LATE BREAKING ABSTRACTS

280

ENHANCEMENT OF FRACTIONAL DELIVERY TECHNIQUE WITH PULSE ELONGATION, AGGRESSIVE SURFACE COOLING, AND SKIN SUCTION

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Background and Objective: Fractional skin resurfacing is an established dermatological procedure. We have investigated opportunities for enhancing the approach by expanding the range of its operational regimes.
Materials and Methods: A modified Lux1540 laser handpiece for StarLux system (Palomar Medical Technologies, Inc.) was used. The modification allowed pulse durations up to 30 ms. A specially designed system cooled the output window down to 0 deg C. An attachment provided a vacuum down to 15 inches Hg. Fresh Yucatan skin was used in vitro for preliminary assessment of immediate tissue effects, followed by initial clinical tests.
Results: Histologically, columns of damage deeper than 1 mm could be obtained using long-pulse regime. Application of aggressive cooling in combination with high energy settings allowed a vertical shift of columns of damage deeper into the tissue. Clinically, treatment with all three suggested modalities was well tolerated. Application of the suction attachment allowed to effectively increase density of columns up to ~20 %.
Conclusions: All three modalities can be used to enhance fractional treatment: 1) Very deep columns can be obtained with long pulses; 2) Aggressive cooling enables precise positioning of columns of damage; 3) Suction attachment allows effective increase in column density without sacrificing safety of treatment.

281

FRACTIONAL CARBON DIOXIDE LASER RESURFACING OF PHOTODAMAGE AND ACNE SCARS

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Background and Objectives: Ablative laser resurfacing has long been considered the gold standard for treating photodamage and acne scarring. However, use of the traditional CO_2 laser has been limited by its associated downtime and potential for long term side effects. A novel device has been developed to provide fractional CO_2 resurfacing (10,600 nm) with the goal of maximizing results while minimizing downtime. The objective of this study is to determine whether fractional delivery of CO_2 provides satisfactory skin rejuvenation and improvement in moderate to severe acne scarring without undesirable side effects.
Materials and Methods: We report on the use of an investigational fractional CO_2 device resurfacing on 30 patients (15 with photodamage and 15 with moderate to severe acne scarring). Patients received one or two treatments. Response and side effect profiles were assessed with standard photography, patient questionnaires, and physician assessment. Quantitative changes were assessed utilizing a 3 dimensional optical profiling imaging system (PRIMOS, GFM, Teltow, Germany) to evaluate skin topography before, during, and after treatment. A biomechanical tissue characterization device BTC-2000 (Surgical Research Laboratory, Nashville, Tennessee) was also used to determine changes in elasticity, laxity, energy absorption, and stiffness.
Results: As demonstrated by objective quantifiable criteria and patient feedback, the fractional delivery of CO_2 laser provides significant improvement in skin texture, scarring, dyspigmentation, and skin laxity. Side effects were minimal and completely tolerable. Post-operative wounding and edema was present in all cases. Full re-epithelialization was noted after 5–7 days. Most patients had mild erythema for up to one month following treatment. No scarring, hypopigmentation, or hyperpigmentation was observed. Furthermore, fractional CO_2 laser resurfacing can be used to treat the neck and eyelids, areas which are not consistently treatable with traditional CO_2.
Conclusion: Fractional CO_2 resurfacing effectively improves acne scarring and overall skin quality without undesirable side effects as scarring and pigmentary alteration. Both subjective and objective data support the use of this novel device for photorejuvenation and for the treatment of moderate to severe acne scarring.

282

BIPOLAR RADIOFREQUENCY WITH VACUUM APPARATUS—A MULTI-CENTER STUDY

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Background and Objectives: A four-center study to evaluate the safety and efficacy of a bipolar radiofrequency (RF) with vacuum device for wrinkle reduction and skin tightening was initiated during 2005. This report presents the interim results obtained at two sites (MHG, MPG) until November 2006.
Study Design/Materials and Methods: Fifty-six patients received 8 treatments with the vacuum-assisted RF device at 2-week intervals without anesthesia. Results were evaluated after each treatment and at 4 and 6 months after the final treatment. In one patient, 3-dimensional images of the left periorbital areas were taken at baseline and just before the fourth and sixth treatment. In vivo postauricular skin was treated with the bipolar RF with vacuum device. Punch biopsies of treatment and control areas were obtained and evaluated 4 months after treatment.
Results: The Elastosis Score reduction at 4 months and Visual Analogue Scores indicated significant improvement ($p < 0.05$). Most patients reported no pain or slight pain and were satisfied with treatment. The primary adverse effect was burn/blistering which was not serious. The 3-dimensional images show increased smoothness of the skin surface and greater shallowness of wrinkles. The treatment gave rise to ultrastructual changes similar to those of other non-invasive tightening devices.
Conclusions: Treatment with the bipolar RF with vacuum device is safe and effective for skin tightening and wrinkle reduction. Treatment benefits can be expected to persist for six months or more.

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283

COMBINED CHROMOPHORE AND SPATIAL SELECTIVITY AS A NOVEL MODALITY FOR TREATING VASCULAR AND PIGMENT ABNORMALITIES

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Background and Objectives: Fractional skin resurfacing with wavelengths absorbed by water has become an established dermatological procedure. We have combined a fractional approach with the principle of selective photothermolysis to improve existing modalities for treating vascular (e.g., port-wine stain) and pigmented targets.
Materials and Methods: A prototype of fractional Nd:YAG (1064 nm operational wavelength) laser handpiece for StarLux system (Palomar Medical Technologies, Inc.) has been used. The system provides stamping mode, fractional treatment over a 10 mm spot size with 1 mm or 1.3 mm pitch beam arrays. Fresh porcine skin (Yucatan Black pig) and bovine liver served as in vitro models to preliminarily assess tissue effects.
Results: In vitro, histology revealed well-defined zones of coagulation, more pronounced in liver tissue in comparison to pig skin. Clinically, treatment was well tolerated with no immediate erythema or edema. Highly pigmented spots coincident with the microbeam locations were observed 24 hrs post treatment on the skin surface, with darker spots occurring within the boundaries of pigmented lesions. Two portwine stains were treated. One treatment session resulted in 40% lightening of these mature reddish purple lesions. Settings were 430 mJ per microbeam with a 30 ms pulse duration.
Conclusion: Combination of fractional delivery and wavelength selectivity offers a new and unique opportunity for precise targeting of hemoglobin- and melanin-containing targets while minimizing impact on surrounding normal tissue. The modality is potentially useful for treating a variety of conditions, ranging from port-wine stains to resistive dermal pigmented lesions.

284

COMPARISON OF FORCED COLD-AIR COOLING (FCAC) VS. CRYOGEN-SPRAY COOLING (CSC) FOR 755-NM LASER HAIR REMOVAL (LHR): AN EFFECTIVE OPTION FOR EPIDERMAL SPARING

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Background: Cryogen-spray cooling offers the greatest coefficient of heat transfer of any commercially available cooling modality. Maximizing this coefficient has been used to maximize safety for LHR. Although associated with a very low heat transfer coefficient, forced cold-air cooling offers pre-/post- and parallel-pulse cooling resulting in sufficient heat extraction and often diminished laser associated pain.
Methods: Thirty subjects received LHR using the 755-nm alexandrite laser. Areas were randomly split into an FCAC side (the CSC device was disabled) and a CSC side in order to compare safety and efficacy at equal fluences. Fluences (range, 40–10 J/cm^2) were maximized based on the subject's skin type (range, I–V). Pre-treatment topical lidocaine was applied evenly over both zones in all subjects.
Results: Post-treatment perifollicular edema, erythema, and hair reduction showed no differences between each cooling modality to a blinded observer. Eighty-percent of subjects noted less intraoperative pain associated with the side treated with FCAC. Seven-percent noted less pain on the CSC side. All other side-effects were transient and equally distributed between both areas for any given subject.
Conclusions: Forced cold-air cooling can effectively provide epidermal sparing for LHR with a 755-nm laser at fluences equal to those typically used with cryogen-spray cooling. In addition, FCAC may provide somewhat greater anesthesia than CSC.

285

CLEAR IMPROVEMENT OF HIDRADENITIS SUPPURATIVA AFTER 3 INTENSE PULSED LIGHT TREATMENT

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Background: Hidradenitis suppurativa is a chronic disease of the apocrine sweat glands in the axillary, inguinal and anogenital regions, characterized by chronic inflammation and drainage, eventuating in sinus tract formation and scarring.
Method: 10 females (21–45 years of age) with many years of active lesions affecting their social life, were treated with I^{2}PL = Intense Pulsed Light (*Ellipse , Danish Dermatologic Development*) 2–8 treatment, Hair applicator 645–950 nm, 30–40 ms, 1,5 ms delay, 17–19 J/cm^2.
Results: 50% of the patients reported clear improvement of their hidradenitis with less or no activity in the treated area and reduction of hair growth after 3–4 tx. Improvement of scarring was also seen. Emla (lidocain cream) and contact cooling were used because of pain and uncomfortable feeling.
Conclusions: Although this study has a small amount of patients, I^{2}PL treatments seem to be a good adjunctive treatment for severe hidradenitis in hairy areas.

286

LASER SPECKLE MEASUREMENTS OF RETINAL BLOOD VELOCITY

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Background and Objectives: Changes in retinal hemodynamics provide important information on serious pathologies such as macular degeneration and diabetic retinopathy. The laser speckle imaging method was used to obtain retinal blood velocities of 30 subjects. The objectives are to develop a normative database and evaluate measurement reproducibility.

Design/Materials and Methods: A nonmydriatic camera was modified for laser speckle imaging. Design changes include the replacement of the flashlamp with a 630-nm, cw diode laser, addition of a shutter for blocking the laser radiation during alignment, use of white LEDs for focusing, and image acquisition using a CCD camera. The test eye was dilated and baseline retinal blood velocities were measured to establish inter- and intra-operator reproducibility. The measurements were repeated after the subject had breathed pure oxygen for five minutes.

Results: The measurements were conducted at Scheie Eye Institute (UPenn) and were concluded in late January, 2007. Preliminary analysis reveals that blood velocity is about 0.3 to 0.8 cm/s, 1.4 cm/s, and 2.7 cm/s in retinal capillaries, veins, and arteries, respectively. The reproducibility of intra- and inter-operator measurements is about 95% and 94%, respectively. Blood velocity for subjects breathing pure oxygen was reduced by approximately 5% and 13% in retinal veins and arteries, respectively.

Conclusions: The laser speckle imaging technique is a powerful tool for noninvasive, qualitative measurements of retinal blood velocities.

287

THE ROLE OF DIFFERENT LASER MODALITIES IN THE TREATMENT OF HEAD AND NECK CANCER

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Background and Objective: The use of lasers in head and neck cancer varies. Most cancer centres depend on the Carbon Dioxide laser. The cost of adding in other laser systems may limit their availability. We looked at 3 years (2003–2006) of laser use in head and neck cancer surgery at our Units. We have 6 different surgical laser systems to choose from, the objective was to see which laser we used for which application in Head and Neck Surgery, and what the incidence of this was.

Study Design, Materials and Methods: A retrospective review of personal data collected from head and neck cancer patients treated in a major UK cancer centre and a private clinic.

Results: In 3 years, the main author (MD) performed 78 cancer related laser procedures.

Laser	Total	Larynx	Hypopharynx	Oral cavity	Oropharynx	Other
Carbon Dioxide	51	36	2	7	2	4
Holmium-YAG	13	2	0		9	2
PDT Diode	10	1	0	2	7	0
KTP	2	1	0	0	0	1
Nd-YAG	1	0	0	0	0	1
810 Diode	1	0	0	1	0	0
Total	78	40	2	10	18	8

PDT = Photodynamic Therapy at 652 nm

Conclusion: The mainstay lasers for the treatment of Head and Neck cancer are the Carbon Dioxide, Holmium-YAG and PDT lasers.

288

LASER-ASSISTED SEPTOPLASTY: PRELIMINARY CLINICAL EXPERIENCE

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Background and Objectives: Laser technology has been used to reshape the cartilage frameworks within the head, neck and upper airway. Heat accelerates stress relaxation in mechanically deformed specimens, and the laser provides control over the spatial and temporal evolution of heat.

Study Design/Materials and Methods: Three patients with septal deviations and narrowing at the internal nasal valve were treated. Under anesthesia, hemi-transfixtion incisions were made and bilateral superior tunnels were developed. The deviated septal cartilage near the internal valve was mechanically deformed and straightened using a speculum and a Cottle elevator. Light from a Ho:YAG laser (2.12 μm, 1–5 W, 5Hz PRR) was used to irradiate the exposed cartilage in regions where internal stress was concentrated. After reshaping was achieved, the incision was closed and the septum secured using a quilting stitch and Doyle splints, which were removed after 3–5 days.

Results: Patients were satisfied with the degree of improvement in their nasal airflow. Post-operative discomfort was similar to conventional surgery. No post-operative epistaxis was observed. No perforations were observed. Morphologically, the septi appeared straighter with an increase in ipsilateral nasal valve cross-sectional area. No longer term complications (atrophic symptoms, external changes) were reported via telephone follow-up for at least one year.

Conclusions: This pilot study demonstrates the feasibility of using laser energy to produce shape change in mechanically deformed nasal cartilage in vivo. Further work must focus on developing device for use in transmucosal reshaping and in better estimating the internal stress distribution.

289

HEAT DAMAGE-FREE LASER-MICROJET SURGERY*

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Background and Objective: Fractional photothermolysis is a new concept in cutaneous re-modeling whereby laser-induced microscopic zones of thermal injury are surrounded by normal, viable tissue. This unique thermal damage pattern allows re-epithelialization in less than 24 hours. To increase patient comfort level during the procedure of fractional photothermolysis, simultaneous skin cooling has been proposed and is now extensively used.

Study Design/Materials and Methods: The water-jet-guided Nd:YAG laser focuses a laser beam into a nozzle while passing through a pressurized water chamber. The water jet guided laser technology was suggested to be used in stead of laser and simultaneous skin cooling.

Results: Unlike conventional laser-based technologies, the water jet guided laser might not generate heat damage and contamination might be also very low.

Conclusion: The water jet guided laser might be one of the best laser choices in fractional photothermolysis

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