-19 cells. Melanin levels were measured to

exclude the presence of chromophores. ARPE-19 cells were maintained in PBS medium in a concentration of 1,5 million cells per milliliter at 37 °C. Absorption curves were obtained by a spectrophotometer UV/VIS/NIR (Perkin Elmer1), with a wavelength range of 200-1000 nm. In human fibroblasts (1BR3G) the light absorption curve was obtained as a control. Melanin levels were measured by ELISA (Cusabio1) from cultured cells in standard conditions and compared to human fibroblasts used as a negative control.

Results: The curve obtained in ARPE 19 cells showed an absorption peak at 258 nm (0.6125). No statistically significant differences in melanin levels were found between ARPE-19 cells and the fibroblast controls, which means no melanin was present in ARPE-19 cells in standard culture conditions. As expected in non-pigmented cells, no absorption peak was found within the wavelengths melanin usually absorbs. The absorption peak at 258 nm may be related to the absorption maximum of DNA, which is also located at 258 nm.

Conclusion: The ARPE 19 light absorption spectrum in standard culture conditions showed a peak in 258 nm which is probably be due to DNA absorption. Further studies must be performed to examine the interaction between tissue and UVC and its potential use in retinal diseases.

## #E37

## LOW INTENSITY LIGHT THERAPY FOR SURGICAL DEHISCENCE: A SYSTEMATIC REVIEW

Elisabete Dias, Alessandro Deana

Universidade Nove de Julho, Guarulhos, Brazil

**Background:** The surgical dehiscence is considered a spontaneous opening of sutures after surgery, leading to an open wound and prolonged healing process by third intention. This surgical complication increases the convalescence period of the patient, the hospital costs and stay, causing comorbidity, psychosocial and disabling problems, often leaving the patient with sequels. It has been demonstrated that low intensity light therapy (LILT) accelerates the healing process in the treatment of skin lesions. However, the basis of clinical evidence for use in surgical dehiscence remains scarce. **Objectives:** Analyze articles published on the use of LILT in the treatment or prevention of incisional dehiscence in humans, through Systematic Review. **Study:** Research conducted in electronic databases by keywords: Laser Therapy, Low Level Laser Therapy, LILT, Surgical Dehiscence. **Language support:** English, Spanish and Portuguese between 2005 and 2015.

**Results:** In total 131 publications were identified. After evaluation 48 were excluded because were not human trials, 26 for being of eye care, 19 to be of dental treatment, 17 were surgical technique of short bowel syndrome correction and 18 do not meet the objective of the research. Of the works that met all the inclusion criteria two described the use of LILT in the prevention of surgical dehiscence and one the treatment. All studies reported significantly positive results. The works on prevention reported more than 50% less dehiscence in the laser group compared to the control group using laser in the infrared (780 nm) and red (685 nm) regions. The work on treatment reported granulated tissue, and inflammatory process reduction. Besides analgesic effects were reported since the first application. **Conclusion:** The studies demonstrate low intensity light therapy is a safe method with good results in preventing and tissue repair of dehiscence, nevertheless more studies are still needed in this field in order to confirm its efficiency.

**Study:** A fractional ablative Er:YAG laser was used to irradiate organotypic three-dimensional (3D) models. Laser treatments were performed at four different settings using a variety of stacked pulses with similar cumulative total energy fluence (60J/cm<sup>2</sup>). Specimens were harvested at specified time points and qRT-PCR and microarray studies were performed. Frozen sections were examined histologically.

**Results:** Three days after Er:YAG laser treatment, an significantly increased mRNA expression of matrix metalloproteinases and their inhibitors (MMP1, MMP2, MMP3, TIMP1, TIMP2) chemokines (CXCL1, CXCL2, CXCL5, CXCL6) and cytokines such as IL6, IL8, IL24 could be detected. Quantitative RT-PCR studies confirmed the enhanced mRNA expression of IL6, IL8, IL24, CXCLs and MMPs. In contrast, mRNA expression of epidermal differentiation markers such as keratin-associated protein 4 (KRT4), filaggrin, filaggrin 2 and loricrin, antimicrobial peptides (S100A7A, S100A9, S100A12) as well as CASP14, DSG2, IL18 and IL36 $\beta$  was diminished. Four different settings with similar cumulative doses have been tested (N10%, C10%, E10%, W25%). These laser treatments result in different morphological changes and effects on gene regulations. Especially longer pulse durations (1000 ms) had the strongest impact on gene expression and resulted in an upregulation of genes such as collagen-1A2, 5A2 and 6A2 as well as FGF2, which can also be detected after CO<sub>2</sub> laser treatment of these model systems. Histologically, all treatment settings resulted in a complete regeneration of the epidermis three days after irradiation.

**Conclusion:** Fractional ablative Er:YAG laser treatment with a pulse stacking technique resulted in histological alterations and shifts in the expression of various genes related to epidermal differentiation, inflammation and dermal remodeling depending on the treatment setting applied. A standardized in vitro 3D model of human skin proved to be useful tool to explore the effects of various laser setting both on skin morphology and gene expression during wound healing. It provides new data on gene expression and microscopic architecture of the exposed skin. These may enhance our understanding of laser treatment at a molecular level.

## #E38

## MOLECULAR EFFECTS OF FRACTIONAL ABLATIVE Er:YAG LASER TREATMENT WITH MULTIPLE STACKED PULSES ON STANDARDIZED HUMAN THREE-DIMENSIONAL ORGANOTYPIC SKIN MODELS

Jens Baron, Laurenz Schmitt, Philipp Amann, Yvonne Marquardt, Ruth Heise, Katharina Fietkau, Timm Steiner, Frank Höflich, Jens Willebrand

RWTH Aachen University, Aachen, Germany

**Background:** The molecular changes in gene expression following ablative laser treatment of skin lesions such as atrophic scars and UV-damaged skin are not completely understood. A standardized in vitro model of human skin for the study of the effects of laser treatment on human skin has been recently developed. Therefore the goal of this study was to examine morphological and molecular changes caused by fractional ablative Er:YAG laser treatment at different laser settings applying multiple stacked pulses of lower fluence on an in vitro full thickness three-dimensional (3D) standardized organotypic model of human skin.

## #E39

## NEAR-INFRARED SPECTROSCOPY OF TEMPERATURE INDUCED PHASE CHANGE KINETICS IN SUBCUTANEOUS FATTY TISSUES

Amir Sajjadi, Stefan Carp, Dieter Manstein

Massachusetts General Hospital, Boston, MA

**Background:** The goal of this work is to study the phase change kinetics due to temperature variation in subcutaneous fatty tissue using Near-Infrared Spectroscopy (NIRS). Near-Infrared Spectroscopy (NIRS) is utilized to study the phase transition in subcutaneous fat tissue during cooling/heating. Temperature gradient and optical scattering are correlated to discover that phase transition point in both cooling and heating processes.

**Study:** The NIRS probe consisted of one source modulated to emit lasers at 8 different wavelengths (635, 670, 690, 752, 758, 782, 811 and 830 nm) and three PMT detectors to determine the scattering and absorption properties of the tissue. We use pig skin samples with thick subcutaneous fat layer and measure the variations in scattering and absorption properties of the tissue during cooling and heating. Two thermocouples are located in the fatty tissue layer in the proximity where the optical properties are measured using NIRS probe. Tissue is cooled/heated during the experiments

using a chiller with an aluminum probe placed on the skin side while the NIRS probe is located on the fat side to measure the scattering/absorption in the fat layer. We measure optical properties of multiple samples with cyclic cooling/heating of the fat layer from 0–40 °C.

Results: The results show that, in general, the optical scattering decreases by heating the tissue and increases by cooling it. However, there is a distinct change in the rate of change of the scattering while the phase transition happens in the fatty layer. Two transition points are observed around 5–10 °C and 20–25 °C. Conclusion: Initial results show that kinetics of phase change due to cooling and heating can be monitored using NIRS methods. Scattering properties can be measured and correlated to the temperature and phase change in fat tissue can be predicted. The temperature vs. scattering changes can be used to obtain the phase transition point and the correlation can be derived to predict the transition point. The hysteresis observed in the cooling/heating cycles could be due to the polymorphic crystallization or different kinds of crystal of the fat tissue at different temperatures.

## #E40

### NO QUANTITATIVE EFFECTS OF PHOTOBIO-MODULATION ON GLUTAMINE ADDICTED CT26 CELLS

Timon Cheng-Yi Liu, Luo-Dan Yang, Mei Gao, Shao-Juan Hu, Chong-Yun Wu, Quan-Guang Zhang  
Laboratory of Laser Sports Medicine, South China Normal University, Guangzhou, China; Institute of Molecular Medicine and Genetics, Medical College of Georgia at Georgia Regents University, Augusta, GA

Background: Photobiomodulation has been found to inhibit tumor growth in animals if immediately treated after tumor cell injection, but has no effects on tumor formation if applied after its maturation. The glutamine addicted CT-26 cells may be a cellular model of colon carcinoma. The effect of low intensity red light at 640 nm from a light emitting diode array (RLED) on tumor formation was investigated using this cellular addiction model in this study.

Study: The golden logarithm was defined as the logarithm to base 0.618. The quantitative difference (QD) of two sets of data was defined as the absolute value of the golden logarithm of the ratio of their mean values. After 2 h 50% horse serum shock, colon carcinoma CT-26 cells were treated with 5% fetus bovine serum and 5 mmol/ml glucose and glutamine at 0.2, 0.3 and 0.63 mmol/ml, respectively. Under these conditions, the proliferation has been found to increase in a stepwise way. The cells were irradiated daily for 15 min. with RLED for 12 days at different power (0.063, 0.156, 0.313, 0.500, 1.030, 1.780, 2.594 and 3.081 mW/cm<sup>2</sup>). In another studies, the cells were co-cultivated for 12 days with H<sub>2</sub>O<sub>2</sub> at different concentration (0.0002, 0.0008, 0.0020, 0.0080, 0.0200, 0.0800 and 0.2000 mmol/ml), or co-cultivated 12 days with Panax Notoginseng Saponins (PNS) at different doses (0.01, 0.10, 0.50, 1.00, 5.00, 10.00, 20.00, and 50.00 µg/ml). The proliferation was assessed with MTT measurement and the data were analyzed with QD.

Results: RLED, H<sub>2</sub>O<sub>2</sub> and PNS modulated the proliferation under some conditions according to statistical difference, but all their QDs between the control group and the treatment group have no significant differences.

Conclusion: The glutamine addition of colon carcinoma CT-26 cells may not be modulated by RLED, while it may be maintained by a negative-feedback mechanism.

## #E41

### NON-EXCISIONAL, MINIMALLY INVASIVE REJUVENATION OF THE NECK USING RADIOFREQUENCY TISSUE TIGHTENING

Eunsoo Park, Seongeun Cho, Seungmin Nam

Soonchunhyang University Hospital, Bucheon, Korea

Background: Non-invasive RF and lasers have been used for skin tightening and body contouring since the 1990s (6,8–12). The safety, efficacy and patient's satisfaction of procedure using novel radiofrequency device (BodyTite) were evaluated.

Study: In this study, we retrospectively included 23 patients who were treated with radiofrequency device to rejuvenate neck skin under local anesthesia under IRB approval from May 2012 to May 2014. The power of the device was set between 10 and 15 W. The target temperature was set by 35 Celsius. The Facetite™ was used as the handpiece to treat. Three independent evaluators were asked to grade baseline and 6 months to 2 years follow-up photographs using a comprehensive quantitative 4-point laxity grading scale adapted from Alexiades-Armenakas. All patients were asked to express a 4-point subjective scale of satisfaction used to assess the aesthetic outcome and quality of life after treatment with radiofrequency device.

Results: Grading of baseline and follow-up photographs of patients taking neck tightening using a radiofrequency device demonstrated statically significant improvement in neck skin laxity with an average grade improvement of 1.01 point on a 4-point laxity grading scale. Using a patient satisfaction scale, patient also significantly more satisfied. (Poor, 0%; Fair, 15%; Good, 46%; and Excellent, 39%). There are transient complications, such as erythema, mild edema. But It resolved spontaneously in 2 weeks. There are no significant adverse effects and complications. and the patients can return to their normal activity immediately after the operation. Conclusion: The BodyTite is a minimally invasive radiofrequency treatment demonstrated to improve skin laxity without the significant adverse effects and complications. The BodyTite™ provide a nonsurgical option for safe and effective rejuvenation of the neck under local anesthesia.

## #E42

### OBJECTIVE EVALUATION ON THE EFFICACY OF A NON-ABLATIVE, FRACTIONAL 1565 nm LASER FOR THE TREATMENT OF SELF HARM SCARS

Gerd Gauglitz, Anne Guertler, Hannah Schweiger, Markus Reinholz, Matteo Tretti Clementoni, Stephanie Steckmeier

Munich, Germany; Milan, Italy

Background: Scars after self-injurious behavior represent therapeutically extremely challenging forms of scarring due to their apparent patterns. Affected patients experience a great loss in life quality and wish to erase their scars and thereby eliminating painful memories. Current treatment regimes mostly rely on surgical techniques, although overall results are frequently little convincing. Preliminary study data suggests the use of non-ablative fractional lasers for this indication, however, objective data supporting this approach is widely missing. The aim of the present prospective study was to objectively evaluate the potential of a non-ablative fractional 1565 nm laser for the improvement of older self-harm scars.

Study: After receiving ethic approval and patient informed consent 18 patients suffering from multiple self-harm scars, mainly located on forearms, wrist and thighs (one male, 17

females, average age 23 years old, Fitzpatrick skin type II-IV) were included in the present study. Patient received a total of three treatments using a non-ablative fractional 1565 nm laser every four weeks, employing two passes (300 2mbeams/cm; 40mJ, onto the scar, 150beams/cm<sup>2</sup>; 50mJ, overall area). Measurements included several questionnaires (DLQI, POSAS, EQ-D-3L), digital photography, and three-dimensional analysis using PRIMOS and VECTRA software at baseline, one month and six months after the last treatment.

Results: All 18 patients completed the study, of whom 75% were "very satisfied" and 25% were "satisfied" with the clinical results of the treatment. Overall tolerability of the procedure was reported to be "very good", with little to no down-time. Significant differences in height (average relative change 28,7%), width, as well as improvement in color, stiffness, and an overall smoother surface texture could be demonstrated based on objective measurements. Clinically improvements were associated with significant improvements in life quality of treated patients.

Conclusion: The use of the fractional non-ablative 1565 nm laser represents a promising and well-tolerated option for the improvement of self-harm scars. Although these scars will never fully resolve, achieved results were associated with a significant improvement in patients' quality of life.

### #E43

#### OPTICAL DIAGNOSIS FOR ALZHEIMER'S DISEASE - EARLY RESULTS OF A PILOT TRIAL

Farnaz Matin, Christian Stephan Betz, Mareike Haack

University Hospital Munich, Munich, Germany

Background: Olfactory dysfunction is a common and early symptom of many neurodegenerative diseases, particularly of Alzheimer's Disease (AD). Pathologically, a deposition of pathological proteins such as hyperphosphorylated tau protein (PHFtau) can be observed within the olfactory epithelium (OE). Recent studies of olfactory dysfunction have focused its potential as a biomarker for the diagnosis of neurodegenerative disorders, such as AD, but their disease specificity and the relationship of PHFtau measurement in olfactory biopsies to brain pathology have not been established.

Study: In an attempt to find a reliable diagnosis for AD, olfactory mucosa is currently examined by contact endoscopy both in and ex vivo using regular, rigid endoscopy, flexible endoscopy and contact endoscopy. A total number of 30 patients with clinically diagnosed AD and of 20 control patients is anticipated. The ex vivo samples are neuropathologically investigated regarding their PHFtau ratings in the OE and its correlation with PHFtau ratings in cerebrospinal fluid (CSF) samples of the same individuals.

Results: First imaging results are presented, and show that it is possible to reliably identify the olfactory mucosa in vivo, so representative biopsies containing OE can be taken. Further examinations are under way to investigate a possible correlation of PHFtau in OE and CSF, which would mean the next step towards the development of a reliable tool for the diagnosis of AD.

Conclusion: pilot trial.

### #E44

#### PAPAIN GEL CONTAINING METHYLENE BLUE FOR SIMULTANEOUS CRIES REMOVAL AND ANTIMICROBIAL PHOTOINACTIVATION AGAINST STREPTOCOCCUS MUTANS BIOFILMS

Zenildo Santos Silva Jr, Zenildo Santos Silva, Jr., Yingying Huang, Lucas Freitas, Raquel Mesquita-Ferrari, Kristianne Fernandes, Cristiane França, Renato Prates, Michael Hamblin, Sandra Bussadori

Nove de Julho University, Massachusetts General Hospital, Wellman Center, Harvard Medical School, São Paulo, Brazil; Massachusetts General Hospital, Wellman Center, Harvard Medical School, Boston, MA; São Paulo University, Massachusetts General Hospital, Wellman Center, Harvard Medical School São Carlos, Brazil; Nove de Julho University, São Paulo, Brazil

Background: To study the effects of papain-gel with methylene blue (PapaMBlue™) to mediate photodynamic therapy (PDT) against *Streptococcus mutans* biofilms. PapaMBlue™ gel is already used for enzymatic removal of caries from affected dentin.

Study: PapaMBlue™ was compared with methylene blue (MB), to generate reactive oxygen species using fluorescence probes (singlet oxygen sensor green and hydroxyphenyl fluorescein). PDT (using 660 nm light) was carried out against *S. mutans* biofilms grown on either plastic dishes or on collagen films and assayed by CFU, live-dead staining using confocal microscopy, transmission electron microscopy and H&E staining for collagen films. Cytotoxicity and subcellular localization was studied in normal human fibroblasts.

Results: PapaMBlue™ produced higher amounts of singlet oxygen and hydroxyl radicals than free MB possibly due to better disaggregation of the dye in solution. The antimicrobial effects on biofilms of PapaMBlue™ and MB were similar (1 log reduction of CFU in dark; 2 log reduction of CFU in light) and almost equal to the positive control of chlorhexidine (2.8 log reduction of CFU). Both MTT and PrestoBlue assays showed higher values in fibroblasts treated with PapaMBlue™ and MB possibly due to stimulation of mitochondrial activity.

Conclusion: PapaMBlue™ is equally effective as MB in destroying *S. mutans* biofilms growing on plastic or collagen without affecting fibroblasts and may have applications to treating deep carious lesions allowing simultaneous removal of diseased dentin and light-mediated killing of bacteria.

### #E45

#### PARADOXICAL HAIR STIMULATION AND HOME-USE LASER AND IPL DEVICES

Godfrey Town, Peter Bjerring

University of Wales Trinity Saint David, Swansea, United Kingdom; Molholm Private Hospital, Vejle, Denmark

Background: This qualitative review of paradoxical hair growth reviews published clinical and scientific studies to clarify whether low fluence is the most probable cause following at home light-based treatments.

Study: The proposed causes of unexpected hair regrowth are examined and our understanding of absorption and scattering of light in turbid tissue is reviewed. Published reports of hair growth following professional treatments and recent scientific studies are assessed.

Results: Exponential loss of energy from divergent IPL sources out of skin contact leaves only a minuscule percentage of light energy at wavelengths associated with cellular changes. The majority of published papers report retrospectively on apparent paradoxical hair growth without adequately documenting pre-treatment evidence of hair color, size and thickness and do not explore thoroughly alternative explanations for regrowth of hair.

Recent home-use studies report significant efficacy data at one-year follow-up. No published paradoxical hair growth studies using PubMed following home-based laser or IPL hair removal treatments, or randomized or controlled studies documenting paradoxical hair growth following professional treatments could be found. Several authors proposed the inflammatory response or single episodes of severe erythema, hyperpigmentation or crusting as the primary cause of hair growth induction.

Conclusion: Hair regrowth several centimeters away from the irradiated tissue cannot be easily attributed to the device used. In anecdotally reported paradoxical hair growth, other coincidental, non-treatment related and undetected causes may be responsible for the unexpected regrowth. Paradoxical hair growth remains a rarely reported event. Dose-response studies on the behavior of the human hair follicle are needed to distinguish different types of hair regrowth following light-based epilation. The primary cause of instances of 'true' paradoxical hair growth is probably limited to darker phototypes with one or more other characteristics including clinical obesity, middle age, symptoms of PCOS or other androgen hormonal irregularities following high energy treatments with corresponding inflammatory sequelae.

## #E46

### PHOTOBIMODULATION IS BETTER THAN SILVER SULFADIAZINE IN SCALD BURN TREATMENT WHEN THE COLLAGEN FIBERS ORGANIZATION IS QUANTIFIED

Daniela Silva, Mariana Gomes, Gabriela Campos,

Viviane Diniz, Rosimar de Souza, Anna Horliana

Background: The thermal injuries represent one of the most severe forms of trauma and remain associated with remarkable morbidity and physical and psychological sequelae. Scald burns that seem superficial often heal with pronounced scar formation and the clinical investigation is mainly limited to macroscopic observation. The microscopical evaluation is essential for a better understanding of burn lesions and wound healing process. In the present study we used the optical path difference (OPD) microscopical technique to quantify the organization of collagen fibers following polarized photobiomodulation vs non polarized of scald buns produced on the back of adult rats in comparison with 1% silver sulfadiazine treatment.

Study: Once anesthetized, the back of the animals was shaved to perform the thermal injury of second-degree. Two areas of the dorsum of 8 mm<sup>2</sup> each was in contact with hot water at 60°C for 45 s. Treatments were performed on days 0, 3, 7, 10 and 14 after the creation of the lesions, with radiant exposure of 1 J/cm<sup>2</sup>. Group 1: injury without treatment; Group 2: treatment with randomly polarized laser; Group 3: treatment with linearly polarized laser; Group 4: treatment with silver sulfadiazine 1%. The OPDs were measured for the determination of more organized collagen fibers and the Kruskal-Wallis test was performed with significance level of 5%.

Results: On day 21th the group 1 showed the lowest OPD (28.78 nm), followed by group 4 (30.30 nm) and groups 2 and 3 (45.45 nm). There was a significant difference between the groups treated with laser and others ( $p < 0.05$ ), but there was no difference between groups 2 and 3 and between groups 1 and 4.

Conclusion: The collagen fibers of the group treated with sulfadiazine showed the same organization of that of the untreated group. The laser groups showed more organized collagen fibers than the gold standard treatment group.

## #E47

### PROSPECTIVE DOUBLE BLINDED STUDY FOR COMPARISON OF LONG PULSE 532 nm KTP LASER ALONE OR IN COMBINATION WITH LONG PULSE 1064 nm Nd:YAG LASER ON FACIAL REJUVENATION IN ASIAN SKIN

Kei Negishi, Shiho Tanaka, Saori Tobita

Tokyo's Women's Medical University, Tokyo, Japan

Background: Long pulsed (LP) 1064 nm laser treatments have been shown to address skin rejuvenation in Asian skin patients with varying levels of efficacy; however, the use of LP 532 nm alone and in combination with LP 1064 nm to address pigment related skin rejuvenation in Asian skin types has not been reported. This study compared the safety and efficacy of LP 532 nm laser used alone to treat pigment concerns and also explored the potential benefits of adding LP 1064 nm to stimulate and enhance dermal remodeling to provide skin rejuvenation.

Study: This was a prospective, double-blinded randomized split-face study of 22 Japanese females, aged 39–70, with photodamage and multiple lentigines on both sides of the face. Subjects received four treatments at three-week intervals of LP 532 nm to the full face and the addition of LP 1064 nm to only half the face (Excel VTM, Cutera). Objective assessment included blinded evaluation of photographs (baseline, and one and three-month post final treatment) using the modified pigment area and severity index (mPSI), mexameter for melanin, and antera 3D for skin roughness. Results: Both LP 532 nm alone and in combination with LP

1064 nm showed statistically significant improvement in mPSI and as measured with a mexameter at the one-month and three-month follow-up exams ( $p < 0.001$ ). Patients and blinded evaluators did observe additional improvement in the appearance of large pores and skin roughness, but not pigment, on the combined treatment with 1064 nm relative to 532 nm alone. No serious adverse events were reported.

Conclusion: Pigment-related skin rejuvenation using LP 532 nm laser is safe and effective for Japanese skin, with added benefits seen from the addition of LP 1064 nm for dermal remodeling and skin rejuvenation.

## #E48

### QUANTITATIVE ANALYSIS IN PHOTOBIMODULATION

Timon Cheng-Yi Liu, Shao-Juan Hu, Ling Zhu, Quan-Guang Zhang

Laboratory of Laser Sports Medicine, South China Normal University, Guangzhou, China; Institute of Molecular Medicine and Genetics, Medical College of Georgia at Georgia Regents University, Augusta, GA

Background: Photobiomodulation (PBM) has been usually studied with statistical approaches. It was reanalyzed with the quantitative difference (QD) in this study.

Study: The golden logarithm was defined as the logarithm to 0.618. The QD of two sets of data was defined as the absolute value of the golden logarithm of the ratio of their mean values. The process logarithm (PL) of each group was the golden logarithm of the ratio of the earlier data and the latter data, and its absolute value was called the resistance logarithm (RL). The QD was significant or very significant if it is equal to or larger than a or b. The a/b of the cellular/molecular/psychological QD or the QD of PL/RL (PD/RD), the organ/tissue QD and the body QD were 0.80/1.27, 0.47/0.80 and 0.27/0.47, respectively.



Results: Much PBM data of statistical significance has no significant QD, PD or RD, while much PBM data with no statistical significance has significant QD, PD or RD. For NeuroThera Effectiveness and Safety Trial of Infrared Laser Therapy for Ischemic Stroke (NEST), the therapeutic effects were of very significance for NEST-1, of significance for NEST-2, but of no significance for NEST-3 according to organ/tissue QD, which suggested that ischemic stroke should be classified into two categories: PBM-sensitive and PBM-resistant. For the well-known randomized clinical trial of acupuncture for chronic knee pain, PD/RD analyses showed needle, laser, or sham laser acupuncture significantly changed most of parameters compared with control at 12 weeks or 1 years. Although much cellular PBM data has no significant QD, PD or RD, the mechanism of signal transduction pathway still held because there were function-specific signal transduction pathways (FSPs) according to molecular QD, PD or RD, and PBM might promote the activation of one or more FSPs if the observation term is long enough.

Conclusion: The biomedical QD, PD and RD may promote the translation of PBM studies into low level laser/light therapy.

## #E49

### REFLECTION SPECTRUM OF LICHEN SCLEROSUS

Daniela Silva, Renata Belotto, Roberto Santos, Rosângela Itri, Maurício Baptista, Wellington Moreira, Yhago Geraldo, Maria Cristina Chavantes, Guelton Guedes UNINOVE; Perola Byington Hospital; University of Sao Paulo, Sao Paulo, Brazil

Background: Lichen sclerosus (LS) is a lymphocyte-mediated disease of unknown etiology that can cause intense itching, stenosis, severe pain and trauma to the skin. The standard treatment for this disease is the use of topical corticosteroids to restrict the clinical symptoms and to try to increase disease-free intervals. Currently, alternative therapies are investigated, especially phototherapy, which require better understanding about the radiation-tissue interaction. Reflectance measurement is a convenient method for skin evaluation due to the intensity of reflectance can be affected by the changes of absorption and scattering properties. Thus, the aim of this study was to compare the reflection spectrum of the skin affected by LE relative to healthy skin by means of reflection spectroscopy in vivo.

Study: 20 patients with diagnosis of LE participated in the study after approval by the Research Ethics Committee (protocol number 768168). The healthy skin was measured at a remote area from LE and 40 measurements were realized, i.e. one measurement on healthy area and another on diseased area in each of 20 patients. It was used a spectrometer to obtain reflection and the spectra were analyzed with the statistical software OriginPro. The data were normalized, and separated in 600 to 700nm and 700 to 800nm ranges. The areas under the curves were measured for the determination of more reflective skin and dependent t-test was performed with significance level of 5%.

Results: The reflection of the LE was significantly higher compared to a healthy skin (p Conclusion: The skin LE reflects more radiation in the visible range of the electromagnetic spectrum in relation to healthy skin and in the infrared range both equally reflect. FAPESP, grant n82015/05259-8.

## #E50

### SIALOMETRY ASSESSMENT AND SALIVARY BIOCHEMISTRY STUDY IN CHRONIC RENAL FAILURE PATIENTS BEFORE AND AFTER LOW LEVEL LASER THERAPY: A PILOT STUDY

Vanessa Christina Pavesi, Fabio Luiz Coracin, Benedito Jorge Pereira, Jeverson Araújo, Renato de Araújo Prates, Alessandro Melo Deana Nove de Julho University, Sao Paulo, Brazil

Background: Chronic kidney disease is due an injury or decreased kidney function for a period less than three months and the classification comprises different stages indicating the progression of severity. In those advanced stages the patients need to the hemodialysis or kidney transplantation. Many studies have related the presence of oral manifestations, salivary alterations and function of the glands in those patients where reported decreased both stimulated and unstimulated salivary flow, pH and buffer changes. In the other hand, the changes in salivary composition, including increased protein and reducing the peroxidase enzyme secretion as well as increased of phosphate, zinc, magnesium and urea secretion. These changes may be related to severe damages to the oral cavity, as worsening periodontal disease, xerostomia, burning mouth, uremic stomatitis and dysgeusia. The low intensity laser, is being used to treat patients with xerostomia-related diabetes, head and neck

radiotherapy, Sjögren's syndrome, and other condition that cause changes in flow rate. The aim of this pilot study was to evaluate the effectiveness of low-level laser therapy in the salivary flow rate and biochemistry in chronic renal failure patients.

Study: Saliva sample was collected in the same patient before and after low-level laser therapy with the parameters 808 nm, 500 mW, 4 J/cm<sup>2</sup> in three points out of the mouth in the parotid glands, submandibular and sublingual sites as well as in three inside the mouth points leading to the check the amount of saliva produced, as well as the change in pH and salivary components.

Results:

Conclusion:

## #E51

### SKIN MELANIN INDEX MEASUREMENTS ENHANCE SAFETY IN SELECTIVE PHOTOTHERMOLYSIS COMPARED WITH OCULAR FITZPATRICK SKIN-TYPING

Per-Arne Torstensson

Optopia, Kungälv, Sweden  
Background: The main objective with selective photothermolysis is not only to perform an effective but also a safe treatment. In darker skin types skin burning is quite a common side effect while performing photoepilation, vascular treatments, collagen stimulation etc. The vast majority of practitioners are taught to estimate clients' epidermal melanin content by applying the Fitzpatrick skin-typing guidelines and to adapt treatment parameters according to the manufacturers' guidelines. This whole procedure is very inexact as the estimation of the Fitzpatrick scale is very subjective and may also not correlate with manufacturers' opinions about skin-typing. The inaccuracy of subjective estimation of melanin density is probably the main cause of skin burns in selective photothermolysis.

Study: To mitigate this problem, efforts have been made to objectively measure the skin color by photometric devices. This

method has not gained wide acceptance since the skin color itself correlates poorly with melanin density.

Results: Accurate quantification of melanin density must be measured radiometrically with a melanin selective spectrophotometer that measures the effective melanin absorption, preferably over the wavelength range that corresponds to the therapeutic light source. The effective melanin absorption coefficient for a specific skin location can now be used to calculate the safe parameter range for a specific light source provided that accurate device parameters such as fluence, spectral power distribution, temporal pulse-form and skin-cooling conditions are known and are consistent over the treatment procedure.

Conclusion: Thus, wide clinical application of radiometric devices for accurate measurement of melanin absorption has the potential to practically eliminate all cases of severe skin burning. Subjective, ocular skin-typing methods should be abandoned by implementation of new regulatory directives.

## #E52

### SOFT TISSUE LASER ABSORPTION, ABLATION AND COAGULATION DEPTHS SPECTRA

Peter Vitruk

Aesculight LLC, Woodinville, WA

Background: Modern day laser-tissue interaction education is limited largely to discussing the laser tissue absorption spectra and stops short of what's of ultimate practical importance: i.e. the depth of ablation (cutting, incision, excision) and the depth of coagulation for the soft tissue. This presentation addresses the wavelength dependent and laser fluence dependent depth of laser ablation that is measured and is also derived from the soft tissue absorption spectra and soft tissue thermodynamic properties. The depth of ablation and the depth of coagulation are discussed with respect to laser pulsing, power, spot size and the handspeed.

Study: The depth of laser ablation is measured and is also derived from the soft tissue absorption spectra and soft tissue thermodynamic properties. Variables such as laser pulsing, power, spot size and the handspeed are taken into account. Results: Ablation depth and the depth of coagulation vary with absorption coefficient, laser pulsing, laser power, spot size and the handspeed.

Conclusion: Ablation depth and the depth of coagulation vary with absorption coefficient, laser pulsing, laser power, spot size and the handspeed.

## #E53

### STUDY OF A SUCTIONLESS NOVEL APPLICATOR FOR THE TREATMENT OF PSEUDOGYNECOMASTIA WITH CRYOLIPOLYSIS

Joanna Bolton, Douglas Wu, Mitchel Goldman

Cosmetic Laser Dermatology, San Diego, CA

Background: Non-invasive body contouring in a method by which significant reductions in excess subcutaneous adipose tissue can be achieved without any form of surgical intervention and with minimal to no subsequent down time. One of the most recognized modalities that has emerged for this technique is cryolipolysis. Cryolipolysis is predicated on the temperature sensitivity of adipocytes wherein cooling of these cells to a level above freezing but below normal body temperature induces an apoptotic response. Several clinical trials have demonstrated the

efficacy of this modality in achieving significant reductions in excess subcutaneous adipose tissue of the flanks and abdomen. Additional body sites including the thighs, arms, chest, buttocks, back, knees, and ankles have also been studied, albeit in less comprehensive fashion.

Study: Conventional cryolipolysis utilizes a suction cup applicator that requires a minimum pinchable fat layer in order to be optimally effective. With the development of a novel suctionless applicator, however, alternative body sites may now be amenable to successful treatment. In this study, we investigate the safety and efficacy of cryolipolysis treatment for pseudogynecomastia utilizing this novel applicator. Study Design: N ¼ 10 male subjects Unilateral treatment to larger breast with untreated contralateral control Treatment plan: 1 cycle per visit, 2 treatment visits, second cycle at 6 week visit Treatments at commercial setting (-13C for 75 minutes) Optional equalization treatments on untreated control at end of study

Results: Endpoints: Clinical photographs at baseline, 6-weeks, and 12-weeks Ultrasound imaging at baseline, 6-weeks, and 12-weeks Patient surveys Initial data shows mean reduction of 6.2 mm in the fatty tissue layer in treated side based on the 12 week ultrasound imaging combined with visible improvement in clinical photographs and patient surveys stating 'very satisfied'. Conclusion: Two treatments using a suctionless cryolipolysis applicator was safe and effective to reduce breast fat associated with pseudogynecomastia.

## #E54

### SUCCESSFUL TREATMENT OF ACTINIC GRANULOMA WITH PULSED-DYE LASER AND FRACTIONATED CARBON DIOXIDE LASER: CASE REPORT AND REVIEW OF TREATMENTS FOR ACTINIC GRANULOMA

Derek Ho, Andrew Mamalis, Kory Parsi, Jared Jagdeo

Sacramento VA Medical Center, Mather, CA

Background: Actinic granuloma is an uncommon, benign, granulomatous condition characterized by annular plaques on sun-exposed areas of skin. It is aesthetically disfiguring and can significantly impact patient quality-of-life. Treatment of actinic granuloma is challenging, as these lesions tend to persist, showing little to no response to topical or intralesional corticosteroids. We present a case of a 66-year-old man with actinic granuloma who achieved aesthetic improvement after pulsed-dye laser (PDL) and fractionated carbon dioxide (CO2) laser, and review the medical literature on published treatments for actinic granuloma.

Study: This patient presented to our clinic with a 5-year history of actinic granuloma characterized by extensive erythematous, raised, annular plaques on his hands and upper extremities bilaterally. Biopsy of a characteristic lesion confirmed histologic evidence of actinic granuloma. The patient received 13 treatments of PDL and 4 treatments of fractionated CO2 laser, each treatment spaced approximately 6 weeks apart.

Results: After the last treatment, the annular plaques demonstrated significantly flattened borders and reduction of erythema, with their color closely matching natural skin color. The patient reported a significant increase in his quality-of-life as he is no longer embarrassed to wear short sleeve shirts. The aesthetic improvements were sustained at 6 month follow up.

Conclusion: Actinic granuloma can significantly impact patient quality-of-life as lesions tend to occur on highly visible, sun-exposed areas of skin (face, neck, arm and chest). A review of the

medical literature demonstrates a paucity of effective treatments. Reported treatments include topical corticosteroids, retinoids, and excision; all of which show minimal efficacy. To our knowledge, this is the first report of successful treatment of actinic granuloma with a combination of PDL and fractionated CO<sub>2</sub> laser, and we believe that using two different types of laser may help clinicians treat and enhance the quality-of-life for patients with actinic granuloma.

## #E55

### SUCCESSFUL TREATMENT OF KAPOSI'S SARCOMA ASSOCIATED HYPERPIGMENTATION BY PULSED DYE 595 nm LASER

Lynne Napatalung, Shari Ochoa

Mayo Clinic, Scottsdale, AZ

Background: Kaposi's sarcoma (KS) associated with human immunodeficiency virus (HIV) is caused by human herpes virus 8. KS can be a major cause of morbidity in AIDS patients, and the pigmentary sequelae in patients whose disease is effectively treated can be a source of social isolation.

Study: We present the case of a 44-year-old male with HIV who was diagnosed with KS and subsequently underwent successful treatment of his KS with chemotherapy. He continued on HAART medication but felt the post-inflammatory hyperpigmentation at the site of his previous KS lesions was disfiguring and stigmatizing. He had failed treatment with cryotherapy and one session of alexandrite laser at an outside dermatologist. A pulsed dye laser (595 nm, 1.5–3 msec, 10 mm spot size). Topical anesthesia was not used, and the patient tolerated the procedure well.

Results: Clinical lightening of the lesions on the trunk and extremities was appreciated after a single treatment, and significant lightening was noted after three to five treatments. The patient was lost to follow up after eight months of treatment.

Conclusion: Although several authors have utilized light based therapy to treat active KS lesions, we are reporting our experience with treatment of the disfiguring post-treatment residual pigmentation that is a hallmark of this disease and can be quite devastating for these patients, as it is evidence of their underlying HIV/AIDS status. The pulsed dye laser is readily available, creates little to no smoke plume given the risk of aerosolized viral particles, does not require topical anesthesia, treats a large area quickly, and has no significant post-procedure wound care since the epidermis is left intact. We report a safe and effective treatment option for post-inflammatory hyperpigmentation resulting from chemotherapy responsive KS lesions.

## #E56

### SUCCESSFUL TREATMENT OF PARADOXICAL DARKENING

Yoon-Soo Cindy Bae, Hamad Alabdulrazzaq, Jeremy Brauer, Roy Geronemus

Laser & Skin Surgery Center New York, New York, NY

Background: Tattoo removal can inadvertently lead to paradoxical darkening after laser procedure. Furthermore, identifying which tattoos will react unexpectedly provides an additional challenge. Although Q-switched lasers have been established as the gold standard treatment for the removal of unwanted tattoos, the advent of the picosecond 755 nm laser may challenge this paradigm. Very few studies have been conducted to

explain the occurrence of paradoxical darkening. We present a new laser device that may treat this unwanted outcome.

Study: We report 2 cases observed in a separate clinical trial, using a novel picosecond 532 nm and 1064 nm laser to treat unwanted red colored tattoos.

Results: Two cases of paradoxical darkening improved with the use of a novel picosecond 532 nm and 1064 nm laser with ultimate successful tattoo removal.

Conclusion: The use of a picosecond 532 nm and 1064 nm laser may treat paradoxical darkening in red colored tattoos. Further studies are needed to investigate the use of the picosecond laser 532 and 1064 nm for this indication.

## #E57

### TATTOO FRAGMENTS CARRYING HUMAN BACTERIA EXIT THE SKIN AT HIGH SPEED FOLLOWING TREATMENT WITH A Q-SWITCHED Nd:YAG LASER

Per-Arne Torstensson, Michael Murphy

Dermalase, Glasgow, Scotland

Background: High speed tattoo fragments have been observed embedded in glass slides following standard treatments of a number of patients with a Q-switched Nd:YAG laser.

Study: Microscopic photographs reveal micron-sized fragments of tattoo ink at various depths within the glass indicating a range of kinetic energies. A first-approximation calculation indicates fragment velocities of tens of meters per second on exiting the epidermis.

Results: Photographs appear to show melted ink patterns, resembling insects. This reveals high impact energies, sufficient to generate high temperatures causing the inks to melt.

Conclusion: Gram stain analysis indicates the presence of Gram-negative bacteria around these embedded fragments. This raises the issue of possible cross-infection during such treatments. Clearly this poses a health hazard which should be considered by all tattoo laser users.

## #E58

### THE ASIAN EXPERIENCE OF INTENSE ULTRASOUND THERAPY (ULTHERA) TO ACHIEVE UPPER LIP POUTING/EVERSION

Victoria Belo, Elosia Buse,

Johanna Cristina Munoz

Belo Medical Group, San Juan City, Philippines

Background: This study aims to determine the potential of intense ultrasound therapy as a non-invasive alternative to achieve upper lip pouting.

Study: 20 Asian patients ages 26–69 with Fitzpatrick III–IV were included in the study. Baseline photographs and measurements (distance in millimeters (mm) from the vermilion border of the upper lip on one side of the philtrum ridge running vertical to the philtrum column up to the nasal columella) were taken.

Treatment done under IV sedation using the 7.0–3.0 mm narrow tip transducer. 20 lines were delivered on the treatment area. Measurements were taken immediately after treatment and 4 weeks post treatment. Ratings of improvement were noted based on the degree of reduction in measurements.

Results: Majority of cases responded to intense ultrasound therapy for upper lip pouting. Thus this proves to be effective as a non-invasive alternative for upper lip pouting.

Conclusion: Intense ultrasound therapy is an effective non-invasive modality to achieve upper lip pouting.

## #E59

### THE CASES TREATED BY REPEATED LOW FLUENCE IPL PULSING WAY

Koji Itai, Hajime Nakano, Daisuke Sawamura  
Goshogawara, Japan; Hirosaki, Japan

Background: Hair removal cases with dark skin colors, post inflammatory hyperpigmentation (PIH), melasma or fine hair are tend to make some troubles during procedure, such as pain and burn. Recently low fluence and high repetition rate pulsing have been popular to reduce the side effect for high risk cases. Mono wavelength laser, mostly diode are common in these machines whereas this repeated low fluence IPL pulsing, BBL BARE irradiate various range of wavelength, 420–1200, 515–1200, 560–1200, 590–1200, 640–1200 and 695–1200 nm: this would affect to various condition by each specification. To evaluate the usefulness of this pulsing method, we had pulsed to various cases, fine hairs on face, acne, teleangiectasia, melasma and PIH. Study: We categorized the diseases into groups; 1) Hair removal, 2) Acne, 3) Teleangiectasia, 4) Melasma and post inflammatory pigmentation (PIH). We had used BBL BARE software, low fluence multiple repeated IPL pulsing way with IPL filters 515–1200 nm to 640–1200 nm, fixed fluence and pulse width;

5 J/cm<sup>2</sup>, 3 ms, kept on pulsing until patient feel hotness and slight pain. Most areas are pulsed between 30 to 70 J/cm<sup>2</sup> for 5 to 10 times 1 month apart. Evaluate the before and after taking photos and analyzed by VISIA. Hair removal: By using 640–1200 nm filter, compared with conventional stamping high fluence single pulsing and repeated pulsing 60–70 J/cm<sup>2</sup> on axillar.. Pulsed by same filter to fine hairs 60–80 J/cm<sup>2</sup> on face. Acne: By using 640–1200 nm filter, patient resistant to oral and topical antibiotics was responded to the therapy 60–70 J/cm<sup>2</sup> on face. Teleangiectasia: By using 560–1200 nm filter, pulsed 60–70 J/cm<sup>2</sup> on face. Melasma and PIH: By using 515–1200 and 640–1200 nm filter, compare side by side, pulsed 60–80 J/cm<sup>2</sup> on face. Results: 1) Hair removal: Axillar: Compared with conventional stamping high fluence single pulsing and repeated pulsing on axillar. Stamping method was more effective at same treatment number, but repeated pulsing is better on pain and reducing fine hairs. Face: 2) Acne: Reducing number of pustules and red papules, the redness and fine hairs. 3) Teleangiectasia: Reduction of redness and small vascular with removal of fine hairs. 4) Melasma and PIH: No color exacerbation was seen on both 515–1200 nm and 640–1200 nm filter side. Improvement on skin texture and reduction of fine hair was seen.

Conclusion: By repeated IPL pulsing, fine hairs on face had been gradually reduced by extending the duration of shaving to 2–3 days, 1 week, 2–3 weeks, 4 weeks, 1–2 months and free of shaving. Acne patients are tend to got worse by irritating by touching and scratching, rubbing on washing and shaving of facial hairs. By stopping the shaving on face, the inflammation would be reduced. That seems to be one of the reason why the redness on acne and teleangiectasia had been improved by this pulsing. By measuring the temperature of the surface of face by thermography, the maximum temperature was reached at 42°C. That also would be the one of the main reason why the acne and the skin texture had been improved. There had been no apparent side effect, pain, burn, hypertrichosis on pulsed site and exacerbation on color on melasma and PIH site. Repeated low fluence IPL pulsing had remarkable improvement on various disease and

condition, because of this pulsing would act like photo biomodulation and low level laser therapy. Thus, this pulsing would be the new way of IPL pulsing in the near future.

## #E60

### THE EFFECTS OF MODIFIED PAPAIN-BASED GEL CONTAINING LIGHT-ABSORBING PIGMENT ON COLLAGEN AND DENTIN: A SPECTROSCOPIC AND MECHANICAL STRENGTH ANALYSIS

Mônica Salgueiro, Zenildo Junior, Sergio Botta, Patricia Ana, Cristiane França, Kristianne Fernandes, Alessandro Deana, Sandra Bussadori

UNINOVE, Sao Paulo, Brazil

Background: Considering the concepts of Minimal Intervention Dentistry, the preservation of a decontaminated dentin after caries removal is essential for the success of treatment. The papain-based gel is useful in this aspect; however, other chemical agents can be necessary to ensure the decontamination of remaining dentin. The aim of this study was to evaluate the effects of a papain-based gel containing blue light-absorbing pigment (Bixa Orellana) on type-I collagen microstructure and on tensile bond strength of primary dentin.

Study: It was performed an in vitro study divided into three experimental phases. In the first one, the absorbance of different concentrations of urucum, associated or not with PapacarieDuo™, was analyzed by UV-VIS spectroscopy. In the second phase, it was evaluated the effects of urucum, PapacarieDuo™ and PapaUrucum, when irradiated or not with blue LED light, on microstructure of collagen using Fourier transformed infrared spectroscopy (FTIR) and, in the third experimental phase, it was studied the influence of the same substances on tensile bond strength (TBS) to primary dentin. Results: It was observed that the incorporation of Bixa Orellana on PapacarieDuo™ did not alter the absorption spectra of pure Bixa Orellana and, in this way, it was possible to use the blue light to activate the PapaUrucum. The application of all proposed substances on type-I collagen did not change the integrity of the collagen triple helix (Kruskal-Wallis,  $p > 0.05$ ), as well as it was not observed statistically significant differences on TBS after treatments when compared to untreated dentin (ANOVA,  $p > 0.05$ ).

Conclusion: It was concluded that Papacarie™ with or without blue light-absorbing pigment is safe for use in minimally invasive dentistry and contributes to the preservation of a sound dentin tissue.

## #E61

### THE EFFICACY AND SAFETY OF A DUAL EMISSION (1540 nm AND 10600 nm) FRACTIONAL LASER SYSTEM FOR THE TREATMENT OF ACNE SCARS IN CHINESE

Samantha Y.N. Shek, Chi K. Yeung, Johnny C.Y. Chan, Henry H.L. Chan

The University of Hong Kong, Hong Kong; The University of Hong Kong, Wellman Center for Photomedicine, Massachusetts General Hospital Hong Kong, Boston, MA, Hong Kong

Background: Previous studies have shown that non-ablative and ablative fractional lasers are individually efficacious for the treatment of acne scars. While fractionated ablative lasers

produce better results, they are associated with higher risk of adverse effects and longer downtime. The objective of this study is to assess the efficacy and safety of the dual emission approach with lower energy ablation and increased depth of coagulation.

Study: 20 healthy subjects aged between 18 and 65 with facial acne scar were recruited. Two treatments, one month apart, were provided. Prior to treatment, topical anesthetic was applied for 30 minutes and locoregional nerve block to supraorbital nerve and facial nerves were administered. Two passes in sequential mode 1540 nm then 10600 nm were applied. Standardized photographs were taken at baseline, 1, 3 and 6 months post treatment. Two independent physicians analyzed the photographs. Clinical scores were based on acceptable scale for acne scarring and for overall global improvement. Subjective improvement and satisfaction were also recorded.

Results: 6 subjects completed the study, 5 subjects are being followed-up and 1 subject has completed one treatment. Preliminary result shows that 9 out of 12 subjects rated moderate to good improvement at their last follow-up visit. In terms of physician assessment, 10 subjects completed 1 month follow-up, 7 of which had mild to moderate improvement. 6 of the 8 subjects completed 3 months follow-up had mild to good improvement. 6 subjects completed 6 months follow-up and 5 had mild to good improvement.

Conclusion: Majority of subjects has various degree of improvement in acne scar with no adverse effects.

## #E62

### THE EFFICACY AND SAFETY OF THE HIGH PNEUMATIC PRESSURE DELIVERY SYSTEM ON IMPROVING SKIN LAXITY: A SPLIT-FACE STUDY

Tai Kyung Noh, Tai Kyung Noh, Ik Jun Moon, Chong Hyun Won, Jie Hoon Kim

Asan Medical Center Seoul, Republic of Korea; Suwon, Korea

Background: Decreased skin laxity in aging skin has been a challenge in the field of cosmetic surgery. The conventional methods currently available, such as face lifting surgery, often require general anesthesia and entail a high surgery-related risk. The high pneumatic pressure delivery system utilizes high-pressure ejection of gas which enables penetration of the desired substance into the subcutaneous tissue and SMAS layer, resulting in the emission of shockwaves. To assess the efficacy and safety of the high pneumatic pressure delivery system on improving skin laxity, a split-face study was carried out.

Study: Eighteen subjects with more than a moderate degree of skin laxity were enrolled. Multiple injections of 20% glucose using the high-pressure delivery system were performed on the temporal area. We assessed skin laxity scale at baseline, 2-, 4-, 8- and 12-week after the initial treatment.

Results: Objective evaluations by the physician as well as subjective evaluation by the patient were done using a 5-point grading scale after the final session. Both subjective and objective assessments for skin laxity showed significant improvement after 3 months post-treatment. Immediately after the procedure, the treated area showed tissue augmentation. Three months after the treatment, retraction and contraction of the treated area were noted. No significant procedure-related adverse reaction was noted.

Conclusion: The high pneumatic pressure delivery system proved to be a safe and effective therapeutic option for the treatment of lax skin in Asians.

## #E63

### THE IMMEDIATE HEMODYNAMIC RESPONSE POST LASERTHERAPY IN HYPERTENSIVE AND NORMOTENSIVE PREGNANT WOMAN

Otávio Madi, Suely Tomimura, Nathali Pinto, Ivone Duarte, Heno Lopes, Fernanda Colombo, Maria Cristina Chavantes

UNINOVE, Sao Paulo, Brazil

Background: Serious complications of systemic arterial hypertension (SAH) and Preeclampsia (PE) in pregnant women may indicate the interruption of pregnancy and childbirth. Low-level laser therapy (LLLT) was applied in spontaneous hypertensive rats and in SAH patients, results indicated hemodynamics changes. Due to a reduction of the oxidative stress parameters by acting on endothelial dysfunction that is etiopathogenic base of SAH and PE. The objective is to evaluate immediate response post laser therapy in hypertensive and normotensive pregnant women and possible fetal repercussion. Study: 20 patients of pregnant women (HPW) divided in 2 groups (normotensive and hypertensive) into 2 phases. First phase: placebo (laser off) results of average heart rate, systolic, diastolic, mean blood pressure besides systemic vascular resistance were recorded. Second phase: LLLT irradiated (laser on) through intranasal in the following applied parameters:

Wavelength  $\frac{1}{4}$  808 nm, Power  $\frac{1}{4}$  100 mW, Time  $\frac{1}{4}$  120 s.,

Fluence 60J  $\frac{2}{4}$  /cm, Energy/AP $\frac{1}{4}$ 6J, TotalEnergy $\frac{1}{4}$ 12J,

Intensity500mW/cm2, SpotS $\frac{2}{4}$ ize $\frac{1}{4}$ 0.2cm. Cardiotocography

monitored the fetuses throughout the entire procedure.

Results: The systemic vascular resistance and therefore the systemic, diastolic and mean blood pressure suffered a significant decrease statistically, succeeding photomodulation in hypertensive pregnant women. In normotensive pregnant women such effects were not observed. Considering cardiotocography no adverse effects of maternal and fetal repercussions were detected. Conclusion: Laser therapy was able to diminish the systemic vascular resistance and decrease the systemic blood pressure in hypertensive pregnant women. LLLT showed no side effect on normotensive and hypertensive pregnant women. Thus, the laser did not produce harm to the fetus, moreover signaled a favorable and feasible fetal repercutation.

## #E64

### THE MODELING OF VARIOUS LASER WAVELENGTHS AND BEAM DIAMETERS EFFECTS ON TUMOR TISSUE DESTRUCTION DEPTH FOR LASER-INDUCED INTERSTITIAL THERMOTHERAPY IN TREATMENT OF PROSTATE CANCER

Parvin Larkinezhad

Awaz, Iran

Background: Uncontrolled heat transfer involves less destruction of cancer cells, and relapse or damage to healthy tissues. Tissue damage volume depends on laser wavelength, laser power, and irradiation time and beam diameter. Lasers at 800–980 nm are applied since light penetrates deeply into tissue in the Near Infrared (NIR) range. The goals of this study are finding the optimum wavelength and beam diameter for Laser-Induced Interstitial Thermotherapy (LITT) in treatment of prostate cancer.

Study: An approximate 3-dimensional model of human prostate tissue was designed and meshed by GAMBIT software. Then

tissue and tumor boundary conditions were defined. FLUENT software solved equations with integralizing implicit linear equations by using coupled solver numerical method in separated controllable volumes. It provided temperature distributions in 762 nm, 850 nm, 916 nm wavelengths, respectively with power of 5 w and beam radii of 0.2, 0.3 and 0.5 mm.

Results: In the definite beam radius, the maximum damaged volume was obtained at the 916 nm wavelength. In wavelengths of 762 nm, 916 nm, the maximum damaged volume was obtained by beam radius size 0.3 mm. Also at 850 nm, the maximal destruction volume was produced by 0.2 mm beam radius. Since in this wavelength the scatter coefficient is very large, the destruction is created in very long time. While the volume that is sited in temperatures higher than 41°C is very small. Therefore, this wavelength is suitable for treatment small tumors.

Conclusion: For different wavelengths with the same absorption coefficient, smaller scattering coefficient provides higher damage depth, and for wavelengths with high scattering coefficients, the smaller beam radius provides higher damage depth. In wavelengths with small scattering coefficients, higher beam radius provides higher damage depth if it can provide the necessary heat flux.

## #E65

### THE POTENTIAL OF NON-LINEAR OPTICAL IMAGING TECHNIQUES FOR LARYNGEAL CANCER DIAGNOSIS

Christian Pfeffer, Magdalena Widmann, Brigitte Mack, Olivier Gires, Philipp Baumeister, Christian Betz

Munich University Hospital, Munich, Germany

Background: Nonlinear optical imaging techniques such as second-harmonic generation (SHG) microscopy and third harmonic generation (THG) can be used to greatly enhance our understanding of the tumor microenvironment of oropharyngeal and laryngeal tumors. SHG can image these changes with great sensitivity and specificity with submicrometer resolution. THG provides information on cell-cell as well as cell-collagen matrix integrity.

Study: We examined laryngeal cancer tissue samples from patients at different tumor progression stages (n = 6) using a non-linear scanning microscope (LaVision BioTec GmbH / Olympus GmbH / Coherent Inc.).

Results: By analyzing fiber morphology in SHG images of mentioned tumors in human tissues we are able to assess the SHG physical underpinnings that establish the delineation of normal and malignant tissues. SHG- polarization studies yield quantitative information related to macromolecular and supramolecular structures and the interconnectivity. The sub-resolution fibrillar assembly is revealed through emission directionality. This information is inherent due to the coherence and phase-matching process of SHG. These analyses yield critical information about the changes of the extracellular matrix (collagen)-tumor microenvironment during the progression towards malignancy and metastasis progression. In summary, we observed striking qualitative and quantitative changes in collagen arrangement at the various tumor progression stages.

Conclusion: This information has the potential to enhance diagnostic and prognostic capabilities. Intravital imaging techniques are emerging that incorporate all of these qualitative and quantitative analyses. These non-linear optical techniques can be coupled to existing fiber optic imaging devices and enhance

pathology analysis of early stage laryngeal cancers as well as real-time surgical determination of tumor margins.

## #E66

### TRANSCRANIAL LOW-LEVEL LIGHT THERAPY IN PSYCHOLOGICAL DISORDERS A REVIEW

Farzad Salehpour, Seyed Hossein Rasta

Neurosciences Research Center (NSRC), Tabriz University of Medical Sciences, Tabriz, Iran; Tabriz University of Medical Sciences, Tabriz, Iran

Background: Depression and anxiety disorders are common major sources of mental distress and social disability. Pharmacotherapy for treating depression is effective but 30% of patients with treatment-resistant depression do not show a partial response to any treatments. Transcranial low-level light therapy (tLLLT) using non-invasive lasers, and light-emitting diodes (LEDs) in the spectral range of 600–1100 nm has gained considerable interest in recent years as a non-drug therapy for treating psychological disorders. This review aims to summarize the recent researches with respect to the efficiency of tLLLT for psychological disorders.

Study: Present study reviewed published experimental and clinical studies on major depressive and anxiety disorders. Online databases including PubMed, Scopus, Medline and Google Scholar were searched in order to identify articles published during 2009 to 2015? using the following keywords: "Transcranial low-level light therapy", "Photoneuromodulation", "Psychological disorders", "Depression", and "Anxiety".

Results: Our results demonstrated that depressed and anxious patients showed a significant beneficial effect on their affective state from a photobiostimulation treatment to the forehead using transcranial low-level laser or/and LEDs light irradiation at near-infrared wavelengths. In the animal model of depression and anxiety, the possible therapeutic effects of transcranial laser irradiation with pulsed mode and wavelength of 810 nm was determined in the forced swim and tail suspension- behavioral tests. In recent unpublished study, we also have found tLLLT using near-infrared in compare with red wavelength could decrease depressive like behavior in the rat model of depression. Conclusion: The results of this study suggested that tLLLT to the prefrontal cortex using near-infrared electromagnetic spectrum is a potential non-pharmacological therapeutic method for the treatment of the psychological disorders such as depression and anxiety.

## #E67

### TREATMENT OF HYPERTROPHIC SCAR USING COMBINATION OF NON-PROGRAM-CONTROLLED FRACTIONAL CO2 LASER WITH PROGRAM-CONTROLLED FRACTIONAL CO2 LASER vs PROGRAM-CONTROLLED FRACTIONAL CO2 LASER ALONE

Chunhui Xie, Chuhui Xie, Jia-ao Yu

Changchun, China

Background: The advent of ablative fractional photothermolysis in the past decade and its application to the treatment of hypertrophic scars represents a breakthrough in the restoration of function and cosmetic appearance for injured patients. Laser scar therapy, particularly fractional ablative laser resurfacing, represents a promising and vastly underused tool in the

multidisciplinary treatment of traumatic scars. The traditional method is program-controlled fractionally laser. This method can improve most of scars. However, the treatment effect is limited for severe hyperplasia of scar. Based on the existing program-controlled fractionally laser, we have developed the non-program-controlled fractionally laser to enhance the treatment effect of hypertrophic scar.

Study: Twenty hypertrophic scars were enrolled. The scars were randomly divided into two parts. The part 1 were treated in three sessions (2-month intervals) with program-controlled fractional CO2 laser plus non-program-controlled fractionally laser. The

part 2 were treated in three sessions (2-month intervals) with program-controlled fractional CO2 laser alone. Digital photographs were taken before every treatment session and 2 months after the last treatment session. These photographs were evaluated by an experienced specialist and every part of the scars were evaluated using VSS (Vancouver scar scale) at the same time. Results: Excellent cosmesis was achieved in both parts. The treatment effect of Part 1 is better than Part 2's.

Conclusion: The non-program-controlled fractional CO2 laser plus the program-controlled fractionally laser is a novel method to treat hypertrophic scars, better than the traditional program-controlled fractionally alone.

## #E68

### TREATMENT OF LEG TELANGIECTASIAS USING A 650-MICROSECOND PULSED Nd:YAG 1064 nm LASER

James Newman, Natalia Geraskova  
Premier Plastic Surgery, Palo Alto, CA; Integrative Laser Clinic, Lubna, Russia

Background: 20–30 millisecond pulsed Nd:YAG lasers are traditionally used to treat cosmetic leg veins, with well documented side effects of bruising and high levels of discomfort particularly with large areas treated. This study was conducted to evaluate the safety and clinical efficacy of a novel short-pulsed 650-Microsecond Pulsed 1064 nm Laser for treatment of Leg Telangiectasias.

Study: A total of 25 subjects, skin types I–III, with leg telangiectasias 0.2 mm to 3 mm in diameter on skin areas of approximately 20 cm<sup>2</sup> were treated 1 to 3 times each at a 4 week interval. Laser treatment parameters varied depending on the type of telangiectasia, quantity and density of vessels as follows: for removal of vessels with a diameter less than 1 mm: spot size 2 mm, fluence 127 J/cm<sup>2</sup>, pulse width 650 microseconds. for removal of vessels with a diameter of 1 to 3 mm: spot size 2 to 3 mm, fluence 155 to 223 J/cm<sup>2</sup>, pulse width 650 microseconds. Ice pack used for pre-cooling. Vessels were treated along the full length. Patients were observed for vessel clearance; discomfort/pain & overall patient satisfaction with the result; complications such as blistering, crusts, scars; and duration of erythema. Photos were taken before and immediately after treatment, also daily during the first week after treatment, as well as 4 weeks and 12 weeks after treatment, respectively. Two independent blinded reviewers evaluated the photos for comparison and rated the following parameters. Substantial Improvement, Some Improvement, or No Improvement.

Results: 72% of treated vessels showed substantial improvement 4 weeks after the 1st treatment. At 3 months after the third treatment, 98% showed substantial improvement. Mild erythema usually appeared immediately after treatment and lasted for 3 to 24 hours. Small vessels with a diameter less than 1 mm frequently disappeared during the treatment session. Red and blue vessels

over 1 mm in diameter tended to change their color by darkening. Some patients exhibited light brown crusting along coagulated vessels with diameter more than 1 mm, which did not leave any pathological changes on the skin after exfoliation. No burns (blisters), scarring, or hyperpigmentation were observed. Patients reported minimum discomfort and high satisfaction with the results.

Conclusion: A 650-Microsecond Pulsed Nd:YAG 1064 nm laser for treatment of leg telangiectasias up to 3 mm diameter is safe and efficient with substantial improvement with minimal or no adverse skin effects and minimum discomfort.

## #E69

### TREATMENT OF MELASMA VIA A NOVEL ALEXANDRITE PICOSECOND LASER REGIMEN UTILIZING BOTH DIFFRACTIVE LENS ARRAY AND STANDARD OPTICS

Anne Mahoney, Christian Halvorson, Robert Weiss, David McDaniel, Chris Mazur

Maryland Laser, Skin and Vein Institute, Hunt Valley, MD; David H. McDaniel Laser and Cosmetic Center, Virginia Beach, VA

Background: Treatment of melasma is well known to be challenging. Currently there are many therapeutic options, but without durable efficacy, nor without adjunctive bleaching agents. The objective of this study was to investigate a novel alexandrite picosecond laser treatment regimen to improve treatment of melasma.

Study: The study enrolled subjects between the ages of 18–65 years of age with Fitzpatrick skin type I–IV and a score of 2 or greater on a melasma severity scale. They were supplied with and instructed to use sunscreen daily. Patients were treated with up to three treatments spaced four weeks apart using an alexandrite picosecond laser (Picosure™ Cynosure, Westford, MA) using both a diffractive lens array in combination with the standard optic hand piece. Pulse duration was 540 picoseconds. Follow-up was at 1 and 3 months after treatment. Results were assessed by blinded photo review via the Melasma and Severity Index (MASI), patient self-assessment and treating physician assessments.

Results: Thirty-two patients were enrolled to date and 23 have completed a minimum of two treatments. Results indicate that 27 patients improved, 3 had no change, 1 worsened and 1 had rebound after initial improvement. The average improvement in blinded review MASI score after 2 treatments was significant reduction from 9.025 at baseline to 6.845. All patients tolerated the procedure well without reports of any serious adverse events.

Expected consequences of treatment included only several hours of erythema.

Conclusion: Our study demonstrates the safety and efficacy of using a standard optic plus a diffractive lens array hand piece for the treatment of melasma utilizing a novel picosecond laser treatment regimen. No topical bleaching agent was required. Significant improvement was noted by blinded photographic review and patient self-assessments.

## #E70

### TREATMENT OF RESISTANT PORT-WINE STAINS LASER FRACTIONAL CO2 AND PULSED DYE LASER

Kamel Messaoud Nacer

Center Laser Surgery, Oran, Algeria

**Background:** The treatment of port-wine stains is codified with a preference of the pulsed dye laser represents the gold standard. Cases of laser resistance are in the order of about 30%. Vascular heterogeneity, a different diameter and a variable depth that these vascular abnormalities are less responsive to laser therapy. Several treatments have been proposed for this resistance with variable results even source of side effects (pigmentation disorders, scars). This prospective study aimed at proposing a fractional ablative laser co2 first intention followed by pulsed dye laser.

**Study:** Nine (9) patients, seven (7) women and two (2) men with an average age of 23 who have a strong and hypertrophic port wine stains after an average of 12 sessions in the pulsed dye laser. This is the face that was the seat of this treatment with territories V1, V2, V3. Eight (8) patients had a skin type IV, one (1) to patient phototype V. Laser used: fractional co2 7 j / cm2, coverage rate to 12%; 2 ms pulse duration without cooling. Two sessions were conducted in total with a photographic before and after treatment. Two neutral observers assessed developments. Pulsed dye laser: 11 to 12 J/cm2, pulse duration (1.5 to 6 ms), DCD 30/10, spot diameter 7 mm. Rating improvement is estimated (0) 0% a 20%, (1) 21a 40%, (2) 41–60%, (3) 61–80%, (4) superior 80%.

**Results:** One (1) Improved patient 41 to 60%, 03 patients 21 to 41%, and five patients no improvement. No side effects were observed.

**Conclusion:** This therapeutic approach could be proposed for some resistant port-wine stains.

## #E71

### TREATMENT WITH LOW LEVEL LASER DECREASES THE LUNG INFLAMMATION INDUCED BY POLLUTANT EXPOSURE

Cristiane Miranda Silva,  
Ana Paula Ligeiro de Oliveira,  
Maria Cristina Chavantes,  
Adriana Lino dos Santos Franco

Barueri, Brazil; Sao Paulo, Brazil; Osasco, Brazil

**Background:** A rising percentage of world's population lives in crowded urban area. Formaldehyde (FA) is an environmental and occupational pollutant, which induces serious lung inflammation. Animal studies have been reported anti-inflammatory effects of low-level laser therapy (LLLT) in some airways diseases. However, the mechanism involved needs to be better acknowledged. LLLT is a non-invasive treatment, without side effects and with low cost. Considering that air pollution is a key factor inducer to lung diseases and LLLT is an important non-pharmacological tool, this work aims to investigate LLLT effects on lung inflammation induced by FA.

**Study:** Male Wistar rats were divided in 3 groups: 1-FA Group, rats exposed to FA inhalation (1%, 90 min/day, 3 days); 2-FA þ Laser group, rats exposed to FA and treated with LLLT (CWDiodeLaserMMOptics 2.2, 660nm, 0.14cm, 12.86J/cm, 30 mW, 60 s/point, total 540 s) 1 and 5 h post each FA inhalation; 3-Basal Group, non-manipulated rats. Nine points per application into lung region by direct contact with skin were performed. After 24 h of last FA exposure we evaluated the lung cell influx, levels and gene expression of cytokines and mast cells degranulation.

**Results:** Acquired data indicated that LLLT produced a marked reduction of leukocytes, mainly neutrophils recruited in the alveolar space ( $P < 0.05$ ). Decreased levels and gene expression of TNF- $\alpha$  and IL-6 concomitantly to increased levels and gene

expression of IL-10 was also observed ( $P < 0.05$ ). We showed that LLLT reduced mast cells degranulation in the lung ( $P < 0.05$ ). **Conclusion:** Our data showed that LLLT was capable to modulate the lung inflammatory response post FA exposure, through the control of cytokines signaling and cellular mechanism. Thus, laser therapy proved to be an efficient treatment to reduce the inflammatory process in rats' lung.

## #E72

### ULTRAFORMER: NON-SURGICAL FACE AND NECK LIFTING

Dvora Ancona

Juva Medical Center, Milan, Italy

**Background:** Skin laxity of the face and neck are common aging signs. The purpose of this study is to show the effectiveness of HIFU technology to heal face and neck tension with a lifting effect. **Study:** This study enrolled 120 adult patients who presented for correction of blurred jawlines, uneven skin tone, nasolabial folds, fine lines and wrinkles by Ultraformer. The subjects were treated two times with the HIFU technology (using 1.5, 3.0 and 4.5 mm probes) with a 6 months follow-up. We used a topical analgesic cream to minimize the pain level during the treatment. The performance was then evaluated photographically.

**Results:** Six months after the first treatment we observed improvement in skin laxity on the 70% of the patients with high tolerance and satisfaction for no associated downtime that allowed them to immediately go back to their daily activities.

**Conclusion:** Ultraformer treated patients show immediate results: an extraordinary tightening effect all over the face and an instant improvement of wrinkles right after the procedure. HIFU is a new non-invasive treatment that offers an alternative technology solution to invasive face-lifting and tightening procedures.

## #E73

### ULTRASOUND GUIDANCE FOR HYALURONIDASE INJECTIONS

Robert Bard

Bard Cancer Center, New York, NY

**Background:** Hyaluronic acid (HA) fillers that are not aesthetic may be reduced by hyaluronidase sonograms show clinical volume assessment may not correlate with aliquot volume.

**Study:** 280 injection sites were evaluated clinically and by 20 mhz sonograms 0.2 cc of HA were used.

**Results:** 15% of sites were fully dispersed 25% of sites were partially dispersed 60% of aliquots were not dispersed (intact) clinical assessment did not demonstrate volume loss.

**Conclusion:** Reduction of HA aliquot by hyaluronidase may be more successful in intact injection sites.

## #E74

### ULTRASTRUCTURAL CHANGES FOLLOWING ANTIMICROBIAL PHOTODYNAMIC THERAPY ON CANDIDA ALBICANS

Renato Prates, Camila Santos,

Victor Arana-Chaves, Martha Ribeiro, Ilka Kato

UFABC, Sto Andre, Brasil; UNINOVE; FOU SP; IPEN-CNEN/ SP, Sa~o Paulo, Brazil



**Background:** Photodynamic therapy induces cell injury by massive production of ROS, and depending on damage level, subsequent cell death occurs. Methylene blue mediated PDT is able to inactivate different microorganisms, including *Candida albicans*. Besides cell death, we previously observed that sublethal photodynamic conditions could reversely affect pathogenicity-related characteristics of this fungus. The aim of this study was to evaluate ultrastructural alterations caused by methylene blue mediated PDT to *C. albicans* cell components.

**Study:** *C. albicans* inocula ( $1 \times 10^7$  CFU/ml) were prepared from 24-h cultures. Yeast cells were incubated with the photosensitizer methylene blue (0.05 mM) for 10 min and they were irradiated with a LED ( $2 \times 2 \times 660$  nm, 70 mW/cm<sup>2</sup> and 140 mW/cm<sup>2</sup>). Cells were harvested by centrifugation and the pellets were fixed in 2% glutaraldehyde and 2.5% formaldehyde mixture. They were washed and postfixed in 1% osmium tetroxide solution. Then cells were dehydrated with gradients of ethyl alcohol and acetone and embedded in Spurr resin and polymerized. Thin sections (60 nm thick) were cut and samples were examined at a transmission electronic microscope.

**Results:** Photodynamic inactivation of *C. albicans* resulted in different efficacy of killing, with increased cell death achieved with higher irradiance. Transmission electronic microscopy analysis demonstrated different degree of changes in the ultrastructure of yeasts cells, according to the irradiation conditions applied. Higher irradiance induced remarkable disorganization within the cell cytoplasm and damage to cell envelope. Complete rupture of cell envelope and release of intracellular components were not observed.

**Conclusion:** Under the conditions used in this study, photodynamic inactivation of *C. albicans* using methylene blue caused structural changes within cytoplasm and irregularities in cell envelope. However, integrity of the outer layer cell barrier appears to be preserved.

## #E75

### USE OF A NON-ABLATIVE, FRACTIONAL 1565 nm LASER FOR THE IMPROVEMENT OF STRIAE DISTENSAE

Gerd Gauglitz, Anne Guertler, Markus Reinholz, Hannah Schweiger, Matteo Tretti Clementoni, Stephanie Steckmeier

Munich, Germany; Milan, Italy

**Background:** Striae distensae (SD) represent therapeutically challenging forms of dermal atrophic scarring. Next to various light and laser-based devices non-ablative fractional lasers have been suggested for their improvement, however, objective evaluations on their efficacy are widely missing. Here, we aimed to objectively evaluate improvements after three non-ablative fractional laser treatments employing various objective means. **Study:** After receiving ethic approval 20 patients suffering from striae albae on the abdomen, breasts, hips, thighs and knees (all female, average age 25 years, Fitzpatrick skin type I-IV) were included in this prospective study. Every patient received three treatments every four weeks using a non-ablative fractional 1565 nm laser (two passes: 300 2 mbeams/cm<sup>2</sup>; 40 mJ inside striae,

150e 2 mbeams/cm<sup>2</sup>; 50 mJ inside striae and laterally to the margins of striae). Measurements (DLQI, POSAS, EQ-D-3L), digital photography, and three-dimensional analysis employing PRIMOS and VECTRA were taken at baseline, one month and six months after the last treatment.

**Results:** All patients completed the study and reported satisfying clinical outcome with improvement in colour, an overall more discreet appearance and smoother surface texture. Procedures were well tolerated without significant side effects. Significant differences in volume of depression and width of SD led to an overall more homogenous appearance which was associated with improvements in life quality (DLQI) and improved POSAS scores. **Conclusion:** The use of fractional non-ablative 1565 nm laser represents a safe approach for treatments of SD albae. Clinically observed improvements were supported by objective measurements.

## #E76

### USE OF COMBINED TECHNOLOGIES OF IPL AND RF TO ENHANCE FACIAL SKIN REJUVENATION

Michael Gold, Julie Biron, Whitney Sensing

Tennessee Clinical Research Center, Nashville, TN

**Background:** The frequent simultaneous appearance of pigmented, vascular and textural lesions on aging and photo-damaged facial skin, calls for a combination treatment that will address all these lesions simultaneously. Since each lesion is better treated by a different technology, combination treatment was approached. The current study was testing the efficacy and safety of a combined facial treatment by IPL for pigments and vessels, by continuous non-ablative RF for skin laxity and by pulsed fractional ablative RF for depressed scars and wrinkles.

**Study:** Eleven female subjects with mean age of 52 years, Fitzpatrick skin types II-III and Fitzpatrick wrinkling average score of 7 completed the study. The InMode™ device (InModeMD Ltd., Yokneam, Israel) with three different applicators was used. Study design included three treatment sessions of IPL (LUMECCATM) alternating with three bipolar RF sessions performed three weeks apart. The RF treatment was composed of continuous non-ablative RF (FORMATM), followed immediately by pulsed fractional ablative RF (FRACTORATM). Topical anesthesia was used before FRACTORA treatment. Subjects were evaluated at baseline and follow-up visits, 6 and 12 weeks post last treatment. The evaluation included photographs and scoring of lesion severity according to pre-determined scales. Adverse events and pain level were recorded.

**Results/Conclusion:** All subjects showed skin improvement that fortified from 6 to 12 weeks follow-up session. Lesion improvement recorded were wrinkling and elastosis (24% and 33%), pigmentation (38% and 62%), vascular lesions (29% and 67%), and laxity (37% and 40%), all statistically significant. No adverse events were reported. Average pain level was 1.9/6. These results indicate the safety and efficacy of the combination treatment of IPL, and non-ablative and ablative RF for the enhanced facial skin rejuvenation. Furthermore, the InMode device that can accommodate all three applicators makes it accessible to use the combination of the three technologies.