have healed with follow-up periods of greater than two years. One additional case with several lesions was reported to have resolved several small lesions, but one large shoulder lesion was only ameliorated. The horse had been killed in an accident approximately 2 years after treatment. Two other horses have been lost to follow-up. From this information, it appears that intradermal ablation of advancing verrucous equine sarcoids is a useful method of treatment.

205

LASERS IN DENTISTRY—AN OVERVIEW OF APPLICATIONS AND NEW HORIZONS

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A variety of laser systems have been investigated and are employed for the treatment of oral disease in human patients. These laser systems, treatment techniques, experiences, and the direction of research interests in the development of new laser-based technologies will be presented. Potential applications of laser technology to veterinary dental patients will be explored.

206

INDICATIONS AND APPLICATIONS OF CO_2 LASERS IN VETERINARY ORAL AND MAXILLOFACIAL SURGERY

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The introduction of lasers to veterinary dental practice has added a new dimension to treatment considerations for a variety of common conditions. This presentation will provide an overview of the indications, instrumentation and treatment considerations for tumor removal, stomatitis, gingival resurfacing, superficial odontoclastic tooth resorptive lesions, gingivectomy, gingival 'troughing' for crown prep, impressions and cementations, oro-nasal fistula repair, 'tight lip' repair, frenectomies, 'gum chewer' syndrome, rugal fold ablation, maxillectomies, mandibulectomies, and lip fold pyoderma.

POSTERS

208

CO_2 LASER TREATMENT OF NEUROFIBROMAS OF PATIENTS WITH NEUROFIBROMATOSIS TYPE 1: FIVE YEARS EXPERIENCE

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The Neurofibromatosis type 1 (NF1) is an autosomal dominant heritable disorder with high variability of clinical expression. The most common disfigurement of the patients is the development of complex plexiforme and thousands of dermal neurofibromas causing beneath other complications stigmatisation and social problems in the private or professional surrounding. Despite intensive investigations of the aetiology and pathogenesis of NF1 no systemic treatments to prevent the growth of neurofibromas are available. Up to now the surgical or laser surgical removal of the neurofibroma remains to be the treatment of first choice. After the retirement of D. Katalinic we established on the basis of his experience the CO_2 laser therapy of NF-1 in our clinic. Up to now 119 patients were treated and about 75 000 neurofibromas were removed in 216 sessions. Most of the patients had thousands of neurofibromas so that repetitive treatments were necessary. The average age of the patients was 41 years (range 4–62 years) with a distribution of sex of 1:1.9 (male:female). All treatments were done in general anaesthesia with an average operation time of about 2 h (range 30 min. to 4 h 15 min). On average 58 (range 1–300) large neurofibromas (1–15 cm size) and 355 (15–1013) small neurofibromas (>1 cm size) were removed in one session depending on the total amount, subtype, size and localisation of the neurofibromas and the requests of the patients. On average the in-patient treatment lasted 6.5 days (range 5–9 days). The wounds closed after 6 weeks or earlier and the cosmetic results were excellent to average if all the recommendations for postoperative wound care were followed. Most of the patients reported an increase in self-confidence and acceptance of the social surrounding. Only three patients developed hypertrophic scars because the local treatment with triamcinolone ointment which should prevent the formation of hypertrophic scars was discontinued. Our experience has shown that the removal of neurofibromas with CO_2-laser proved to be a rapid, low cost procedure to remove hundreds of neurofibromas in one session and even although the neurofibromas were replaced by white depigmented scars the patients lost their stigmatisation and won more self-confidence.

Keywords: Neurofibroma, Neurofibromatosis 1, CO_2 laser, M. Recklinghausen's disease

209

FAST OPTICAL 3D IN VIVO MEASUREMENT FOR DOCUMENTATION OF LASER EFFECTS: ADVANTAGES AND DISADVANTAGES

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The introduction of laser therapy as a surgical tool especially in aesthetic surgery allowed the treatment of diseases and skin alterations. Different laser devices were propagated and used for several indications. The effects and advantages were demonstrated using photos for documentation or evaluation. The changes were mostly estimated semiquantitative by independent experts. This kind of evaluation was always criticised as subjective and dependent on the quality of the photos. Therefore there exists a huge demand for objective methods for the measurement of laser effects on the skin. Since 1997 a device (PRIMOS, GFM Ltd., Berlin, Germany) for contact optical 3D in vivo measurement of the skin surface were evaluated in our department to document skin alteration after laser therapy. This device used the stripe projection technique in combination with digital micromirror devices (DMD^{TM}, Texas

Instruments, USA). With this technique it was possible to get a 3D picture of the skin surface in a very short time (< 65 ms) with high resolution (up to 20 μm). For example changes of the roughness of the skin after laser assisted rejuvenation, depth of an atrophic acne scars or the size of a hypertrophic scar could objectively be measured and determined.
We would like to give an review of our experience and to summarise the advantages and disadvantages of this new device for the daily documentation of laser effects in experimental fields and using common treatment modalities with different laser devices.
Keywords: skin measurement, laser effects, optical device, documentation

210

CLINICALLY SIGNIFICANT FACIAL EDEMA FOLLOWING EXTENSIVE TREATMENT WITH PURPURA-FREE PULSED-DYE LASER

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Purpose: To investigate the degree and duration of post-treatment edema following treatment of diffuse erythema on all or most of the face with purpura-free pulsed-dye laser.
Methods: Follow-up survey of 25 consecutive patients who received single visit purpura-free pulsed-dye laser treatment to greater than 50% of the facial surface area. Patients were followed at one day and one week post-operatively. Photographs were taken. Phone contact was used to document the point of final resolution of edema, if any. Patients who developed post-treatment purpura within one week of treatment were excluded.
Results: Patients undergoing purpura-free pulsed-dye treatment to greater than 50% of facial surface area experienced notable facial edema after treatment. This peaked within 24–48 hours of treatment and receded gradually over the ensuing week. Patients complained of impaired appearance at work and social functions. Approximately one-third of patients complained of swelling around the eyes that transiently impaired vision. Patients being treated for the first time with purpura-free pulsed-dye experienced the greatest degree of swelling. Over 90% of patients were pleased with the results of their treatment and a similar percentage did not consider the transient edema an unacceptable outcome.
Conclusions: Purpura-free pulsed-dye laser permits patients to receive treatment for diffuse facial erythema without disfiguring post-treatment purpura. However, when extensive treatments are performed, significant edema can occur following even purpura-free treatment. This can impair appearance and cause patient anxiety. Patients, especially those receiving purpura-free treatment for the first time, should be advised of the possibility of transient swelling.

213

PRELIMINARY DATA COMPARING EFFECTIVENESS AND SIDE EFFECTS OF THE ALTUS COOLGLIDE (1064 nm) AND COOLTOUCH VARIA (1064 nm) IN HAIR REMOVAL IN TYPE II-V PATIENTS

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Purpose: Pigmentary disturbance is always of concern when treating skin types III-VI. Since CoolGlide and CoolTouch Varia both generate 1064 nm wavelengths, the melanin absorption is significantly lower in comparison to other hair removal lasers. Thus, the side effects including pigmentary disturbance, blistering and scarring should be diminished, making these lasers ideal for skin types III-IV. To test this hypothesis, the side effects and effectiveness of the two were studied in 20 dark skin patients. Both lasers generate the same wavelengths but chill the skin surface differently—the Altus CoolGlide by contact cooling and the CoolTouch Varia by dynamic cooling. Thus, we also compared dynamic vs. contact cooling.
Methods: 20 female patients skin types III–IV were included in this study. The bikini area was randomized to treatment with one of the two lasers. Hair count at baseline and monthly before each treatment were done. Immediately after each treatment, erythema, burned hair, edema, blistering and painfulness were recorded.
Results: Preliminary data shows the Altus CoolGlide to be slightly more effective vs. CoolTouch Varia. Side effects profile is the same for the two lasers—treatment with both lasers is painful. Patients did not experience blistering and scarring.
Conclusions: The Altus CoolGlide and CoolTouch Varia are effective in hair removal. No short and long-term side effects including blistering, burning, pigmentary disturbance and scarring were noted as a result of treatment with either laser.

214

A COMPARISON STUDY WITH FOUR LASERS FOR THE TREATMENT OF PSEUDO-FOLLICULITIS BARBAE (PFB) IN ALL SKIN TYPES

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To evaluate the efficacy and safety of four lasers to treat PFB on all skin types (I-VI), 20 adult subjects, representing all "Fitzpatrick skin types" (10-VI, 2-V, 3-IV, 2-III, 2-II, 1-I) were treated in the study. Patients were randomly selected for treatment with either the diode laser systems (Lumenis LightSheer and Palomar SLP1000) or the Nd:YAG laser systems (Altus Coolglide and Laserscope Lyra). Patients were treated at the maximum tolerated fluence as determined by test sites. Patients received three treatments and were evaluated at monthly intervals for three months. Hair regrowth, hair shaft diameter, hair shaft color and associated epidermal side effects

were assessed at 1,2, and 3 months post laser. Patients were also asked to evaluate treatment pain.
Skin Type VI patients were more safely treated with the Nd:YAG laser systems as compared to the diode laser systems used in this study. Preliminary results show similar efficacy with all systems, but final results will be presented.
All four laser systems tested appear to allow for effective treatment and management of pseudo-folliculitis barbae, even in dark skin. Caution should be used when using high fluences to treat dense haired areas, because of thermal conduction between closely adjacent hair follicles.

216

THE 1.5 ms PULSE DURATION PDL DELIVERS IMPROVED PERFORMANCE FOR TREATING PORT-WINE STAINS

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Purpose: Preliminary evidence suggests that the longer pulse-duration dye lasers are more effective at clearing PWSs than previously available PDLs. The longer pulse duration and the associated dynamic cooling device enable tolerance of higher fluences than were previously possible.
Methods: Forty-five patients with 50 port-wine stains (PWSs) were treated with the 1.5 ms pulse-duration, 585 nm, pulsed-dye laser (PDL). Three patients with PWSs in different anatomical locations had different areas of their PWSs evaluated separately. Thirteen of the 50 PWSs had been treated previously with conventional 0.5 ms PDLs. Improvement was measured by dermal spectrometry measurements as well as subjective assessment of improvement by both the treating physician and patient.
Results: Previously treated PWSs that had failed to improve following subsequent treatments with conventional 0.5 ms pulse-duration PDLs, substantially improved following treatment with the 1.5 ms pulsed duration PDLs. Improvement of untreated PWSs was often quite dramatic, with complete clearing in treated areas. Dermal spectrometry measurements correlated with clinical assessments. A small number of PWSs improved only moderately, offering a clinical problem for future studies investigating alternate wavelengths and pulse-durations.
Conclusions: Longer pulse duration PDLs offer the potential for faster and more complete clearing of PWSs, and improvement of PWSs that have been resistant to conventional PDLs.

217

THE 1.5 ms PULSE DURATION PDL COMBINED WITH INTRALESIONAL CORTICOSTEROIDS IS EFFECTIVE TREATMENT FOR KELOIDS

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Purpose: Keloids and hypertrophic scars are inflammatory lesions with a significant vascular component. Intralesional triamcinolone is a mainstay of treatment, but with the desired effect of atrophy comes telangiectasia. In this study we attempt to investigate the role of the pulsed-day laser in managing erythematous keloids.
Methods: Patients with erythematous keloids were treated with intralesional triamcinolone and the 1.5 ms pulse duration, 595 nm PDL. Patients were evaluated by blinded observations of photographs and dermal spectrometry readings.
Results: Both dermal spectrometry readings and clinical evaluation demonstrated similar rates of improvement.
Conclusions: The combination of intralesional trimacinolone and PDL treatment are an effective modality for treating erythematous keloids.

218

LASER BLEPHAROPLASTY & FACIAL REJUVENATION-2001

Stephen Bosniak and Marian Cantisano-Zilkha

Incisional CO_2 laser blepharoplasty techniques, combined with Erbium:Yag resurfacing and non-ablative techniques, enhanced with Botox and Restylane injections can result in superb eyelid and facial rejuvenation with a shortened recovery time.

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219

CHARACTERIZATION OF THE AUTOFLUORESCENCE PROPERTIES OF LIVER TISSUE

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Autofluorescence is an intrinsic parameter of the biological material that has been proved to be suitable for the evaluation of morpho-functional conditions of several organs and tissues. Liver is an organ greatly involved in metabolic, biosynthetic, catabolic and detoxification functions so that it is to be expected that the autofluorescence properties of this tissue are particularly complex. In this work an identification of the endogenous fluorophores responsible for autofluorescence emission and a characterization of their spectral properties has been done on normal rat liver. Both ex vivo and in vivo studies have been performed. In the former case, tissue homogenates and cryostat sections were analyzed by means of spectrofluorometric techniques under excitation in the 360–440 nm spectral range; in the latter case an optic fiber-based spectrofluorometer was used to analyze the autofluorescence emission at organ surface. The results indicated that liver autofluorescence can be attributed mainly to pyridine nucleotide coenzymes (NAD(P)H) and vitamin A. Less important contributions are provided by flavins, constitutive proteins and fat acids. The use of a spectral fitting procedure allows to estimate the relative contributions of each single endogenous fluorophore to the whole emission. Changes in the relative contributions of the fluorophores can be found depending on the histological structures considered (hepatic lobules, connective lobule margins, portal tract regions). Preliminary experiments on in vivo organ gave data consistent with those obtained on ex vivo samples.
These findings can provide the basis to develop a real-time, non-invasive diagnostic technique to monitor the functional conditions of liver during the phases of organ transplantation practice.

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220

TREATMENT OF FACIAL SCARS WITH CONCURRENT LASER SKIN RESURFACING AND EXCISION

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Background: Facial resurfacing with CO_2 lasers has been demonstrated to be beneficial for use with atrophic scars. Treatment of more well-defined "ice-pick" and "crater" scars is more complex, often involving some type of scar excision/revision prior to resurfacing. The time of this excisional phase has been controversial.
Purpose: To demonstrate improved outcomes in the treatment of facial scars when laser resurfacing is combined with punch excision of smaller ice-pick scars and elliptical excision of larger scars during the same treatment session.
Methods: Nineteen patients with facial acne scars and patients with traumatic or surgical scars underwent facial resurfacing with a pulsed CO_2 laser (Ultrapulse, Coherent Medical, Palo Alto, California) followed by scar excisions. Acne scars varied from small shallow depressions, to deeper small ice-pick scars, to large concave scars and hypertrophic scars. The shallow depressed scars that improved with slight stretching of the skin were treated with laser resurfacing alone. Three passes with the pulsed CO_2 laser were performed with a Computer Pattern Generator (CPG) at settings of 596, 595, and 596. In patients with deeper acne scars, one pass with the CPG was performed on the entire face and then only the areas of scarring were treated with two additional passes. Two passes with an erbium:YAG laser were also done to remove thermal necrosis. The erbium:YAG laser was also used to further plane the edges of the scars. Immediately following resurfacing, ice-pick scars that remained visible were removed by a 2-, 3- or 4-mm punch biopsy excision. The base of the punched out tissue was left in place in order to avoid a depression upon suturing the new wound. For larger, concave or hypertrophic scars, scalpel excision was performed.
Results: All nineteen patients treated experienced an improvement in the surface irregularities and facial skin texture of 50% or more. No complications of scarring from laser resurfacing were seen. Transient post-inflammatory hyperpigmentation was noted in two patients.
Conclusions: Combined laser resurfacing and scar excision in the same treatment session is an effective treatment for acne or traumatic scarring of the face. No increase in adverse sequelae is seen when these treatment modalities are performed in the same session and the patient is spared separate surgeries.

221

IMPORTANCE OF TEMPORAL LASER PULSE PROFILE DURING NON-ABLATIVE WRINKLE REDUCTION

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Purpose: To determine the effect of the temporal profile of the laser pulse in stimulating type III collagen production rate post laser irradiation for non-ablative wrinkle reduction.
Method: Twenty subjects were treated with a non-ablative wrinkle reduction dye laser system (NLite, ICN Photonics Ltd, Wales, UK) utilising varying laser temporal pulse forms. Seventy two hours post irradiation epidermal suction blisters were raised on all areas and the blister fluid was aspirated for biochemical analysis for the amino-terminal propeptide of procollagen type III (PIIINP).
Results: All treated areas showed an increase of the PIIINP concentration compared to the control site, indicative of an increased level of type III collagen production. The level of the PIIINP concentration increase was shown to be highly dependent upon the temporal pulse form used.
Conclusions: Non-ablative wrinkle reduction is based upon an increased formation of new collagens in the skin. The data shows that the temporal pulse form is as significant as the overall pulse duration when using selective techniques to stimulate collagen production.

222

LONG TERM CLIINCIAL STUDY OF NON-ABLATIVE FACIAL PHOTOREJUVENATION WITH INTENSE PULSED LIGHT THERAPY

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The purpose of the study was to clinically evaluate the safety and effectiveness of Intense Pulsed Light (IPL) non-ablative treatments for facial rhytids and photoaged skin. Full face treatments using 2 passes per session were conducted. Forty–seven patients, skin type I through IV were initially treated with IPL cut-off filters between 550 nm and 590 nm. An additional pass was subsequently made over facial rhytids using a 695 nm or a 755 nm filter. Patients underwent 4 to 5 treatments at a 3 to 4 week intervals between February 2000 and March 2001. Photographs were taken at baseline and 4 to 6 weeks post procedure along with documentation of adverse effects and clinical improvement. Preliminary results were presented in April 2001. Initial data analysis revealed significant improvement in rhytids, vascular lesions, pigmentation, and pore size using Fitzpatrick 'Photographic Classification of Rhytids and Solar Elastosis scale. Thirty-two patients were then clinically evaluated at 5 to 14 months post treatment using the same scoring techniques. Long term analysis has shown significant continued changes. The clinical results suggest that non-ablative facial photorejuvenation results in long term improvement of rhytids, vascular and pigment lesions with minimal risks or side effects.

223

LASER HAIR REMOVAL: A COMPARATIVE STUDY OF 30 AND 100 ms WITH A DIODE LASER IN SUNTANNED INDIVIDUALS

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Purpose: The use of lasers to remove dark hair in fair skin individuals has proven to be safe and effective, providing significant long-term hair reduction. In this study we evaluated the safety, efficacy and side effects of an 800 nm diode laser (LightSheer EP), using the 30 and 100 ms pulse duration. Comparative results of these two pulse duration at the same subjects using the same fluence, would be helpful to further define their specific roles for hair removal in suntanned individuals.
Methods: Twelve adult subjects with skin types IV and V were treated at two 5×5 cm sides at the thighs. All subjects had recently been sun exposed (less than 7 days) at the treatment site. Fluence of 30 J/cm^2 and pulse durations of 30 and 100 ms was given in one single treatment. Pretreatment hair counts were made, and at 1, 3, 6, 9 and 12 months after laser treatment. Digital images were recorded at the same follow up visits.
Results: There was a significant hair growth delay in all subjects. There was also apparently permanent hair loss at long-term follow-up: a single treatment induced an average long term hair reduction of 30% at the test sites using the pulse duration of 100 ms and 39% of hair reduction using the pulse duration of 30 ms. Transient pigmentary changes were seen in the test sites using the 30 ms pulse duration.
Conclusion: The preliminary data suggest that the long pulsed (100 ms), 800 nm diode laser is a safe and long lasting method for hair removal in suntanned individuals.

224

POST-RHINOPLASTY TELANGECTASIAS: A TEDIOUS COMPLICATION SUCCESSFULLY TREATED WITH A CuBr LASER AT 578 nm

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Telangiectasias are a possible complication of rhinoplasty. Their appearance may compromise the result of an otherwise uneventful operation, causing patients' dissatisfaction. Cutaneous photoageing, topical steroids, familial predisposition, cutaneous damage by surgical dissection, early postoperatory trauma are among the possible factors that may contribute to this fastidious phenomenon. In some cases telangiectasias may appear even though none of these factors is present. The medical litterature often mentions this complication among others, but there are no data about its incidence, that may be heavily under-reported. During the last years laser treatment of telangiectasias has turned from an innovative procedure to a standard treatment modality, thanks to the possibility of selectively eliminating the undesired vessels without damaging the surrounding tissues. However, this is not so obvious for this series of complications that were referred to our practice: in these very demanding and impatient operated people we had to look for a highly effective and yet safe treatment modality, since they probably would not have tolerated other untoward effects such as purpura or scarring, or an excessive (in their eyes) number of sessions to solve their problem. We present 8 consecutive cases of nasal telangectasias following primary rhinoplasty. The mean age of our patients was 33 (range: 19–52) with a 1:3 M to F ratio. The mean time that elapsed between surgery and the appearance of telangiectasias was 9 months (range: 4–16). All cases were treated with a Copper Bromide (CuBr) laser at 578 nm. This laser was chosen due to its high affinity for oxyhemoglobin, together with an adjustable pulse duration and its low side effects profile. In all our cases the telangiectasias were the only cause of dissatisfaction for otherwise successful operations, as judged by patients and their referring physicians. The results show a 70–90% clearance after one treatment session. No relevant undesired effects were caused and there were no complications. All treatments were well tolerated without any anesthesia. No particular pre- or post-treatment topical care was necessary, and patients were allowed to use camoufflage immediately after treatment. Patients' satisfaction average was 3.2/4, as shown by feedback questionnaries. In most cases we were able to isolate the probable causes of the telangiectatic complication, that shall be discussed in the presentation in order to try to prevent them in the future. We conclude that the CuBr laser is a safe and effective treatment modality for telangiectasias, even when they appear after rhinoplasty operations. We find this conclusion potentially very reassuring both for patients and surgeons, and we urge the latter ones to consider this possibility when informing their patients before the operations.

225

CHARACTERIZATION OF TEMPERATURE DEPENDENT MECHANICAL BEHAVIOR OF CARTILAGE AND IMPLICATIONS FOR TISSUE RESHAPING

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Interest in reconstruction and modification of the facial cartilaginous frameworks using advanced technology and instrumentation is growing rapidly. In present, the characterization of viscoelastic behavior has been studied making a numerical model to apply nasal septal cartilaginous surgery. The objective of this study is to characterize the stress relaxation of porcine cartilage associated and mechanical viscoelastic behavior with temperature and time dependence based on moisture content. In this study, we measured the viscoelastic nature, storage and dissipate energy, of porcine septum cartilage using a dynamic mechanical analyzer (DMA) as they are deformed under a period (sinusoidal) deformation (stress or strain). Under the measured linear elastic strain levels, 0.99%, we characterized the change of elastic modulus using characteristic of thermal stability on porcine septum cartilage minimizing the effect of mass and elasticity loss with 0.5–1.0°C/min scan rate. The reference temperature 58–61°C for Williams-Landel-Ferry (WLF) equation was determined by specific heat curve of porcine septal cartilage from data of Temperature Modulate Differential Scanning Calorimetry (TMDSC) and the reference temperature was compared with the initiation temperature on the significant change of elastic modulus from DMA measurements. By selecting a reference curve and then shifting the other data with respect to

time, a master curves was generated and the activation energy, 145–160 kJ/mol, associated with the relaxation transition on porcine septal cartilage was calculated. The curve of stress relaxation was expressed by Prony series and the curve fitting was characterized for predicting long term behaviors of linear viscoleastic cartilage. The correct factor on specimen orientation of elastic modulus was discussed. This study plays an important part of making effective numerical model in order to predict the behavior of cartilage reshaping under laser irradiation for medical clinic.

226

THE USE OF PULSED DYE LASER IN THE TREATMENT OF HYPERTROPHIC SCAR IN CHINESE

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Purpose: To establish the efficacy of pulsed dye laser in the treatment of hypertrophic scars in Chinese.
Subject and Methods: 18 Chinese patients (23 sites) with linear scar were included into the study. Half of the scars were treated with pulsed dye laser 585 nm (5 mm spot size, 8 J/cm^2) with the other half as control. The scars were further classified as less than 6 months or more than 6 months. All cases received 3 or more treatment and were assessed both subjectively using a structure questionnaire and objectively by clinical photographic evaluation, thickness by ultrasound and cutometer for the degree of viscoelasticity.
Result: Overall, improvement of symptoms was common. 78.3% of the patients improved in itchness, 56.5% in pain and pins/needle. Blister formation was seen in 21.7%, a common complication in Asian skin. 47.8% and 56.5% of the patients noticed improvement in color and sizes of the scars respectively. There was significantly objective improvement of thickness of younger treated scar ($p = 0.006$, student t-test), whereas older scars improved significantly objectively in term of viscoelasticity. **Conclusion:** Pulsed dye laser is effective in the treatment of hypertrophic scar in Asian and the type of improvements in term of thickness and viscoelasticity depend upon the age of the scar.

227

THE USE OF PULSED DYE LASER WITH DYNAMIC COOLING DEVICE IN THE TREATMENT OF PORTWINE STAIN IN CHINESE

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Purpose: To establish the importance of epidermal cooling when 585 nm pulse dye laser is used for the treatment of port wine stain in Chinese.
Methods: Area of port wine stain was chosen to perform testing and the test area is divided into 2 halves. 33 patients were be recruited into the study whereby half of the lesion will be randomized to be treated with 585 nm pulse dye laser (PDL) on its own with the other half treated by pulse dye laser in conjunction with the dynamic cooling device (PDL-DCD). Dose testing will first be performed to obtain the optimal fluence which is defined as highest fluence that causes purple discoloration without epidermal damages. Once the optimal fluence is determined, the rest of text area was treated with that fluence. Patients' tolerability was assessed using a questionnaire and a research assistant noted the presence or absence of blister 1 week after treatment.
Result: The average fluence was significantly higher with the use of DCD than PDL alone (10.1 J/cm^2 for PDL-DCD, 6.5 J/cm^2 for PDL alone, $p < 0.0001$, student t test), immediate pain was significantly greater for PDL alone ($p = 0.025$, student t test) and blister occurrence was significantly more common on the side treated by PDL than PDL-DCD (37% vs 16%, $p = 0.031$, student t test). Finally, most patients prefer PDL-DCD than PDL alone (80.5% vs 19.5%).
In conclusion: Despite the use of higher fluence, PDL-DCD was better tolerated and associated with less adverse effect than PDL alone.

228

THE ROLE OF EPIDERMAL COOLING IN IMPROVING THE OUTCOME OF LASER THERAPY IN THE TREATMENT OF NEVUS OF OTA

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Purpose: To assess whether epidermal cooling would reduce the pain and swelling that commonly occurs after Q-switched laser treatment for Nevus of Ota.
Method: 31 patients with nevus of Ota will be recruited from the Dermatology out-patient clinic. Before treatment, the research nurse will use an ink pen to divide the lesion into two halves Half of the lesion is treated with Q-switched Alex laser system with a cool sapphire plate in contact as a mean of epidermal cooling. The other half is treated with the same laser but with the cooling device switched off. Patients were assessed using a questionnaire to assess for symptoms associated with laser surgery immediate after treatment and 1 week later.
Results: There was no difference in term of fluence used but in term of immediate pain, the side treated with the cooling plate was associated with significantly lesser degree of pain than the non-cooled side ($p = 0.002$, student t test). Furthermore, 81% of the patients preferred the cooled side than the non-cooled side.
Conclusion: Pre and post skin cooling is effective in improving the patient tolerability among nevus of Ota patients' treated with Q-switched laser.

229

INTRAVENOUS PHOTOCOAGULATION (IVP) OF VARICOSE VEINS

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Background and Objective: The treatment of varicose veins can be divided into two categories: nonsurgical and surgical. Nonsurgical approaches include: compression and sclerotherapy. There are several surgical options for varicose veins. However, there are many adverse side effects from traditional surgical management. Based on the concepts and our experience of applications of laser. We believe laser treatment would be an effective alternative treatment.
Study Design/Materials and Methods: One hundred and forty-nine patients with varicose vein (include 252 GSV) were recruited between January, 1996 and January, 2000. Subjects' age ranged between 23 years 9 months and 80 years 7 months; there were 27 males and 122 females. Severity of the varicose veins was categorized, based on the Hach's classification, into four grades: 4 grades: I–23 (14.9%) groin; II–56 (37.3%) mid thigh, III–62 (43.3% upper calf; IV–5 (4.5%) ankle. All patients were treated with a neodymium: yttrium-aluminum-garnet (Nd:YAG) (1064 nm) laser. Intravenous photocoagulation was performed using the Nd:YAG laser delivered with a 600 nm optical fiber. Laser power was set at 10 or 15 Watts, delivered with a pulse duration of 10 seconds. The range of total delivered energy is from 9200 to 20100 Joules. The entire procedure was completed in 95 to 175 minutes (mean 122.33 minutes) for bilateral procedures, and 65 to 100 minutes (mean 81.07 minutes) for unilateral procedures.
Results: The in-hospital stay ranged from 1 to 5 days with a mean of 3 days. The follow-up period ranged from 10 to 28 months with a mean of 19 months. Common early complications of IVP are: local paresthesia (62.7%), pigmentation (38.3%), superficial burn injury (9.0%), phlebitis (3.0%) and hematoma (1.5%). The final outcome showed no significant morbidity or mortality in our series. One hundred and forty patients (94.0%) demonstrated remarkable improvement.
Conclusion: IVP is a simple effective treatment modality for varicose veins. This less invasive method can minimize the complications of conventional surgery.

230

COMBINATION OF LASER SPECKLE IMAGING AND OPTICAL IMMERSION TECHNIQUE IN IMAGING THE DYNAMIC OF CEREBRAL BLOOD FLOW

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In present study, we used Laser speckle imaging method, which was a true full-field technique that produced a two-dimensional map of flow velocity without the need for scanning, combined with optical immersion technique to monitor the spatio-temporal characteristics of CBF. Two experiments were designed: one was to monitor the full-field intralipid flow covered with the in vitro dura mater, and the other was to image the spatio-temporal characteristics of CBF. In the former experiment, the optical immersion technique showed that the transmittance of the dura mater increased after applying the mannitol. While the spatial resolution of intralipid flow increased after application of the mannitol on the dura mater. In the latter experiment, the optical immersion result showed that the reflectance of dura mater decreased after the application of mannitol from the first to the tenth minute, which indicated that the dura mater of cerebral cortex became more transparent during this period. At the same time, the laser speckle imaging method was used to monitor the CBF. We found that more small vessels appeared and many blood vessels became clearer after application of mannitol. These showed that the combination of laser speckle imaging method and optic immersion technique obtained more CBF distribution information with higher spatial resolution and also eliminated the need of removing the dura mater, which would cause the complex physiological method to maintain the brain pressure.

231

TREATMENT OF BULKY CONGENITAL VASCULAR MALFORMATIONS WITH LONG PULSED LASERS

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While pulse dye lasers easily treat most port wine stains (PWS), violaceous, hypertrophic ones are more difficult to clear. To better target the darker color and the larger, deeper vessels, we studied lasers with longer wavelengths (which penetrate deeper and are better absorbed by darker pigments) and longer pulse widths (better matches vessel size). Two patients with bulky facial hypertrophic port wine stains responded dramatically to long pulsed alexandrite and Nd:YAG lasers. Initial tests were performed with the 755 nm GentleLASE (Candela, Wayland, MA), 755 nm Apogee (Cynosure, Wayland, MA), and 1064 nm CoolGlide (Altus Medical, Burlingame, CA). Prior to each treatment, the patient utilized topical Ela-Max anesthetic. With the initial test sites there was dramatic shrinking, however ulceration and secondary infection ensued in one patient which cleared with antibiotics. Marked thinning of the hypertrophic areas was noted in all the test sites, with prolonged healing at a few sites treated with the Apogee and the CoolGlide. Subsequent treatments were performed using either the GentleLASE at 15 mm spot/30–40 J/cm^2 with either 30 msec cooling spray or chilled gel or with the CoolGlide at 80 J/cm^2, 60 msec pulse width, a 10 mm spot size and pre-cooling. To minimize potential ocular damage from these deeper penetrating rays, the immediate periorbital area was treated with the 595 nm V-Beam (Candela, Wayland, MA), laser. Progression of treatments can be seen in the photographs showing dramatic shrinkage of the lesions. Although patients were very pleased with their cosmetic as well as functional improvement, there were some areas of scarring. Based on these results, we have now treated multiple hemangiomas and other large bluish vascular malformations and significantly improved clearing. Significantly fewer treatment sessions are needed to get equal if not better clearance. Our experience supports the use of longer wavelength, long pulsed lasers for treatment of bluer vascular malformations. Use of test sites (to establish safe treatment parameters) and cooling will minimize possible scarring.

232

VENUS LAKE TREATMENT USING A LONG PULSED 1064 nm LASER

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Venous lakes are violaceous vascular papules which occur on the lips and ears of adults. Histology demonstrates dilated, blood-filled vascular channels. Treatment options have included excision, electrocautery, argon laser, flash lamp pulsed dye laser and intense pulsed light. The purpose of this study is to investigate the efficacy and side effects of the long pulsed 1064 nm laser in treating venous lakes. Fifteen patients with venous lakes on the lips were treated with the long pulsed 1064 nm laser (CoolGlide, Altus Medical, Burlingam, CA). The laser was used at 60 to 100 J/cm^2, 10 mm spot size, and 60 to 80 ms pulse duration. Patients were treated with one to four pulses. At 6 months post treatment, 14/15 patients had 100% clearance of their venous lake after one treatment session and 1/15 required 2 sessions. Side effects included swelling and superficial ulceration. 6/15 complained of swelling for one to two days and 1/15 (treated with 4 pulses at higher fluences) did have significant swelling and blistering but healed without complication. All fifteen patients healed without pigmentary changes or scarring. In conclusion, we believe the 1064 nm long pulsed laser is an effective and safe treatment option for venous lakes and may be an excellent option for other vascular lesions in the blue/purple color range.

233

PSEUDOFOLLICULITIS BARBAE: ETIOLOGY, MEDICAL, LASER THERAPIES AND IMPROVED QUALITY OF LIFE UTILIZING THE EXTENDED PULSE WIDTH DIODE LASER

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Purpose: We investigate the efficacy of the diode laser with extended pulse width in the treatment of pseudofolliculitis barbae in persons with skin types five and six and report quality of life findings.

Methods: Twenty five male or female patients with moderate to severe pseudofolliculitis barbae were treated with three monthly treatments using a hair removal laser with an extended pulse with, after an initial test spot. Before, during and after treatment, both objective and subjective measurements were made of disease severity and improvement.

Results: By extending the pulse width of the diode hair removal laser, a very effective alternative has been developed for treating this chronic and emotionally distressing disease, while protecting the overlying epidermis and significantly reducing, if not eradicating, the inflammatory papules. There was a uniform improvement in the patient's quality of life. Long-term hair removal, improved skin texture, and some improvement in post-inflammatory hyperpigmentation were added benefits.

Conclusions: Pseudofolliculitis barbae (PFB) is a chronic, inflammatory process which is known to be common in men with skin of color, who have a genetic tendency towards coiled or curly hair. Our awareness of the number of affected women has dramatically increased, as well as our awareness of this condition in white skin. The number of patients now presenting for treatment of this condition has escalated. There have been many advancements in the medical and laser treatment of PFB. Several newer recruits, utilizing pulse width extension, have become a part of the armourmentarium in treating this disease, while maximizing outcome, minimizing complications, and significantly improving quality of life. The extended pulse width diode laser provides a definite effective means to achieve this goal.

235

NON-ABLATIVE PHOTOREJUVENATION: EVALUATION OF A HIGH-POWERED, 4 mm SPOT SIZE Q-SWITCHED Nd:YAG 1064 nm LASER

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Many different laser systems are being evaluated for photo rejuvenation, including ablative methods such as CO_2 resurfacing to non-ablative methods using varying wavelengths including 585 nm and 1400 nm. Photo rejuvenation effects can be made more clinically significant by using a larger spot size and higher fluences.

A total of 30 patients with periocular rhytides (grade I to III) were recruited from healthy volunteers with skin phototypes Fitzpatrick I through IV. After application of a topical anesthetic, three consecutive treatments with 4-week intervals with a high powered Q-switched Nd:YAG 1064 nm (Continuum Biomedical, Livermore, CA) were administered. This laser was used without cooling and with a 4.0 mm spot size and a fluence (on average 9–9.4 J/cm^2) sufficient to produce what was defined as a pupuric response. Epidermal sloughing and pinpoint bleeding was avoided at all times. An independent, blinded panel of laser experts, to grade for rhytide improvement as well as side effects, did evaluation of all subjects by standardized digital photography. Results indicate a modest but clinically significant improvement without any permanent side effects.

236

MICRODERMABRASION/Nd:YAG LASER COMBINATION FOR OPTIMUM SKIN RESURFACING

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Microdermabrasion is a superficial skin treatment that propels crystals across the epidermis, removing the top layer of cells. The Nd:YAG laser—operating at 1064 nm—in conjunction with a topical carbon cream, also exfoliates these superficial cells. By stimulating the epidermis to regenerate itself, both treatments even out pigment discoloration, tighten the skin minimizing fine rhytids, and reduce the visibility of acne scarring. We report the use of these techniques in combination to achieve skin rejuvenation. One hundred and twenty patients, of both genders, age range 17–90 (mean 50) were treated over two years. Three percent of the patients had acne vulgaris, 97% desired a reduction of fine rhytids on the face and tightening of the jowl and submental regions.

Pretreatment for a minimum of one week included topical glycolic acid, pigment blockers such as hydroquinone, vitamins C and E, and moisturizer.
106 patients (88%) reported improved skin texture after six weeks, compared to their pretreated skin. The combination of microdermabrasion and the Nd:YAG laser resulted in the greatest visible improvements. Seven patients (6%) did not complete their six treatment sessions, and three (2.5%) completed the program but without significant improvements.
We postulate that abrading the epidermis prior to Nd:YAG laser phototherapy, allows deeper penetration and remodeling of subepidermal tissues. Microscopy studies will be needed to elucidate the mechanism by which these improved results occur.

237

TREATMENT OF EYELID HYPERPIGMENTATION WITH QS RUBY LASER AND INTENSE PULSED LIGHT DEVICE

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The purpose of this study is to evaluate the efficacy of the QS ruby laser (QSRL) and Intense pulsed light (IPL) on eyelid hyperpigmentation. Four female patients were included in this study. Skin biopsies were taken from 2 patients on the eyelid area before and after treatment with QSRL or IPL. The patients were submitted to QSRL or IPL as follows:
Patient 1: 2 sessions of QSRL 7 J/cm^2 on the right side and 4 sessions of IPL on the left side(filter 570 nm, double pulse)
Patient 2: 2 sessions of QSRL on the left side(same parameters) and 3 sessions of IPL on right side(same parameters)
Patient 3: 2 sessions of QSRL and 1 sessions of IPL on right side and 3 sessions of IPL on left side. (same parameters)
Patient 4: 2 sessions of IPL on both sides (same parameters)
All patients showed significant clinical improvement of hyperpigmentation. The areas trested with IPL cleared more than with QSRL. We also observed improvement of skin texture with IPL Histopathology showedreduction of the number of dermal macrophages contaning melanin. Dermal fibrosis was observed after treatment with IPL.
IPL and QSRL proved to be useful alternatives to treat eyelid hyperpigmentation.

238

NECK, CHEST, AND HANDS NON ABLATIVE REMODELING WITH A 1540 nm Er:GLASS LASER. CLINICAL, ULTRASOUND IMAGING AND PROFILOMETRIC EVALUATION

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Purpose: To evaluate the efficacy of an Er glass laser 1:54 nm Aramis Quantel in non ablative skin remodeling of neck, chest and hands with non invasive methods.

Methods: 10 patients of skin phototype 1 to 5 were treated on neck, chest and hands rhytids with a 1540 nm Er glass laser with cooling system at +5°C.
Three passes with the laser were performed at four weeks intervalls for a total of 3 treatments.
Laser was applied with a 4 mm spot, contact cooling (+5°C), in a pulsed mode, and a fluence of 50 J/cm^2.
The treatment sites were evaluated using clinical parameters, digital pictures (before an after each session), silicon imprints and ultrasound imaging before the first treatment and after the last treatment.
Results: We observed a clinical, profilometric and ultrasound improvement after non ablative of neck, chest and hands without any adverse effect.
Conclusion: 1540 nm Er glass non ablative remodeling is a safe and effective methods of treatment and prevention of cutaneous photodamage for neck, chest and hands.

239

NON-ABLATIVE WRINKLE REDUCTION BY Er:YAG LASER: ENCOURAGING RESULTS (CASE REPORT)

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In traditional Er:YAG laser skin resurfacing the epidermis is ablated and a certain amount of heat is conducted to the dermis in order to stretch facial wrinkles. To avoid potential side effects like pigmentary changes or scaring and to shorten the down time a new Er:YAG laser technique of collagen remodelling without skin ablation was introduced.
The periocular area of a 43 years old femal volunteer showing fine to moderate wrinkles was treated once with an Er:YAG laser with non-ablative pulses (SupErb XL^{TM}, WaveLight) without anaesthesia. Those sub-ablative pulses (spot diameter 4 mm) consisting of 10 non-ablative subpulses with a total fluence of 2.4 J/cm^2 were heating the superficial epidermis and inducing a heat transfer to the upper dermis. A very superficial crust and a mild edema were present one day post op, the erythema was resolved after 5 days. At a follow up investigation after 7 months the wrinkles had been removed in 75% and the skin had a firm and straight appearance at the treated areas making the patient very happy.
This first clinical case of non-ablative Er:YAG laser treatment may support the idea of the combined influence of minimal epidermal ablation and moderate heat transformation resulting in collagen neogenesis.

240

Er:YAG LASER SKIN RESURFACING LONG TERM FOLLOW-UP

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The main goal of our study was to determine the beneficial effects of the Er:YAG laser resurfacing and the persistence of cosmetic effects over a long term follow-up.
54 patients were included in the study. They were treated with the Er:YAG laser (Fotona Skinlight, Fotona Fidelis) for skin resurfacing and were followed with office visits and serial photographs over 6 years. The treatments included mostly rhytides, acne scars and hypertrophic scars.

Skin resurfacing for rhytides was performed with coagulation mode energy density (0.5–1.5 J/cm^2); SP-short laser pulse (energy 250 mJ, spot diameter 5mm and repetition rate 12–15 Hz), with 60% overlapping. In acnae and hypertrophic scars only ablation mode was used. For the ablation, energy densities higher than 2.5 J/cm^2 were required.
No special pre-treatment was performed. Types of anesthesia: EMLA or 2% Xylocain solution subcutaneously. After the treatment nonadhesive dressing was applied for 24 hours, and after that moisturizing cream. Sun blocks were recommended during summer. Follow-up ranged from 1 to 6 years.
All patients were subjectively satisfied with the result, objectively we measured a 50% to 70% improvement in acne scars, 70% to 90% in hypertrophic scars and 30% in rhytides after 6 years.
Er:YAG laser resurfacing was recognized as an effective tool for improving facial rhytides and acne scars. The improvement can be seen for up to and over 6 years.

242

THE EFFECTS OF ADDING LOW ENERGY LASER IRRADIATION AFTER SKIN RESURFACING IN LOWERING COMPLICATION

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Purpose: The purpose of this study was to evaluate the effectiveness of adding low power (780 nm) Diode laser irradiation after skin resurfacing with superpulse CO_2 laser.
Materials and Methods: Twenty female patients with ages between (38–60) were elected for full face skin resurfacing with superpulse CO_2 laser 500 mJ/cm^2, and half of them were randomly elected and treated with low power Diode laser for the wounds and patients in these two groups. Pain, swelling, erythema, healing period, infection rate and itching were compared for three months.
Conclusion: Low power Diode laser irradiation after skin resurfacing can lower complications and benefit in rehabilitation of the patients.

244

TREATMENT OF ACTINIC KERATOSES OF THE FACE, SCALP AND NECK WITH THE ULTRAPULSE CO_2 LASER AND THE Er:YAG LASER

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Purpose: To demonstrate the efficacy and safety of the ultrapulse CO_2 laser and Er:YAG laser in the treatment of actinic keratoses of the face, scalp and neck.
Methods: Fourteen patients with actinic keratoses of the face, scalp and neck were included in this 5-year retrospective clinical study. These patients all had more than 30 lesions and were seen at 3- to 6-month intervals for cryotherapy, without ever being lesion-free. Patient age ranged from 48 to 74, and the female:male ratio was 4:3. The forehead was the site most commonly affected (79%) and the chin and scalp were the least affected areas (14% each). Treatment with the $UPCO_2$ consisted of 2 to 5 passes with the Computer Pattern Generator (CPG) using 396 and 595 parameters, and fluences of 200–300 mJ/cm^2. Only 1 to 2 passes were performed on the full face, and the rest of the passes targeted the affected areas only. Following this the 3-mm hand piece with the collimated beam of the $UPCO_2$ at a fluence of 500 mJ/cm^2 was used to further ablate the base of the AKs. The Erbium:YAG laser was then used to remove the residual layers of thermal necrosis and for the purpose of sculpting. AKs of the neck were treated with two passes of the Erbium:YAG laser alone.
Results: Complete destruction of actinic keratoses was observed immediately after laser treatment in all patients. Two patients (14%) had a recurrence of 1–2 AKs in previously treated areas noted within the first year after laser resurfacing. These responded effectively to a second treatment with the $UPCO_2$ laser. No further recurrence of AKs has been noted in up to 6.6 years of follow-up. Actinic keratoses of the neck were destroyed with two passes of the erbium:YAG laser, and no recurrence has been noted. Overall side effects were minimal and included transient hyperpigmentaiton in one patient (7%), pseudohypopigmentation of the lower cheeks in another patient (7%), and a Staph aureus infection in a third patient (7%) that responded successfully to dicloxacillin.
Conclusions: Treatment of actinic keratoses of the face, scalp and neck may be accomplished with the ultrapulse CO_2 laser in combination with the Er:YAG laser in a safe and successful manner.

245

TREATMENT OF BASAL CELL CARCINOMA AND SQUAMOUS CELL CARCINOMA WITH THE ULTRAPULSE CO_2 LASER IN COMBINATION WITH THE Er:YAG LASER

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Background: Treatment of basal cell carcinomas (BCC) and squamous cell carcinomas (SCC) consists of surgical excision, curettage and dessication and/or photodynamic therapy. Resurfacing and ablation with the ultrapulse CO_2 ($UPCO_2$) laser followed by the Erbium:YAG laser may present an attractive and effective treatment option in the management of these cutaneous cancers.
Purpose: To demonstrate the efficacy and safety of the ultrapulse CO_2 laser and Er:YAG laser in the treatment of basal cell carcinomas and squamous cell carcinomas of the skin.
Methods: Sixty-seven patients with a total of 103 BCCs and SCCs were included in this 7-year retrospective clinical study. There were 57 BCCs and 46 SCCs treated. Patient age ranged from 32 to 74, and the female to male ratio was 1:1. The areas most commonly affected were the cheeks and the back. Other areas affected included the nose, inner canthus, earlobe, scalp, dorsal hand, fingers and lower extremities. Treatment with the $UPCO_2$ consisted of 3 to 5 passes with the Computer pattern Generator (CPG) using 396 and 595 parameters, and fluences of 200–300 mJ/cm. Only 1 to 2 passes were performed on the full face when applicable, and the rest of the passes targeted the affected areas only. Following this the 3-mm hand piece with the collimated beam of the $UPCO_2$ at a fluence of 500 mJ/cm was used to further ablate the base of the cancers and reach their follicular extensions. The Erbium:YAG laser was then used to remove the residual layers of thermal necrosis and the for the purpose of sculpting.
Results: Complete destruction of BCCs and SCCs was noted after treatment with the $UPCO_2$ laser followed by the Erbium;Yag laser. There have been no recurrences of the skin cancers in a follow-up period spanning from 10 months to 7 years. No adverse effects or scarring have been noted with this treatment.

246

TREATMENT OF LEG TELANGECTASIAS WITH A 532 nm KTP LASER IN A MULTIPULSE MODE EMISSION

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Purpose: Evaluation of the efficacy of a 532 nm KTP laser emitting in multipulse mode, for the treatment of superficial 0.5–1 mm leg telangectasias.

Materials & Methods: A 532 nm KTP laser (Quantel Medical, Viridis Derma, France) was used with a multipulse mode emission (3 stacked pulses: 100 ms, 30 ms, 30 ms and a delay between pulses: 250 ms), fluence: 60 J/cm^2 and a spot: 0.75 mm. No cooling was associated. No anesthesia was done. The clinical evaluation was performed on 14 female patients, average age: 36 (27–57), phototypes I to IV. All subjects were examined with Doppler ultrasound to ensure their veins were competent. A treatment site (6×4 cm) was selected on each patient with anatomical references to be easily located. The topography of the vessels network was reported on a tracing plastic mask before each session and 6 weeks after the last one. These masks were digitized and the number of vessels (before and 6 weeks after each session) was automatically determined using an imaging software. Side effects were systematically noted before and after every treatment, and 6 weeks after the last one. Pain and patient's satisfaction were recorded on a scale going from 1 to 4.

Results: Moderate pain was reported (mean: 2.4). Immediate erythema and oedema were observed systematically, temporary hypopigmentation rarely. No matting was reported. After 1 treatment, vessel clearance, calculated from the tracing masks, was 53% ($p < 0.002$). It greatly increased after 2 (78%) and 3 treatments (92%). The treatment was completed after 2 sessions for 3 patients with a total clearance. The patient's satisfaction was high (3.2 after 2 sessions).

Conclusion: This multipulse mode emission emphasizes the efficacy of the KTP laser in this study. It provides a safe and effective treatment that achieved an important reduction of red leg veins telangectasias from 0.5 mm to 1 mm in diameter, with very few side effects.

247

RELATIONSHIP BETWEEN HAIR CYCLE AND LASER HAIR REMOVAL: OPEN STUDY ON 492 SESSIONS

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This study araised from the observation of our clinical results. In order to obtain the best «cost-benefit» index for our patients, we asked them to come back as soon as the hair was growing up again, as they would priorly do while waxing for example; they were asked not to wait neither to perform any other method of hair removal between the laser sessions. For the patients who were able to follow this rythm, we could notice that the results were much better, and that the delay of regrowth, related to the hair cycle, was following a regular graph which mathematical formula was to determine. This is the purpose of this paper.

248

IPL EPILATION—A FIVE YEAR ANALYSIS

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IPL use for long-term epilation has been successfully shown for over the past five years. Over 100,000 treatment sessions have been performed with the IPL device for long-term epilation. This review will cover the clinical trials which led to FDA approval to long-term studies which confirmed the usefulness of the device. IPL for epilation has been cleared for permanent hair reduction and has been approved to treat all skin colors and hair colors. The future of IPL for epilation will also be addressed and its role in long-term hair removal.

249

LITIGATION IN THE LASER WORLD—WHAT I HAVE LEARNED

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Lasers and IPL devices have become routine medical devices in many dermatology and plastic surgery offices around the nation. They have also become prevalent in many other settings—including medical and non-medical offices. Over the past several years, I have been involved in numerous medical malpractice cases regarding lasers/IPL. The purpose of this presentation is to review what I have learned from these cases and to share this experience with my colleagues to help prevent future litigation when not appropriate. Physicians must be well-trained in the proper use of these machines and if physician extenders are used, they, too, must be well-trained and have proper working protocols available at their disposal. Informed consent cannot be stressed enough. Photographs should be taken to document the patient's response to the therapy. Adverse events will occur—every laser physician has encountered problems—but physicians must understand proper wound healing and be prepared to handle adverse sequelae to prevent unnecessary litigation. Handled properly, litigation should not be a major concern for laser physicians, even in a litigious society.

250

THE EFFECT AND INTERACTION OF FLUENCE AND PULSE DURATION ON PULSED MILLISECOND Nd:YAG LASER HAIR REMOVAL

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Previous studies have evaluated the clinical hair removal effects of progressive fluence increases using a cooled pulsed millisecond 1064 nm Nd:YAG laser. This study evaluated the interaction between fluence and pulse duration on hair removal efficacy using a cooled pulsed millisecond 1064 nm Nd:YAG laser. Twenty two subjects were treated with a long pulsed cryogen spray cooled Nd:YAG laser utilizing fluences of 50, 60 or 80 J/cm^2 at pulse durations of 25 and 50 msec. Hair counts were obtained before and after three months after treatment. Multivariate regression analysis was used to determine the significance of hair reduction

with varying parameters. Adverse events were also evaluated. Hair reduction with the long-pulsed Nd:YAG laser increased as fluence and pulse width increased, but with more frequent and greater adverse events.

251

THE USE OF DYNAMIC COOLING AND LONG PULSE DURATION IN THE TREATMENT OF RESISTANT PORT WINE STAINS

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It is well documented that a percentage of patients with portwine stains will have limited or no response to treatment with a pulsed dye laser. In an effort to try to improve laser penetration, without subsequent epithelial damage, dynamic cooling devices have been introduced. Newer lasers are also producing longer pulse durations, to better match the thermal relaxation times of the vessels.

We present a series of 22 patients who had previously been treated with minimal or limited improvement using both pulsed dye and continuous wave dye lasers. 90% of these lesions involved the face and/or upper limb. 5 patients had suffered scarring during previous treatment. All patients were treated using the Coherent Versapulse HELP-G (potassium titanyl phosphate) 532 nm laser with sapphire tip contact cooling device. All patients were treated with pulse durations of 20–50 ms, 3–6 mm spot size, and fluences of 10–22 J/cm^2.

To date, 16 patients have had >50% lightening of their portwine stain, with 2 showing complete resolution. There have been no incidence of scarring or pigmentary complications.

The Versapulse KTP laser with dynamic cooling may have a role to play in the treatment of portwine stains resistant to pulsed dye lasers. It is unclear whether this benefit is due to the contact cooling, long pulse duration or a combination.

252

FACIAL REJUVENATION WITH THE V-BEAM VASCULAR LASER

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Time and experience has shown that ablative laser resurfacing with either the carbon dioxide laser or the erbium laser is associated with a significant healing time and the potential for scarring or hypopigmentation. Non-ablative resurfacing with intense pulsed light along with other laser systems has been shown to offer some cosmetic improvement with almost no risk of scarring or permanent pigment changes. We present a prospective study evaluating the safety and efficacy of non-ablative resurfacing with the long pulsed, pulsed dye laser (V-Beam laser, Candela). Each patient underwent a series of five full face treatments. An area of sun exposed skin on a forearm was also treated. Biopsies from the forearm were taken before the first treatment and 1 month after the last. Before and after photographs were taken and evaluated by an independent observer. 5 out of the 6 subjects who have completed the study to date report cosmetic improvement in their skin. 67% noticed tighter skin and improvement in texture. 50% noticed improvement in wrinkles, decrease in facial redness and telangiectasias. These results are supported by independent evaluation of before and after photographs. For facial rejuvenation, the VBeam laser rates favorably compared to other non-ablative laser and intense pulsed light systems.

254

SUPER LONG PULSED DIODE LASER TREATMENT FOR HAIR REMOVAL IN DARK SKIN: CLINICAL-PATHOLOGIC CORRELATION

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Hypertrichosis is a common problem often resulting in frustration and poor self esteem. Clinical observations of laser-assisted hair removal have shown a decrease in hair diameter with treatment however, no study to date has shown pathologic correlation of this observation. This pilot study evaluates the safety and efficacy of a new super-long pulsed diode laser (Cynosure, Apogee 100) in patients with dark skin with histopathologic correlation to clinical observation.

Ten African-American patients, skin types III-VI, were treated with the Cynosure Apogee 100 diode laser. Biopsy specimens were taken from a subgroup of patients at various intervals.

Cynosure Apogee 100 was effective in reduction of hair growth without evidence of adverse sequelae. Biopsy specimens document change in hair follicle diameter correlated with treatment parameters.

Laser assisted hair removal results in decrease in hair shaft diameter with treatment.

255

IMAGING SKIN WITH A POLARIZED LIGHT VIDEO CAMERA

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The purpose of this study is to develop a camera that can see the margins of skin cancer and guide Mohs surgery or other surgical excisions of cancer in dermatology. When a doctor views the light reflected from skin, he is blinded by the large number of photons that have penetrated deeply into the reticular dermis and backscattered back to the surface and cannot easily view the superficial regions of the skin. About 90% of the observed light is due to such multiply scattered deeply penetrating photons. About 5% of the observed light is due to the glare off the tissue surface. Only about 5% of the observed light is scattered off the superficial tissue region (epidermis, papillary dermis and upper reticular dermis) where cancer growth and invasion initially occur. The method of this study is to (1) view the skin from above normal to the surface with a CCD video camera while illuminating the skin from a 30 degree angle off the perpendicular with linearly polarized light that is oriented parallel to the source/skin/camera triangle, (2) place a glass plate on the skin surface coupled with fluid to flatten the skin surface and deflect glare away from the camera, (3) acquire a first picture called “par” using a linear polarizer in front of the camera oriented parallel to the illumination light’s polarization orientation, (4) acquire a second

picture called "per" with the polarizer oriented perpendicular to the illumination, (5) calculate the polarization image, pol = (par per)/(par + per), where "par" = superficial + deep photons and "per" = only deep photons. The difference "par"-"per" cancels the deep photon contribution because the deep photons are multiply scattered and randomized and contribute equally to both "par" and "per". The "pol" image therefore depends only on photons scattered by the superficial tissue. The result is a polarization image that has pixel values of about 0.05 in the range of 0–0.10 due to photons scattered by the superficial skin. In conclusion, a polarization camera images only the superficial skin region where cancer originates and grows, and rejects surface glare and the blinding reflectance of deeply penetrating photons.

256

TREATMENT OF WARTS WITH A FREQUENCY-DOUBLED Nd:YAG LASER (532 nm)

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Purpose: To study the efficacy and safety of Diolite 532, a frequency-doubled Nd:YAG (532 nm) laser, in the treatment of warts.
Methods: Ten patients with warts were treated with Diolite 532, a frequency-doubled Nd:YAG (532 nm) laser. Photographic and clinical evaluations of the warts were performed pre- and post-operatively. Patient's subjective assessment of the treatment-associated pain was also obtained.
Results: All patients showed improvement after one treatment. The number of treatements necessary to clear the wart was dependent on the size and thickness of the lesion. The treatments were associated with minimal intra-operative pain and no discomfort during recovery period. There were no scarring or permanent pigmentary changes associated with this treatment.
Conclusions: The Diolite 532, a frequency-doubled Nd:YAG (532 nm) laser, is a safe and effective treatment option for warts, and offers the advantage of a pain-size recoverey period.

257

LOW LEVEL LASER THREAPY IN TREATMENT OF PSORIASIS IN INDIAN PATIENTS

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Psoriasis is one of the commonest skin disease. It is chronic relapsing and remitting scaling skin disease. Low Level Laser Therapy (LLLT) was applied to study its efficacy as a mono therapy on resistant cases of psoriasis. Study was performed on 25 patients in the two pioneer laser centres in India between 1999–2001. All the patients were chronically ill for more than one year. They had been treated previously by conventional treatment by consultant doctors with little or no effect. Application of LLLT in the psoriatic patients was clinically studied on parameters of psoriatic plaques, scaling, itching and relapses of the lesions. Immunocorrection and anti-inflammatory properties of low level laser beam seem to act favourably on psoriasis. The study was conducted by using red lasers a) Mulat (Technica-Russia, 632 nm, with power 5 mW continuous mode), b) Maestro-Red Line Scan (Medicom-CZ, 670 nm, power 20 mW) and infra red laser c) Muravey (Technica—Russia, 890 nm, power 10 mW continuous mode). Three application techniques were used *viz*. direct skin contact, non-contact scanning for the larger surface areas and intravenous application. Therapy continued for 15–20 sessions in a course. Follow up was conducted for a year after initial LLLT treatment. It was observed that 70% patients have achieved best results on all parameters mentioned above. The therapy also improved psychological response to the disease. Thus, LLLT could be the modality of choice in resistant cases of Psoriasis.

258

ABLATION OF CUTANEOUS LESIONS USING AN ERBIUM:YAG LASER

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Purpose: To evaluate the use of Erbium:YAG laser to remove cutaneous lesions.
Methods: Seven female and ten male patients with skin types I to VI with various cutaneous lesions were treated with Erbium:YAG laser. An Er:YAG laser with a wavelength of 2.94 μm was used with a fixed pulse width of 250 μs. A fluence of 5 to 60 J/cm^2, spot size 1.5, 3.0 and 5.0 mm, with repetition rate of 4 or 8 Hz was used to ablate benign, pre-malignant and superficial malignant skin lesions. The lesions were exposed to the laser until they were visibly removed. Photographs were taken before and after treatment at all follow up visits. The follow up visits ranged from few weeks after treatment to more than a year after initial treatment. A total of 227 facial lesions were treated. These lesions included Seborrheic Keratosis, Acrochordon, Verruca Vulgaris, Solar Lentigo, Benign Nevus, Sebaceous Hyperplasia, Xanthelasma, Milia, Actinic Keratosis and Squamous Cell Carcinoma in situ. A surgical excision was performed and microscopic evaluation was done after the ablation of SCC.
Results: All the lesions were removed successfully and there was no recurrence at time of the submission of this abstract. A microscopic evaluation confirmed the complete ablation of SCC in Situ. There was usual erythema, swelling and pinpoint bleeding associated with the use of Erbium:YAG laser. None of the patients had infections, scarring or permanent pigmentary alterations.
Conclusion: Erbium:YAG laser is another effective and safe device that can be used to remove benign, pre-malignant and superficial malignant cutaneous lesions.

259

MULTIPLE LASER TREATMENT ON PHACOMATOSIS PIGMENTOVASCULARIS

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To evaluate the efficacy of the multiple laser approach in the treatment of phacomatosis pigmentovascularis (Type IIa).
A-3-year-old girl with phacomatosis pigmentovascularis was seen at the outpatient department. The patient had dermal melanosis on the face, both arms, chest, back, and both legs as well as portwine stains on the face, right arm, chest, back, and both legs. Histological examination showed dilated vessels in upper dermis and melanocytes scattered in upper and middle dermis. There was no evidence of malignancy. The patient was treated with multiple lasers including the dye laser (585 nm, 6 J/cm^2, 450 microsec,

7 mm), Q-switched ruby laser (694 nm, 7 J/cm^2, 30 nsec, 4 mm), and Q-switched alexandrite laser (755 nm, 7 J/cm^2, 50 nsec, 3 mm) under general anesthesia. After 6 sessions of multiple laser treatment, the outcome of dermal melanocytic lesions and vascular lesions was good to excellent. Histologically a marked decrease in the number of melanocyte in the dermis was observed. We obtained good to excellent results in the treatment of phacomatosis pigmentovascularis with multiple laser approach. We believe that multi-laser approach is an effective therapeutic tool in the treatment of both melanocytic and vascular lesions.

260

TREATMENT OF DIVIDED NEVUS OF THE PENIS

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Divided nevus or "kissing nevus" has been first defined on adjacent parts of the upper and lower eyelids. It is a rare pathologic entity on the penis in which only three cases have been reported as we know. Skin grafts and local flaps have been used in the treatment of divided nevi; however, there is no report on the treatment of divided nevi of the penis. We present our experience with divided nevi of the penis in two cases. Divided nevi of the penis show a mirror image symmetry on the glans penis and the prepuce. The nevus on the glans was treated with laser and the other on the prepuce was treated with surgical approach. The lasers used in a combined fashion were the normal mode ruby laser (NMRL) and the Q-switched ruby laser (QSRL). After single pass of the NMRL irradiation, the epidermis was peeled off manually using a wet gauze followed by further treatment using QSRL with multiple (3 to 4) consecutive passes. As a general rule, the treatment of congenital pigmented nevi is surgical. If the prepuce is only affected, surgical treatment may be thought appropriate; however, this represents difficulties if the gland penis is affected. We obtained good results with combined (NMRL plus QSRL) ruby laser in the treatment of divided nevi of the penis with an overall improvement of 92.6% dermaspectrocopically. No complication was noted postoperatively. We think that combined ruby laser would provide an effective therapy for divided nevi of the penis, but the progress of the patient should be monitored for recurrence or malignancy.

261

DEPENDENCE OF STONE RETROPULSION ON FIBER SIZE AND LASER ENERGY DURING Ho:YAG LITHOTRIPSY

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A Ho:Yag laser lithotriptor produces calculus fragmentation by thermally mediated ablation. During irradiation, the calculus is subjected to a retropulsive momentum caused by particle ejection and/or laser-induced bubble formation. If the stone cannot resist this strong kinetic momentum, it will recoil away from the laser delivery fiber. Thus, efficient lithotripsy requires an understanding of the factors that impact stone movement.
We studied the impact of fiber diameter and pulse energy on stone retropulsion during irradiation. Stone phantoms were placed in a clear glass tube filled with deionized water. Each sample was irradiated in the contact mode for various fiber diameters and pulse energies. Phantom displacement was monitored with a high-speed camera, with images obtained once per 1 msec. Cross-sectional images of craters with optical coherence tomography were acquired.
For energies up to 500 mJ, the stone recoiled away from the fiber and slowed down due to the frictional and drag forces. Phantom displacement and velocity increased as pulse energy increased. At high laser energy, the motion of the stone differed from that of the lower energy cases. 1) The 272 μm and 355 μm fiber caused the stone to initially move away, the stone stopped and the top of the stone rocked back toward the fiber. The stone then moved away from the fiber. 2) The 940 μm fiber caused the stone to move away regardless of laser energy. Crater size increased as pulse energy increased. Crater width increased and crater depth decreased as fiber diameter increased. The micro-jet, induced by the asymmetric bubble collapse, is considered to be the cause of the rocking of the stone. The retropulsion increases as pulse energy increases and as fiber diameter increases. The wide, shallow crater of the larger fibers produces recoil momentum directed perpendicular to the irradiated stone surface, providing more energy contributes to retropulsion.

262

COMPARISON OF ALEXANDRITE LASER AND YAG LASER FOR HAIR REMOVAL IN RECENTLY TANNED INDIVIDUALS AND THOSE WITH DARKER SKIN TYPES

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Purpose: The clinical effectiveness of two commercial lasers marketed for hair removal was examined in 20 patients. Recent tanning and denser melanin concentrations found in individuals with darker skin types results in a relative contraindication to laser hair removal. Because of competition from chromophores common in both skin and hair, laser treatment in these patients may result in an increased risk for undue dermal heating, increased pain, color changes, and scarring. While methods to assure adequate skin protection such as cooling devices have a significant role in dermal preservation, proper wavelength selection of the laser may play an even more important role for laser hair removal in the setting of a melanin-rich skin surface.
Methods: The lasers that were included in the study were the 3 ms Alexandrite GentleLase Plus and the 3 ms GentleYag- both relatively long pulsed and manufactured by the Candela Laser Corporation. Both were equipped with a Dynamic Cooling Device (DCD) that was used for all treatments. Energy fluence for clearing of hair, subjective parameters, and the timing of hair regrowth if any, was compared. A conventional flexible laser delivery system was used for the GentleLase Plus. For the GentleYag, an armored high efficiency fiber was used.
Results: The GentLase was more effective than the GentleYag for removal of hair that was not very dark in color. On the other hand, the GentleYag was relatively blind toward recent tanning and/ or very dark skin types. Higher fluences could be used without concern for blistering or secondary scarring, hypo-pigmentation or hyper-pigmentation using the GentleYag.

Conclusion: While the GentleLase was quite useful for darker skin types, we would not suggest it for first-line treatment of individuals with a recent suntan or sunburn. The GentleYag was superior for laser hair removal in individuals who would be classified as Fitzpatrick type 4, 5, and 6, and in those people who had recently tanned.

263

TREATMENT OF CHRONIC PLAQUE PSORIASIS WITH THE PULSED DYE LASER

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Pulsed dye lasers have been shown to improve psoriatic plaque in previously reported studies. In this study, the Candela Clearbeam^{TM} 585 nm pulsed dye laser (PDL) is evaluated to determine the number of treatments required for complete clearance of plaque, and whether the use of dynamic cooling reduces the incidence of epidermal injury with PDL treatment. Twenty subjects with mild to moderate chronic psoriasis with at least 4 discrete stable plaques received up to 5 treatments with the PDL, at 3 week intervals. One plaque remained untreated as a control. A second control plaque received cooling alone (no PDL treatment). Half of the remaining plaques were treated with the PDL with dynamic cooling, and the other half were treated with the PDL alone. Treated and control plaques were assessed using standard psoriasis severity scores at each visit prior to retreatment. Any evidence of epidermal injury including pigmentary and texture changes were noted. For all treatment plaques with and without cooling, the number of treatments required for clearance was determined. Subjects returned for continued assessment at followup visits 3 weeks after the last treatment.
The number of treatments required for clearance and the incidence of epidermal injury are assessed for plaques with and without dynamic cooling.

264

EVALUATION OF THE LONG-PULSED PULSED DYE LASER FOR THE TREATMENT OF PERIORBITAL RHYTIDES

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Purpose: To evaluate the efficacy of long-pulsed pulsed dye laser (Cynosure, Inc) to treat sun-induced rhytides involving the periorbital area.
Methods: Twenty-one patients with sun-induced rhytides received a single laser treatment using a long-pulsed pulsed dye laser to the periorbital area. Two laser settings were evaluated: the right side was treated with 10 mm spot size, 40 millisecond pulse duration and 4 J/cm^2; the left side was treated with 10 mm spot size, 40 millisecond pulse duration and 7 J/cm^2.
Pre-treatment biopsies and photographs were compared with 3-month follow up biopsies and photographs. Due to the encouraging biopsy results, 19 patients agreed to receive four additional laser treatments with follow up biopsies and photographs.
Results: Initial H&E obtained 3 months after a single laser treatment demonstrated an increase in collagen deposition in the papillary dermis. Initial clinical photographs did not reveal any clinically significant improvement in rhytides. Additional laser treatments were given to the area and follow up H&E was obtained. Clinical photographs as well as H&E showed signs of improvement. There was no significant difference noted between the 2 treatment parameters.
Conclusions: The long-pulsed pulsed dye laser is effective for the non-ablative treatment of rhytides.

265

LASER HAIR REMOVAL: RESULTS OF 2-WEEK VERSUS 6-WEEK TREATMENT INTERVALS

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Purpose: To determine efficacy of 2-week versus 6-week treatment intervals for laser removal of axillary hair.
Methods: Sixteen patients received 5 treatments at 2-week intervals to the right axilla and 5 treatments at 6-week intervals to the left axilla using the Cynosure Apogee laser system. Each treatment was done using a single pass of the Cynosure Apogee Laser with the following parameters: 16 mm spot size, 755 nm wavelength, 20 millisecond pulse duration and 20 J/cm^2. Results were evaluated 1 year following the last laser treatment using before and after photographs for computerized hair counts.
Results: One-year follow up photographs demonstrate the average hair reduction at 2-weeks of 57%. While 6-week treatment intervals demonstrate and average of 81% reduction.
Conclusions: Treatment intervals strongly effect the efficacy of hair removal results. For this study, 6-week treatment intervals provided better efficacy than the 2-week intervals.

266

COMPARATIVE STUDY OF ROUND (5 mm) VS. ELLIPTICAL (5.5 × 3 mm) PULSED DYE LASER SPOT SIZE FOR TREATMENT OF LINEAR FACIAL TELANGIECTASIAS

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The pulsed dye laser has long been known to be an effective treatment for facial telangiectasias. The major side effect of the pulsed dye laser reported is subsequent purpura.
We compared the efficacy and side effect profile of two different pulsed dye laser spot sizes, a 5.5 × 3 mm elliptical spot and a 5 mm round spot, with all other parameters being identical.
Fourteen patients (12 female, 2 male) ages 18–85 years with Fitzpatrick skin types I–IV were enrolled in the study. All patients had linear, red facial telangiectasias. Three similar vessels in an anatomic area were chosen and randomly assigned to be treated with the round spot, the elliptical spot, or left as a control. A Cynosure pulsed dye laser at 450 sec and 5.5 J/cm^2 was used to treat both vessels. The patients were followed for two months with evaluations and photographs at the time of treatment, at three days, when each line of purpura disappeared, and after two months to assess final vessel clearance. The patient rated the amount of pain associated with each spot on a visual analog scale from 0–4. The patient and a blinded observer rated the amount of purpura at three days on a visual analog scale from 0 to 4 (nothing to deep purple bruises). The extent of vessel clearance was rated by the patient and blind observer on a scale from I (0–25%) to IV (75–100%) remaining. Patients were assessed

for adverse effects such as scarring, hypopigmentation, or hyperpigmentation.
The elliptical spot seemed to be superior to the round spot in terms of resulting in less pain, less purpura, and faster clearance. Both spot types resulted in equivalent level of clearance. No long-term complications were observed with either spot.
Elliptical and round spot resulted in equivalent clearance of linear facial telangiectasias. However, the elliptical spot appears to induce less of a side effect profile: less pain, less purpura, and faster disappearance of purpura.

267

BOTOX-A GIVES ADJUNCTIVE BENEFIT TO PERIORBITAL LASER RESURFACING

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Purpose: Periorbital aging and lines are a result of intrinsic skin aging, ultraviolet damage, and repetitive action of periorbital muscles. Rejuvenation of this area should therefore be optimized by combining treatments that approach the different causative factors.
Results: We have concluded a bilateral study comparing effects of Botox-A versus saline placebo injections to the periorbital areas before and following Erbium-YAG laser resurfacing of the areas in 33 patients. The results demonstrated that the Botox-A treated side with laser resurfacing improved more significantly than the contralateral saline with laser treated area in diminishing periorbital rhytides as well as textural, pigmentation, and other features of periorbital skin aging.
Conclusion: This study illustrates the benefits of a combined approach to treating periorbital skin aging.

268

LASER TREATMENT OF KELOIDS AND HYPERTROPHIC SCARS: HISTOLOGICAL EVALUATIONS

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Keloids and hypertrophic scars develop as a result of abnormal proliferation of dermal tissue following skin injury in predisposed individuals. Histologically, these lesions are composed of excessive collagen with an abnormally large number of partially or totally occluded microvessels. Laser therapy, the most promising therapeutic management of keloids and hypertrophic scars, is used since years with very encouraging results. Despite increasing knowledge of laser interaction with biological tissue, the reasons for the obtained results are still unclear. Our study is focused on histological observation of collagen fiber arrangement in treated and untreated lesions. 32 patients with 21 keloids and 11 hypertrophic scars were enrolled in this study. Five treatment, every six weeks, were performed on each patient using 532 nm QS Nd:YAG laser working in pulse mode. Laser was applied with a 3mm spot, using fluences of 1.8–2.2 J/cm^2 and pulse repetition of 10 Hz. Biopsies were taken prior to treatment and 2months after last treatment. Laser therapy effectiveness was determined by clinical evaluation, photographic analysis and histological observation. All hypertrophic scars showed an improvement greater than 50% and 6 of 11 showed complete healing. Among the 21 keloids only two were refractory to the treatment; all the other lesions demonstrated at least a 50% reduction. Side effects were limited to mild transient erythema. Surprisingly, histological examination of treated lesions revealed classical features of normal tissue, i.e., in addition to expected cutaneous microvessel collapse, a regular arrangement of collagen fibers is present. Figure reports two slides of a treated and untreated keloid. Work is in progress to explore the capability of the coherent electric field of the laser to orient in a preferential direction the collagen fibers.

272

LASER-TATTOO REMOVAL—COMPARISON OF CLEARANCE RATES OF NEW VS. OLD TATTOOS

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Purpose: Removal of undesirable tattoos is possible with a variety of lasers. This study evaluated the clearance rate of professional tattoos with respect to the age of the tattoo. Histologic and objective correlation was obtained.
Method: 4 patients with professional tattoos ranging in age between 2 months to 30 years old were treated with the Q-switched ruby laser (694 nm, 6.5 mm spot, 3.5–7.0 J). Each area received 3 treatments at 4–6 week intervals with a final evaluation at least 1 month after the last treatment. Evaluations consisted of clinical photographs, and patient and clinician assessment at each visit. High frequency ultrasound (Longport) studies and histological specimens were also obtained.
Results: Older tattoos demonstrated a greater clearance rate when compared to newer tattoos. Good clinical histological correlation was observed in the treated areas. None of the patients experienced scarring or pigmentary changes during the treatments.
Conclusion: Laser Tattoo removal results in a faster clearance rate for older, dark tattoos compared to newer tattoos.

275

LASER-ETCHED CONDITIONING OF DENTAL HARD TISSUES USING THE Er:YAG LASER AND THE CO_2 LASER

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The objective from our research was to evaluate the dental hard tissues surfaces conditioned by laser-etching using the Er:YAG laser and the 9.6 μm emitting CO_2 laser prototype of Esc-Sharplan, and compare with the conventional method of acid-etching. A total of 150 bovine maxillary incisor teeth were chosen. They were all free of hypoplastic areas, cracks or gross irregularities in enamel structure. These teeth were cleaned, have the crowns separated from roots and divided into 6 groups. Three of them, each one containing 25 teeth, were polished up to the dentin surface, and in the other three ones, the enamel was kept. In group 1 (enamel) and group 2 (dentin), we used the Er:YAG laser of KAVO (80 mJ, 2 Hz of repetition rate, 1 min of exposure time, 3 mm of spot diameter, 28.3 J/cm^2), in the group 3 (enamel-control) and group 4 (dentin-control), we used the conditioning method prescribed for the Z-100 resin ("3M"), and in

the last two groups (5 and 6, enamel and dentin, respectively), we used the CO_2 laser prototype (3 W, 4 s of exposure time, 300 μm of spot diameter, 212.2 J/cm^2). The tensile strength of the resin was conducted in the Instron Machine and the results of the lased areas were compared with the acid-etched areas. All of these results were statistically analyzed using the ANOVA method and SEM was also performed in order to compare the surface morphological alterations before and after laser irradiation. Our results showed that the Er;YAG laser produced a better.

276

TOLERANCE OF HIGH FLUENCE PULSED DYE LASER TREATMENT BY NEWBORNS

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Purpose: Enhanced technologies allow the use of higher fluences to improve efficacy in treatment of vascular lesions using pulsed dye lasers. The objective of this study is to determine the tolerance of these higher fluences in newborns.
Methods: In this prospective study, 86 subjects with facial port wine stains excluding eyelids were enrolled. First laser treatments were given before age of one year. Treatments employed the Vbeam, Sclero Plus, and Sclero Plus HP lasers (Candela Corporation), using parameters of 1.5 ms pulse duration and 595 nm, with a 7 mm spot handpiece. Fluences ranged from 10 to 15 J/cm^2. Most subjects were treated with 10 to 12 J/cm^2, to avoid crusting. Dynamic cooling was used in conjunction with all laser treatments.
Results: All subjects responded to treatment with purpura lasting 1 to 2 weeks. Four of 86 had transient hypopigmentation, and none had hyperpigmentation. Approximately 20% of subjects treated with 12 J/cm^2 or more had crusting, while only 5% treated with lower fluences had crusting No scarring or atrophy was seen.
Conclusions: High fluence pulsed dye laser treatment with dynamic cooling is safe for the treatment of newborns with portwine stains on the face.

277

TREATMENT OF RADIODERMATITIS WITH PULSED DYE LASERS

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Purpose: Radiodermatitis is an underestimated side effect of radiation therapy for cancer, characterized by telangiectasias and atrophy of the skin. The objective of this study is to test the efficacy of pulsed dye laser treatment of this condition.
Methods: 102 women with a total of 142 lesions were enrolled in this study. The topography was presternal in 71%. Three of the 102 subjects were lost to followup, one because of recurrence of cancer. Subjects were treated with the SPTL-1a, ScleroPlus, and Vbeam lasers (Candela Corporation). Short pulse durations (6 ms or less) were used. The number of treatments required to achieve 90% clearance of the telangiectasia was determined.
Results: The number of lesions responding with 90% clearance were as follows: 19 with 1 treatment, 72 with 2 treatments, 40 with 3 treatments, 5 with 4 treatments, and 2 with 2 treatments. After laser treatment all lesions were purpuric, 8% had transient hyperpigmentation, 16% had superficial scabs, and none had scarring. Atrophy appeared to be reduced after treatment, with a reduction in the tendency to present superficial scabs or crusts.
Conclusions: Pulsed dye laser treatment is safe and highly effective for treatment of radiodermatitis. Most lesions respond with 2 to 3 treatments. Subjects report a high degree of satisfaction with this treatment.

278

RANDOMIZED CONTROLLED TRIAL OF SELF ESTEEM AND LASER DEPILATION

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Purpose: To develop a randomised controlled methodology to evaluate emotional well being during laser depilation in women with Poly Cystic Ovary Syndrome and unwanted facial hair.
Methods: Suitable subjects were recruited from endocrinology outpatients using clear selection criteria. After consent patients were randomised to receive six months sham treatments or six months conventional treatment using a long pulsed Alexandrite laser. The assessor and patient were blind to the allocation. Questionnaires were administered at the start of the trial, at 3 months and at 6 months. The questionnaire consisted of some validated instruments, WHOQ01-Bref, Hospital Anxiety and Depression Score, Rosenberg Self-Esteem Scale and the Cronin PCOS Quality of Life Questionnaire, together with study specific items derived from pilot interviews with patients. The power calculation was based on the self esteem item in the Cronin PCOS questionnaire.
Results: Eighty patients were recruited to the trial. Results were analysed on an intention to treat basis, so that withdrawals were included and reasons noted. Good response rates were achieved to the questionnaires. Randomising the allocation avoided selection bias. Concealing the allocation avoided recruitment bias. Blinding the assessors avoided assessment bias.
Conclusions: A randomised controlled design helps to avoid the biases inherent in observational and descriptive studies. This methodology can be successfully applied in laser medicine.

279

TREATMENT OF ADENOMAS OF PRINGLE IN BOURNEVILLE SYNDROME WITH A 532 nm QS Nd:YAG LASER

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Purpose: To evaluate the safety and the efficacy of a 532 nm QS Nd:YAG laser in the treatment of cutaneous symptoms of Bourneville Syndrome.
Methods: Bourneville Syndrome is a genetic disease characterized by the association of cerebral damage responsible for epilepsy, mental retard and cutaneous lesions that affect the skin, especially of the face. These are little yellowish nodules of fibrovascular nature located on the nose, chin and cheeks. The incidence of the disease is 0,3 on 1000 children born alive. Four patients were treated with a 532 nm QS Nd:YAG laser with a 3 mm spot, pulse frequency of 5 Hz, pulse width of 6 ns and fluences of 1,8–2,6 J/cm^2. Laser therapy effectiveness was determined by clinical evaluation, photographic and spectrophotometric analysis. To improve aesthetic results, each patient received one treatment of laser resurfacing with a 532 nm QS Nd:YAG laser used with 6 mm spot, pulse frequency of 10 Hz, pulse width of 6 ns and fluences of 0,55–0,70 J/cm^2.
Results: All patients have shown a remarkable aesthetic improvement. Each subject noted a subjective improvement of cutaneous lesions. Objectively, all patients demonstrated at least a 60% reduction of yellowish nodules. In addiction, neither scarring, nor pigmented changes were noted

in any of the subjects; only a post-operative blushing and erythema were observed for all patients and were short-lived.
Conclusions: 532 nm QS Nd:YAG laser is an effective and safe treatment for cutaneous manifestations of Bourneville Syndrome, without epidermal injury. This is the first report of the description and treatment of this kind of disorder.

280

PIGMENT-CONTROL THERAPY OF MELASMA FOR ASIAN SKIN

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We invented a protocol of combined method of treatment and suppressive control of pigmentation of melasma together with Intense Pulsed Light (IPL) and topical therapy for Asian skin.
We treated 46 female Melasma patients with skin type III to V We used IPL with 640 nm filter integrated contact cooling system with three to four weeks intervals associated with topical therapy between each visits. The parameter was 4.0/6.0, delay time 20 ms, $23 \sim 26$ J/cm^2. Digital photographs and spectro-colorimeteric measurements were taken before every procedure for objective measurements. Ointment containing 5% hydroquinone, 0.1% retinoic acid and 0.1% dexamethasone was prescribed to all cases for application every night and no other medication was used. Patients were also indicated to apply sunscreen cream when they go outside. Micro crusts appeared on every melasma lesions which self-exfoliated in one week after the IPL applications and then the lesions became lighter in color for approximately two weeks and then started to show recurrence. So topical ointment in order to control melanin was applied. The treatments for four times on average were effective for 42 cases in which both subjective and objective significant improvement was seen. The treatment continued to be more topical therapy dependent while IPL was applied less frequently. IPL application was still effective for partial recurrence. Four cases resulted in showing only a slight improvement.
Although laser treatment had been regarded as contraindication for melasma, Our carefully designed protocol and application of therapy to avoid post inflammatory hyperpigmentation together with IPL and ointments proved to be an useful tool for the treatment of Asian melasma for more prompt improvement of pigmentation compared to topical therapy alone.

281

COMPARING 18 mm VS. 12 mm SPOT SIZE IN HAIR REMOVAL USING A GENTLELASE 755 nm ALEXANDRITE LASER

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Purpose: The purpose of this study is to compare the efficacy of an 18 mm vs 12 mm spot size in hair removal using a Gentlelase Alexandrite laser from Candela Corporation (Boston, MA).
Methods: Seventeen females (age ranging 18–25) with skin types I-IV were enrolled. Each axilla was marked by a 2×2 cm square template. Three sites were selected and randomized: 1) control, 2) 18 mm spot size, 3) 12 mm spot size. These sites were treated with respective spot size, or left untreated as control. The fluence was 16 J/cm^2 and cooling spray time was 60 ms. Patients were treated three times at 6-week intervals and followed post-treatment for 6 months. Photographs were obtained at each visit and analyzed for hair counts by a blinded observer.
Results: Major hair reduction was observed at both treated sites as compared to the control. Significant difference was observed between the treated sites, favoring the 18 mm spot size. No side effects were observed.
Conclusion: 18 mm and 12 mm spot size are both safe and effective in causing significant hair reduction. Our results seem to indicate that a larger spot size is more efficacious.

282

ULTRASTRUCTURAL CHANGES ELICITED BY A NON-ABLATIVE WRINKLE REDUCTION LASER (N-LITE)

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Purpose: Recently, the non-ablative wrinkle reduction laser (N-Lite, ICN Photonics, UK) was developed. In this study, we have investigated ultrastructural changes elicited by N-Lite laser exposure.
Methods: 8 adult volunteers were recruited for this study. They were treated with the N-Lite laser and a single 3-mm punch skin biopsy was obtained immediately after the irradiation, as well as 3 hours, 3 days, 3 weeks and 3 months later. These specimens were examined under an electron microscope.
Results: Capillary endothelial cells showed marked edema and inflamed mast cells were observed at acute phase. 3 days after the laser therapy, elaunin fibres were also observed. Until 3 months later, ultrastructural collagen replenishment was observed.
Conclusion: In acute phase, N-Lite laser irradiation leads to marked edema of endothelial cells and dermal connective tissue, although endothelial cell necrosis was not observed. Ultrastructural new collagen formation begins from 3 days after the laser therapy.

283

LASER HAIR REMOVAL WITH MEDIOSTAR DIODE LASER

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The purpose of the study is to evaluate the efficacy and safety of the MeDioStar diode laser for hair removal.
Twenty patients were enrolled. All had unwanted hair of brown or black color. Skin types ranged from I-IV. Body location included axillae, beard, chin, neck, and legs. Exclusion criteria included: white, gray, blonde, or red hair, skin type V or VI, tan skin, history of keloid formation, history of plucking within the last 6 weeks, and history of endocrine disorder. A hair count within a 1.5×1.5 cm area was performed prior to each treatment session. Photographs were taken of the treatment area. The hair was shaved prior to treatment. Treatment was given with the MeDioStar laser using the contact cooling handpiece (810 nm, 12 mm spot, pulse duration 100–140 ms, fluence up to 44 J/cm^2). The highest tolerated fluence that produced the endpoint of erythema and perifollicular edema was used. Treatment was given with one pass and minimal overlap. Patients rated pain during treatment on a scale of 1–10. Patients returned for two additional treatment sessions approximately six weeks apart using the same protocol as above. Treated areas were examined for any side effects, including erythema, hyperpigmentation, hypopigmentation, and scarring. Patients returned for follow-up 6 weeks, 3 months, 6 months, and 12 months after their final treatment session. Photographs and hair counts were performed at each follow-up visit. Patients and investigators independently rated results on a scale of 0 (no change), 1 (up to 25% hair

reduction), 2 (26–50% reduction), 3 (51–75% reduction), and 4 (76–100% reduction).
The results showed that the MeDioStar diode laser achieved long-lasting hair reduction in most patients after three treatment sessions. Hair of thicker caliber responded most readily. Pain during treatment was greater in patients with darker hair, denser hair, and hair of thicker caliber. There were no cases of hyperpigmentation, hypopigmentation, persistent erythema, or scarring.
In conclusion, the MeDioStar diode laser is safe and effective in treating brown or black hair in skin types I-IV.

284

COPPER BROMIDE LASER FOR FACIAL TELANGIECTASIA: A REEVALUATION

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Purpose: The purpose is to evaluate the efficacy and safety of the Copper Bromide laser for facial telangiectasia and to develop baseline dose-response data related to the size and location of vessels. Although the Copper Bromide laser has some ideal characteristics for treating telangiectasias, only a few studies have looked at the results on a prospective or retrospective basis.
Methods: Nineteen patients with telangiectasia of the face and nose were treated using the yellow (578 nanometer) wavelength and a 0.6-millimeter spot size. The pulse duration was selected to achieve an average fluence of 22 to 23 Joules per centimeter squared, with a 200-millisecond interval. Treatment was accomplished by tracing the beam along each vessel. A total of thirty-three sites were treated. The response was evaluated after a minimum of four weeks had elapsed. Results were graded by quartile percent improvement using before and after photographs, patient assessment, and noting any pigmentary change or scarring.
Results: Response was recorded as percent of improvement based on vessel size and location. Overall improvement of cheeks/chin after one treatment was 83 percent. Overall improvement of nose after one treatment was 54 percent. Overall patient satisfaction was good to excellent. No incidence of pigmentary changes or scarring was seen.
Conclusion: This study supports the Copper Bromide Laser as a safe and effective treatment for facial telangiectasia and gives baseline data from which further dose and treatment parameters can be expanded.

285

EX VIVO DIAGNOSIS OF BREAST CANCER USING FLUORESCENCE AND REFLECTANCE SPECTROSCOPY

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This study examines the biological basis and efficacy of fluorescence and reflectance spectroscopy for diagnosis of breast cancer. Diffuse reflectance spectra and fluorescence emission spectra at multiple excitation wavelengths were taken from tissue samples obtained from breast cancer and breast reduction surgeries. Measurements were taken using a fiber-optic probe, placed directly on the exposed surface of the tissue samples. Histopathology was then taken on the area of tissue beneath the probe to serve as the gold standard for classification purposes. This work is preliminary and ongoing, but distinct differences have been noted in the spectra of cancerous and non-cancerous tissue. Notably, the fluorescence peak corresponding to collagen has consistently shown increased signal intensity in cancerous tissue. This may be due to the increased density of collagen often seen in breast cancer.
The fluorescence properties of breast cells are also being characterized in order to understand the biological basis of any differences seen in the normal and cancerous breast tissue. Normal and cancerous breast cell cultures were suspended and their fluorescence properties characterized at the same excitation and emission wavelengths as in the tissue study. It was found that differences in fluorescence intensity between cancerous and normal cells exist for all fluorophores examined and that these differences are dependent on cell concentration. Normal cells appear to exhibit greater fluorescence per cell at all fluorescence peaks and reach peak intensity at a lower cell concentration before turbidity begins to decrease the signal, suggesting perhaps a decrease in scattering in the cancerous cells. Either of these properties could be exploited in developing a clinically useful *in vivo* diagnostic tool.

286

NONABLATIVE TREATMENT OF FINE WRINKLES, SKIN LAXITY, TELANGIECTASIA AND UNEVEN SKIN PIGMENTATION OF THE FACE USING A 532 nm DIODE LASER

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Purpose: To investigate whether treatment with a 532 nm diode laser with scanning could result in improvement in fine wrinkles, skin laxity, telangiectasia and uneven skin pigmentation without adverse effects requiring the patient to miss work or social obligations.
Methods: A series of 25 patients underwent biweekly full face treatments with the DioLite^{TM} 532, 532 nm laser system for the treatment of mild to moderate rhytides, skin laxity, telangiectasia and uneven skin pigmentation. Patients with skin types I-IV were included in the study. Photographic, clinical evaluation, patient evaluation and patient satisfaction scores were obtained at regular intervals.
Results: Subjects reported mild to moderate improvement in wrinkles and textural improvement, with excellent improvement in clearance of vascular and pigmented irregularities. Adverse effects were minimal and transient and patient satisfaction was high.
Conclusion: The 532 nm diode laser is a safe and effective method for treating fine wrinkles, skin laxity, telangiectasia and uneven skin pigmentation without epidermal injury resulting in missed work or social commitments.

287

PHOTOEPILATION WITH THE NEW PULSED DIODE APEX 800 LASER SYSTEM WITH SUBZERO CONTACT COOLING

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Purpose: To investigate the efficacy and safety of a new pulsed diode laser system with subzero contact cooling for photo epilation.

Methods: A new hair removal laser system combines 800 nm wavelength, long—up to 100 ms pulse duration and cooling down to $-2^{\circ}C$ to provide effective hair removal on a wide range of skin types. Subzero cooling and long pulse durations should permit higher fluences and result in effective hair loss and prolonged growth delay. 20 patients skin type I-V received a single and three laser treatments at each of 2 test sites. The ColdTip subzero contact cooling hand piece was used on all patients. A cooling temperature of $-2^{\circ}C$ was selected. For skin types I-III, the maximum energy density tolerable and the shortest pulse duration available was selected. For skin type IV a minimum of 40 ms was selected. For skin type V, 60 ms was selected. Patients were followed for eight months. Subjects were evaluated for hair removal efficiency after one vs. three treatments as well as the complication rate.
Results: All subjects reported subjective decrease in the quantity of hair without significant adverse effects. Clinical hair counts and photographs confirmed these findings.
Conclusion: The clinical results show that subzero cooling permits effective and safe hair removal on a wide range of skin types.

288

CURRENT THERAPEUTIC OPTIONS FOR PSEUDOFOLLICULITIS BARBAE

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Our purpose is to educate and enlighten participants about effective treatment options for Pseudofolliculitis Barbae (PFB). Hair removal techniques (the Bumpfighter razor, single to triple blade razors, depilatories, etc.), medications in varying combinations (antibiotics, corticosteroids, tazarotene, alpha and beta hydroxy acids, retinoids, bleaching agents, and eflornithine decarboxylase) and surgical procedures (chemical peels, light cryosurgery and laser therapy) have been used to prevent PFB and treat the inflammation, hyperpigmentation, and hyperkeratosis that occur. Our results are presented in a poster with photographic evidence that patients respond well to the Bumpfighter razor, topical monotherapy with Tazarotene, monotherapy with the Lumenis Lightsheer Extended Pulse Width Diode Laser, and combination therapy with the Lumenis Laser and hydroquinone and keratin-reducing agents.

289

FPDL-TREATMENT OF PWS—BETTER RESULTS IN YOUNG CHILDREN

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During the last meeting in New Orleans a question arised, about the influence of age on treatment results in FPDL-treatment of PWS. Our data and results of other European centers strongly encourage an early onset of therapy.
489 Patients were treated during a period of 4 years in our clinic. 3034 treatments were performed. We have treated 32 patients below 1 year of age, 47 between 1 and 4 years, 73 patients were between 4 and 7 years old, 120 patients between 8 and 17 and 217 patients were 18 years or older at the start of the therapy.
Besides a lower number of therapies was necessary, the results were best in the groups of less than 3 years of age. About 90% of patients left with a good or excellent result while in the adult group (over 18 years of age) good and excellent results could only be achieved in 60%.
As FPDL-treatment in childhood often requires general anesthesia (predominant region: face, safety measures) the start of the therapy should only be limited by anesthesiological risks. In otherwise healthy children we suggest to start the therapy after the first year.
Keywords: Port Wine Stains, Laser, Children, Toddlers

290

CLINICAL EFFICACY OF DEPILASE TWIN LASE LONG-PULSED Nd:YAG AND ALEXANDRITE LASER FOR PERMANENT HAIR REMOVAL IN ALL FITZPATRICK SKIN TYPES

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Purpose: It is still controversial which is the ideal wavelength to be utilised to archive permanent hair reduction. Recent clinical data have suggested the use of shorter visible wavelengths for lighter hair color and skin types and longer mid-infrared wavelengths for the treatment of darker hair and skin types. The objective of this study was to evaluate the clinical efficacy and safety of the new Depilase Twin Lase, a laser system tha has selectable wavelengths of 1064 nm and 755 nm, an adjustable spot size (8 to 12 mm), pulse durations (3 to 50 ms, Alexandrite and 3 to 100 ms, Nd:YAG) and fluence (10 to 100 J/cm^2).
Methods: A cycle of three sessions of laser treatment with the new Depilase Twin Lase laser system (Depilase Twin Lase Laser System, Depilase Group Ltd, London, UK) were delivered on a monthly basis to a series of patients of Fitzpatrick skin type I-III utilising the 755 nm wavelength and to a series of patients of Fitzpatrick skin type IV-VI utilising the 1064 wavelength. A beam of chilled air (3–5°C, Depilase skin cooling system) was delivered on the area of treatment before, during and after the laser pulse. Follow-up photographs, clinical evaluation and hair counts were conducted at each treatment visit and at 1, 3, and 6 months following the third treatment.
Results: Laser-induced hair reduction was significant and prolonged in all patients and treatment areas. Side effects were limited to mild treatment discomfort and transient erythema.
Conclusions: The *Depilase Twin Lase* laser System is a safe and effective treatment for long-term hair removal in all skin types. Utilising the visible 755 nm wavelength (Alexandrite) for skin type I to III and the mid- infrared 1064 nm wavelength (Long Pulse Nd:YAG) for skin type IV to VI it is possible to archive permanent hair reduction on all Fitzpatrick skin types without complications.

291

CLINICAL EVALUATION OF DEPILASE LONG PULSE ND:YAG LASER IN THE TREATMENT OF FACIAL AND LOWER EXTREMITY TELEANGECTASIAS AND RETICULAR LEG VEINS

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Purpose: The objective of this study was to evaluate the clinical efficacy and safety of the new Depilase Long Pulse Nd:YAG laser (Depilase Yag Lase Plus Laser System) in the treatment of facial and lower extremity teleangectasias and reticular leg veins. The laser system has a wavelength of 1064 nm and an adjustable spot size (2 to 12 mm), pulse durations (3 to 100 ms) and fluence (20 to 500 J/cm^2).
Methods: A cycle of two sessions of laser treatment with the new Depilase Long Pulse Nd:YAG laser system (Depilase Yag Lase Plus, Depilase Group Ltd, London, UK) were delivered on a monthly basis to a series of patients of Fitzpatrick skin type I-V presenting facial and lower extremity teleangectasias and reticular leg veins. Non overlapping pulses were applied and a second pass was performed only if no clinical endpoint was seen. A beam of chilled air (3–5°C, Depilase skin cooling system) was delivered on the area of treatment before, during and after the laser pulse. Patients were follow-up at 1, 2 and 3 months after the final treatment session. Clearance was evaluated at 3 months after the last treatment by assigning a grade of none, moderate or significant clearance.
Results: All vessel sizes (0.25 mm to 4 mm) and all vessel colors were successfully treated. Significant cosmetic improvement was seen after each of the two treatment sessions. The most common immediate responses to the laser treatment included blanching, erythema, and edema. Side effect included mild treatment disconfort. Blistering and whitening were not observed.
Conclusion: The Depilase Yag Lase Plus Long Pulse Nd:YAG Laser System is a safe and very effective method of non invasive treatment of facial and lower extremity teleangectasias and reticular leg veins. For the treatment of small vessels a very small spot size and high energy might be required.

292

TREATMENT OF LEG TELANGIECTASIA WITH A 595 nm LPDL

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Purpose: To demonstrate the efficacy of a 595 nm LPDL for the treatment of leg telangiectasia measuring between 0.05 and 1.5 mm in diameter.
Methods: 40 female patients (mean age 35, skin types I-III) suffering from leg telangiectasia measuring between 0.05 and 1.5 mm in diameter were treated with a 595 nm LPDL laser (Candela Vbeam) at the following parameters: 6–20 ms pulse durations, 7 or 10 mm spot, 10–13 J/cm^2 and 6–7 J/cm^2 respectively, DCD setting of 30 ms spray, 10 ms delay. 1 to 7 treatments were performed at 3 week intervals Pre-treatment care involved the use of a vitamin K cream one week prior to treatment. Post-treatment, a cream containing hydroquinone and desferal was used.
Results were measured by patient and physician satisfaction scores (1 to 10) and before & after photographs.
Results: Optimal results were obtained after 1.97 ($\pm$ 0.7) sessions. 8% patients had total clearance, 19% patients had clearance between 70% and 99%, 40% of patients had clearance between 40% and 69%, and 33% patients had clearance below 40%. Side effects were as follows: 100% of patients had post-treatment purpura (lasting 7–10 days), 15% suffered from long-lasting hyperpigmentation (2+ months), 33% from short lasting hyperpigmentation (– 2 months). There was no incidence of hypopigmentation, matting, or scarring. 100% of patients felt mild pain.
Conclusions: The results of this study suggest that leg telangiectasia measuring between 0.05 and 1.5 mm diameter can be successfully treated with a 595 nm LPDL. The individual patient results suggest that optimal results are obtained on vessels measuring between 0.2 and 0.5 mm. This size vessel is also that which needs the least number of treatments to get total clearance.

293

TREATMENT OF LEG TELANGIECTASIA WITH A 1064 nm Nd:YAG LASER

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Purpose: To demonstrate the efficacy of a 1064 nm Nd:YAG laser for the treatment of leg telangiectasia measuring between 0.1 and 2.0 mm in diameter.
Methods: 45 female patients (mean age 40, skin types I-IV) suffering from leg telangiectasia measuring between 0.1 and 2.0 mm in diameter were treated with a 1064 nm Nd:YAG laser (Candela prototype) at the following parameters: 8 ms pulse durations, 8 mm spot, 65–70 J/cm^2, one to two passes consecutively, DCD setting of 40 ms spray, 20 ms delay. 1 to 5 treatments were performed at 4 to 8 week intervals
Pre-treatment care involved the use of Doppler measurements to exclude patients with venous insufficiency, and the use of a vitamin K cream one week prior to treatment. During the treatment, an icepack was placed on the treated vessel immediately after the laser pulse. Post-treatment, a cream containing hydroquinone and desferal was used.
Results were measured by patient and physician satisfaction scores (1 to 10) and before & after photographs.
Results: Optimal results were obtained after 1.8 ($\pm$ 0.7) sessions. 33% patients had total clearance, 45% patients had clearance between 70% and 99%, 15% of patients had clearance between 40% and 69%, and 7% patients had clearance below 40%. Side effects were as follows: 2.5% of patients suffered from hypopigmentation, 5% from long-lasting hyperpigmentation (2+ months), 18% from short lasting hyperpigmentation (–2 months), 5% from matting. 100% of patients felt moderate to severe pain. There was no incidence of scarring or purpura.
Conclusions: The results of this study suggest that leg telangiectasia measuring between 0.1 and 2.0 mm diameter can be successfully treated with a 1064 nm Nd:YAG. The individual patient results suggest that optimal results are obtained on vessels measuring between 0.5 and 1.5 mm.

294

MICROLASERBRASION: A NEW USE FOR YOUR ERBIUM LASER

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Light chemical peels or microdermabrasion have enjoyed recent popularity for treatment or mild photoaging. However, clinical efficacy for these modalities is extremely poor from both patients and physicians perspective. Er:YAG lasers have been effective in treating mild to moderate photoaging but need for either regional or general anesthesia as well as the significant recovery period has limited its use. We sought to utilize an Er:YAG laser with

topical anesthesia and low fluence to ascertain its efficacy in treating mild to moderate photoaging.
20 patients aged 32–75 with types 1–3 skin and mild to moderate rhytids were treated with a Sciton Contour Er:YAG laser set at ablation only, 12.5 J/cm^2, 50% overlap with the computer pattern generator. Topical anesthesia of Lidocaine and Prilocaine was used. External eye shields were placed and 1 pass was performed with feathering at the neck. Prophylactic antivirals and antibiotics were used in 12/20 patients. Post operative cleansing was instituted with application of petrolatum jelly for 2 days post procedure then skin cleansing with cetaphil was instituted. Two patients were treated a second time at 1 month. 15/20 patients were placed on OBAGI skin products at 1 week following procedure.
2 patients who did not receive antivirals developed minor herpes simplex infections that responded to oral valacyclovir. There were no bacterial infections or other wound healing complications. Most patients were completely healed with minor redness only at 3 days post procedure. 15/20 patients were started on OBAGI skin care regimen at 1 week post procedure and tolerated the regimen without problems. Results were judged to be excellent in thin skinned individuals and good in thicker skinned patients.
We concluded that one pass Er:YAG resurfacing under topical anesthesia is effective for treatment of mild to moderate photoaging.

295

USE OF A LONG—PULSE WIDTH 1064 nm LASER FOR NON-FACIAL NON-ABLATIVE RESURFACING

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Non-ablative resurfacing has become extremely popular for treatment of facial aging and loss of elasticity. However, the alternative ablative treatments such as carbon dioxide or erbium laser resurfacing, dermabrasion or chemical peels produce much more dramatic and quicker improvement. Non-facial areas with their paucity of skin appendages have proved difficult to enhance elasticity and appearance. We sought to test both histologically and clinically the degree of improvement in skin elasticity with a new long pulse 1064 laser.
The Sciton Profile 1064 long pulse laser with a contact cooling system and computerized pattern generator was utilized for this study. Two areas of in-situ abdominal skin of a 43 year old type 3 patient was treated 1 week and 1 hour prior to abdominoplasty with a 2×2 cm pattern, 50 msec of pulse duration and varying fluences from 50–90 J/cm^2. Pre, parallel and post cooling was provided with a sapphire contact tip set at -10 degrees centigrade with actual temperatures ranging from -4 to 0 degrees. The skin segments were excised, placed in formalin and read by 2 blinded dermatopathologists. and graded for degree of inflammation and depth of injury.
Results showed more inflammation in the 1 week specimen than the 1 hour specimen and more inflammation with increasing fluence.
10 patients were additionally treated at 60 J/cm^2 and 50 msec pulse duration with a 4×4 cm spot and chill tip set to -10 degrees centigrade. Areas of treatment included neck, upper arms and inner and outer thigh skin. 5 patients were treated 2–3 times and 5 patients treated once. Results were difficult to assess but most patients subjectively noticed some skin tightening. Photographic documentation was difficult to assess.
Conclusions were that non-facial non-ablative skin resurfacing with a long pulse 1064 laser with contact cooling appears promising but that further work is necessary prior to general use.

296

PATIENT SATISFACTION WITH LASER HAIR REMOVAL

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43 patients attending a laser hair removal clinic completed a questionnaire to determine their satisfaction with their treatment. The clinic offered Ruby or Alexandrite laser treatment for Fitzpatrick skin types I-III and Nd:YAG laser treatment for Fitzpatrick skin types IV-V. Frequency of hair removal before (and after) laser hair removal was: daily 30% (10%); up to weekly 38% (27%); up to monthly 22% (37%); greater than monthly 3% (25%). 61% of patients spent less time removing hair after laser treatment than before.
Satisfaction with laser treatment was recorded on a linear analogue scale (LAS) with 0 = not at all satisfied and 10 = extremely satisfied. 24 patients with Fitzpatrick skin types I-III scored a mean of 6.5, 74% scoring 6 or greater.
19 patients with skin types IV and V scored a mean of 5.5, 53% scoring 6 or greater (differences not significant).
Laser treatment compared favourably with electrolysis, mean LAS 8.6 (median 9.3) and waxing, mean LAS 7.7 (median 8.7) with 0 = laser treatment very much worse and 10 = laser treatment very much better. Patients were asked how likely they would be to recommend laser treatment to other patients with unwanted hair. 23 patients with skin types I-III scored a mean LAS of 8.2 (median 9.4) and 18 patients with skin types IV-V scored a mean LAS of 8.08 (median 9.1) where 0 = I would never recommend laser hair removal and 10 = I would always recommend it.
In conclusion patients attending for laser hair removal demonstrated a high degree of satisfaction with the treatment.

297

IMAGING TRANSVERSE FLOW VELOCITY USING SPECTRAL BANDWIDTH OF THE DOPPLER FREQUENCY SHIFT IN PHASE-RESOLVED OPTICAL DOPPLER TOMOGRAPHY

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The Doppler bandwidth extracted from the standard deviation of the frequency shift in phase-resolved optical Doppler tomography (ODT) is used to image the velocity component transverse to the probing beam. Using a simple geometric optics model, the linear dependence of the Doppler bandwidth on flow velocity is theoretically derived and it is found that the effective numerical aperture (NA) of the optical objective determines the slope of this

dependence. Above a certain threshold flow velocity, this linear relationship is in good agreement with experimental data. In the case where the angle between the probing beam and flow direction is within ± 15 degree to the perpendicular, the Doppler frequency shift is very sensitive to angle position while the Doppler bandwidth is insensitive to flow direction. Linear dependence of the flow velocity on the Doppler bandwidth allows accurate measurement of flow velocity without precise determination of flow direction. In addition, it also extends the dynamic range of phase-resolved ODT.

298

IRRADIATION MODEL FOR LASERINDUCED THERMO-THERAPY OF LIVER TUMORS—EX-VIVO EVALUATION

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Introduction: Treating liver tumors by in situ ablation techniques like laser-induced thermotherapy (LITT) creates thermal lesions with complex geometry. The fact that they cannot be predicted or monitored on-line increases the risk of local recurrence. The aim of this study was to develop a computer-aided 3-D irradiation model for predicting the LITT volume and to evaluate it in porcine liver ex vivo.
Material/Methods: Light and heat distribution in tissue was calculated by a Monte Carlo simulation. We first established a tissue database from optical parameters (human/animal/healthy/tumorous, n = 120 samples). LITT parameters (30 W, 15 min) were defined for the computer-model and a 3-D image of the coagulation volume was created. The simulation results ($Long_{Sim}$, $Trans_{Sim}$, Vol_{Sim}) were correlated to those in vivo. The livers (porcine liver, 3–4 kg, n = 15, 25°C) were treated using a Nd:YAG-laser system and a diffuser fiber tip. After LITT the lesion were measured and the volumes (Vol_{LITT}) were calculated.
Results: Simulating the coagulation volume required 28.5 (23–27) minutes. The deviation in the diameter between the simulation and in vivo data was a maximum of $5.1\% \pm 0.3$ ($Long_{Sim}$), $6.6\% \pm 0.3$ ($Trans_{Sim}$) and $15.6\% \pm (Vol_{Sim})$, corresponding to 0.2 cm, 0.3 cm and 0.7 cm.
Conclusions:

1. The developed 3-D irradiation model showed very good agreement between simulated and ex vivo data with prediction of the coagulation volume in LITT under ex-vivo conditions.
2. Due to the tridimensionality of the model, it is now possible for the first time to make a statement about the expected lesion geometry and the application parameters required for reliable tumor destruction during interstitial in situ ablation procedures.

299

CAN PATIENTS TREAT THEMSELVES WITH HAIR REMOVAL DEVICE?

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This study was designed to evaluate the safety and efficacy of patients treating themselves without the assistance of a physician using a low energy light and heat based system for hair removal. Forty-seven patients, both male and female, between the ages of 19 and 53 with skin types I through IV were enrolled in the study. Subjects chose a treatment site and the area was mapped and photographed for hair count. Brief instructions were given to the subjects. The instructions on self-treatment were reinforced by a short video presentation. A test area was located and treated by the physician to determine the optimal treatment fluence. This fluence was given to the patient. Without further instructions, the patient went into a private room and administered the treatment to themselves with the Spa Touch device by Radiancy. This small ($16 \times 12 \times 7$ inches, 12 lb) system emits light between the wavelengths of 400 and 1200 nm with a 35 msec pulse width. It has a spot size of 22×56 mm and delivers up to 7.5 J/cm^2.
The treatment site was evaluated by the investigators for side and adverse effects. Subjects returned one month later for follow up evaluation, hair count, and re-treatment of the site. This treatment was again performed by the patient without the assistance of the investigators. The site was photographed for hair counts and monitored for side and adverse effects at one month and two months following the second treatment.
Results showed a 62.5% clearing one-month following the second treatment. 17% of patients were noted to have some degree of erythema, hyper or hypopigmentation.

300

CLINICAL AND MORPHOLOGIC EVALUATION OF Er:YAG LASER ACTION AT THE FRONT OF CERVICAL DENTINAL HYPERSENSIVITY

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This work was achieved *in vivo* and *in vitro* to avaliate the efficiency of Er:YAG laser In the cervical dentinal hypersensivity treatment (HSDC). The clinical study was achieved in patients with HSDC. Ethical approval was granted by the University of São Paulo, Dentistry School's Research Ethics Committee. The treatment was performed in five sessions: The first for selection, the second for exams (clinic and X-Ray) and trying to remove the etiologic factors that could provoque the HSDC. The third and fourth sessions were subjected to the radiation with that protocol: 60 mJ energy, 2 Hz frequency, 6 mm out of focus, under air cooling, 20 seconds each application which the same was repeated four times with one minute breaks, which scanning moviments and without using anaesthetics. The fifth was avaliation. The patients were avaliated and registred in a subject scale of pain 0 to 3, in the begining and end of each session of irradiation, and one month after the last session. The results showed that for the irradiated group occurs significant differences in the begining of each session and between. For the control group didn't occurs significant differences in the begining and after each session, but did show a difference between the sessions. As the control group as the irradiated group, had reduction of sensibility between the session. For the morphologic study nine teeth were selected, 7 molars and 2 pre-molars from operative dentistry discipline. Half of the surface was irradiated with Er:YAG laser, the same protocol used *in vivo,* and the other half were used as a control without receiving any laser irradiation. Subsequently, specimens were prepared for SEM examinations. The results showed that

laser treated surfaces showed a reduction of dentine tubular diameter with partial or total closure of the dentine tubules. For the control group, it was observed bigger amounts smear layer and open dentine tubular. The results obtained indicated that the Er:YAG laser can to contribute to the HSDC treatment.

301

A COMPARATIVE STUDY OF THE EFFECT OF LOW LASER RADIATION ON MAST CELLS IN INFLAMMATORY FIBROUS HYPERPLASIA COLORED AND NOT COLORED BY THE TOLUIDINE BLUE

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This study shows a comparative analysis of the effects of the laser radiation in low intensity on the mast cell degranulation in inflammatory fibrous hyperplasia when they are colored or not by the toluidine blue. Eight patients with inflammatory fibrous hyperplasia caused by prosthesis badly adapted were selected for this investigation. Ethical approval was granted by the State University of Londrina, Research Bioethics Committee. The dye was used in order to increase the absorption of the laser light by the tissue. The injure was divided in three equal parts, and each part received a different kind of treatment. One of them was removed to be the control, the second part was laser treated ($\lambda = 670$ nm; P = 15 mW; D = 8 J/cm^2) and then immediately removed and the last one, after being superficially colored, was laser treated and then immediately removed. The order of the stages was randomly changed, then the time between the stages would not interfere in the statistical analysis of the mast cell degranulation rates. It was found that the mast cell degranulation rates were 49% for the control group, 87% for the laser group and 88% for the colored/laser group. There was no significant statistical differences between the group laser treated and the one colored/laser treated. However, there was a significant difference between the control and the treated group ($P \leq 0{,}01$).

302

MARGINAL MICROLEAKAGE EVALUATION IN CLASS V COMPOSITE RESTORATIONS OF DECIDUOUS TEETH PREPARED CONVENTIONALLY AND USING Er:YAG LASER

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The purpose of this study was to evaluate marginal microleakage in class V restorations of deciduous teeth prepared using Er:YAG laser and comparison to the ones observed when conventionally prepared. Twenty eight complete deciduous teeth were divided into four groups Group 1 (G1) prepared with high speed drill + composite resin; Group 2 (G2) prepared with high speed drill + glass ionomer cement; Group 3 (G3) prepared using Er:YAG laser ($\lambda = 2.94$ μm), 300 mJ, 3 Hz, handpiece 2051, energy density 86 mJ/cm^2 + composite resin; Group 4 (G4) prepared using Er:YAG laser ($\lambda = 2.94$ μm), 300 mJ, 3 Hz, handpiece 2051, energy density 86 J/cm^2 + glass ionomer cement. After the preparation and restoration the specimens where stored at 37°C for 24 hours, thermally stressed, immersed in 50% aqueous solution of silver nitrate for 24 hours while kept in the dark. The specimens were rinsed in water, soaked in photodeveloping solution and exposed to fluorescent light for 6 hours. After this process the samples were sectioned and observed by stereomicroscopy. For comparison the groups were divided into occlusive and cervical microleakage. For the occlusive microleakage the statistical significance was 5% among the groups and the average comparison showed higher microleakage for G1 (M = 35.1) than for G2 (M = 24.0) as well as compared to G3 (M = 22.3). The other groups didn't present statistical differences among them. For the cervical microleakage the Kruskal-Wallis test didn't present any statistical difference. Comparing the occlusive and cervical microleakage data, for every group, using the Wilcoxon test, no statistical differences were observed. Concluding, this study showed the Er:YAG laser to be effective for class V restorations and to result in a smaller microleakage degree using the composite resin. These results indicate the viability of the Er:YAG laser for conservative restorations of deciduous teeth.

303

BONE REPAIR OF THE PERIAPICAL LESIONS TREATED OR NOT WITH LOW INTENSITY LASER ($\lambda = 904$ nm)"

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The purpose of this study was to evaluate the influence of low intensity laser on the bone repair over periapical lesions of dental elements. Fifteen patients with a total of eighteen periapical lesions were selected and divided into two groups. Ethical approval was granted by the University of São Paulo, Dentistry School's Research Ethics Committee. Lesions of the control group were submitted to endodontic treatment and/or periapical surgery and the lesions of the experimental laser group, were submitted to the same proceduresof the first group but also irradiated by low intensity laser. It was used a 904 nm wavelength laser GaAs, employing 11 MW of power delivered by a fiber optic system, irradiation continuous and contact mode, using a fluency of 9 J/cm^2. The mentioned treatment was repeated for 10 sessions with intervals of 72 hours between each session. Bone repair was evaluated through lesion measurements, which were accessed from the x ray pictures using a time and then, were also statistically analyzed. Results showed a significant difference between lased and control groups ($p < 0{,}10$), emphasizing that for the laser group presented a significant reduction of the lesions area, confirmed by X-ray.

304

IN VIVO STUDY ON MAST CELLS BEHAVIOR FOLLOWING LOW-INTENSITY VISIBLE AND NEAR INFRARED LASER RADIATION

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Low-intensity laser therapy (LILT) at adequate wavelength, intensity, and dose can accelerate tissue repair. This acceleration can be due to reduction in the duration of acute inflammation resulting in a rapid entry into the proliferative stage of repair when granulation tissue is produced. Primary mechanisms that stimulate cell activity leading to an enhanced mast cell recruitment and degranulation can occur. This study was undertaken to investigate the influence of low-intensity laser radiation on mast cells behavior from non-mineralized wall of suprabony periodontal pockets. Twenty patients with periodontal disease were selected for this investigation. Ethical approval was granted by the University of São Paulo, Dentistry School's Research Ethics Committee. The required treatment for all of patients was the gingivectomy, a ressective periodontal surgery. Fragments were obtained from the gingival area and were divided in three samples. The first one was removed without irradiation (control). Before surgical procedure the other two samples were submitted to infrared ($\lambda = 785$ nm) or visible ($\lambda = 688$ nm) low-intensity laser radiation, dose 8 J/cm^2. The output power was 50 mW and frequency 36 Hz. After surgery the samples were fixed in formol, cut and stained by toluidine blue. The results indicated that 1) Both wavelengths promote mast cells degranulation in gingival tissue because the degranulation index was statistically significant in the irradiated areas when compared to control areas, and 2) There was not difference statistically significant between the visible and infrared irradiated areas on the mast cells degranulation.

305

EXPERIENCES IN THE TREATMENT OF VASCULAR LESIONS: A COMPARISON STUDY EVALUATING THE EFFICACY OF A 940 nm DIODE LASER VS A SHORT-PULSED DYE LASER VS A LONG-PULSED DYE LASER

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Introduction: Several laser systems are efficient in the treatment of vascular disorders. The efficacy is not only due to wavelength and pulse duration but also changing with body site of lesions. We compared the results after treatment of facial telangiectasia, leg vein telangiectasia and port wine stains in two centers (Plataforma Láser Centro Médico Teknon, Barcelona, Spain. and Laser Center Haydnplatz, Innsbruck, Austria) using a 940 nm Diode Laser and Pulsed Dye Lasers (585 nm and 595 nm) with different pulse duration.
Methods: 199 patients were treated with short-pulsed (0.450 ms) Dye laser, 51 patients with long pulsed (1.5 to 40 ms) Dye laser and 21 patients with Diode 940 nm laser (pulse duration between 10 and 100 ms). Most of the patients were treated in the face (62.3%) followed by leg veins (30.2%) and port wine stains (7.5%). Treatment results were documented comparing photographs taken before and after treatment, the result estimated by doctors and patients using a rating scale between 1 and 5 (1 = excellent).
Results: Treatment results were satisfying with all laser systems used. There were no serious side effects. Best results for small facial telangiectasia and port wine stains were obtained with Pulsed Dye lasers using pulse duration between 0.450 and 2.0 ms. Larger facial telangiectasia and leg vein telangiectasia responded best to 940 nm Diode laser using pulse duration between 30 and 100 ms.
Conclusion: 940 nm Diode Laser short- and long-pulsed Dye Lasers (585 nm and 595 nm) are save and efficient in treatment of vascular lesions with different response rates according to vessel diameter and treatment sites.

306

ULTRASTRUCTURAL CHANGES AFTER NON-ABLATIVE DERMAL REMODELING WITH A LOW FLUENCE, 350 usec, 585 nm PULSED DYE LASER

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A variety of laser and light source technologies have been shown to promote non-ablative dermal remodeling. All show some degree of both clinical and histologic improvement. The exact mechanisms of improvement have yet to be determined. In attempt to better understand the mechanism behind this improvement, we looked for a correlation between the clinical response and ultrastructural electron microscopic findings. Ten female subjects, Fitzpatrick I-IV skin types with Class I-III rhytides were treated twice with a 585 nm, 350 usecond, pulsed dye laser at 2.5 J/cm^2 and a 5 mm spot size. Biopsies were taken before and after 2 treatments. The study takes an objective look at the correlation between clinical response and ultrastuctural findings.

307

1064 nm Nd:YAG LASER IRRADIATION FOR FACIAL TELANGIECTASES: EFFICACY AS MEASURED BY FLUENCE AND VESSEL SIZE

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Laser treatment of facial telangiectases has been successfully accomplished with a variety of visible and near infrared lasers and light sources. Millisecond 1064 nm Nd:YAG laser irradiation has recently been shown to be safe and effective in the treatment of telangiectases and small reticular veins of the lower extremities. In this study, we evaluated a millisecond contact cooled 1064 nm Nd:YAG laser for the treatment of facial telangiectases. Ten female subjects with Fitzpatrick skin types I-IV received up to two laser treatments separated by a 4-week period. Vessels, varying in size between 0.1–1.5 mm, were treated. Pulse durations of 10-50 msec and fluences of 100–150 J/cm^2 were utilized Three months after the initial treatment, patients were evaluated for vessel clearance, changes in pigmentation, erythema, telangiectatic matting, and textural changes. Vessel improvement with respect to color, size and associated complications were evaluated. 1064 nm Nd:YAG laser irradiation with associated contact cooling can effectively treat some facial vessels.

308

ALTERATION OF OSMOTIC FRAGILITY OF RED CELLS AFTER NEAR-INFRARED NASA LED PHOTORADIATION IS NOT ATP DEPENDENT

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Red blood cells (RBC) are considered as the primary photoacceptor in low energy level laser irradiation (LLLR) between 600–1000 nm. This activity is due to their hemoglobin content, since the main absorption peak of hemoglobin exists between 400–600 nm followed by a secondary peak with lower intensity in the near-infrared region.
RBC mediated photobiostimulation through generation of oxygen derived free radicals is demonstrated but the effect of LLLR on RBC themselves has not been studied extensively. In this study we investigated the effect of LLLR at different wavelength on osmotic fragility and ATP content of whole blood during the storage Blood was obtained by phlebotomy in ACD solution. The whole blood was irradiated at wavelength of 670 nm, 728 nm, 880 nm with 5 J/cm^2 between 0–30 days by NASA LED device (Quantum Devices, Barneveld, WI). Blood was stored for 30 days at 4°C. The osmotic fragility of RBC between 0 and 290 mOsm and ATP content (Sigma Diagnostic, St. Louis, MO) were monitored during the storage. Results at 30 days are summarized in the: table #1:
Osmotic fragility, ATP content at 30 days

Irradiation Hgb	Osmotic frag. mOsm*	ATP cont μM/g
None	96.6 ± 9.9	$4.55 \pm .12$
670	128 ± 10.7	$4.42 \pm .09$
728	124 ± 12.5	$4.53 \pm .13$
880	100 ± 7.2	$4.55 \pm .08$

*Osmolarity causing 50% hemolysis; normal value: 145 ± 5 mOsm LLLR treatment of whole blood at 670 and 728 nm at 5 J/cm^2 contributes for preserving the RBC osmotic tolerance against hypotonic solution. Differences between the control and treated samples are statistically significant: $t = 4.392$, $p < .001$, $n = 4$, $t = 3.567$ $p < 0.03$, $n = 4$ for None vs 670, 728 repectively. The treatment does not influenc the ATP level, further study is warranted for the explanation of this contradictory finding.

310

POSSIBILITY OF DECREASED INCIDENCE OF BREAST CANCER BY USING LASER FOR REMOVING UNWANTED UNDERARM HAIR

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During two years experience with 2,500 patients in a hot and sunny area of the world, a great number of female patients were seen with chronic, painful axillary lymphadenitis due to waxing or using hair removal creams, presenting with pain, tenderness and bad smell secretions, unresponsive to antibiotics. I treated them with several sessions of Light sheer diode laser leading to complete cure. Hence, I recommend laser hair removal instead of any other alternative method in underarm. A smaller number of patients had the same problem in the groin due to waxing and using hair removal creams in the bikini line. Considering the importance of breast lymphatic drainage through the axillary nodes, I recommend laser hair removal instead of other hair removal methods in axillary area, specially in patient with high cancer risk factors, although relation between breast cancer and axillary lymphadenopathy should be more studied.

311

REPORTING USING LIGHT SHEER DIODE LASER ON 2,500 MALE AND FEMALE PATIENTS OF DIFFERENT AGES AND SKIN TYPES IN A HOT, HUMID AND SUNNY AREA

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My research results include: 1) Using anesthetic creams (e.g., EMLA) will in my experience decrease the effectiveness of laser treatment, so for reducing pain the best alternative is cooling the area; 2) In Asian type skins, the first session is very important and should be done with the highest fluence possible. In my experience starting with low dose fluence can cause increased hair growth in the area; 3) Despite the knowledge that diode laser is not effective on white hair, in Asian skins white hair reduction was noticed in few cases; 4) In my experience there was no changes in hair color from black to white or fair after laser therapy; 5) Patients claim better facial skin texture and color after laser therapy; 6) Very good results seen in male and female patients undergoing Light sheer diode laser therapy for black head comodones; 7) None of the patients received pre medication or skin preparation; 8) No sun exposure restrictions; 9) No after treatment medications; 10) No known complications to date; 11) Follow up shows that outcome is better in men than women; 12) For ears because of ear folds, laser therapy was done from the posterior surface with excellent results; 13) Hyperpigmentation due to using traditional methods, like waxing and threading were completely cured much faster after using diode laser; 14) Very effective for ingrowing hair; 15) According to my experience, the best regimen is, sessions with 12 week intervals with free shavings as needed in between, except for the last week before the next session when shaving should not be done; 16) To date I have done 12 million laser pulses personally for my patients in the past 2 years, and there is absolutely no ophthalmologic side effects on my eyes as confirmed by my ophthalmologist.

312

COMPARISON OF LOCALIZED UVB PHOTOTHERAPY SYSTEMS FOR HIGH DOSE TREATMENT OF STABLE PLAQUE PSORIASIS

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Purpose: Two light based systems have recently become commercially available for the targeted UVB phototherapy of skin disorders. This study compared the clinical outcome and performance characteristics of two technologically distinct sources of therapeutic UVB; the 308 nm Xtrac excimer laser and the BClear targeted UVB phototherapy system.
Methods: A pilot study was conducted with individuals having mild to moderate plaque-type psoriasis on several anatomic locations. Subjects initially received minimal erythema dose (MED) testing on their healthy, untanned skin using both devices.

After determining the MED for each subject, plaques were separately treated at equivalent MED multiples by the incoherent UVB light source and the excimer laser. Patients received one or more treatments and the treated plaques were clinically evaluated for erythema, scale and induration. Side effects and patient satisfaction with the procedure were noted. Photographs were taken at baseline and throughout the course of the study. In addition, the profile and uniformity of the beams emitted from the two systems were evaluated at a range of fluences using MED test spots and photosensitive recording papers.

Results: Both devices were safe and effective at treating localized psoriasis plaques. Decreased psoriasis severity at the treated sites was observed after one to two treatments. Both localized phototherapy systems reduce psoriasis severity and clear plaques rapidly, each requiring approximately three weeks of treatment. The most common adverse effects are erythema, epidermal erosions and hyper-pigmentation.

Conclusions: Rapid clearance of localized psoriasis plaques can be achieved with minimal side effects using selectively targeted, high dose UVB phototherapy. Unlike conventional phototherapy devices, patients benefit from rapid clearance of psoriasis plaques with minimal UVB exposure to the healthy skin. This technology is particularly amenable to patients with mild to moderate psoriasis, individuals with localized stubborn disease and for treating plaques of the intertriginous areas that are less accessible to light emitted from paneled phototherapy devices.

313

MULTI-PASS TREATMENT PHOTODAMAGE USING THE PULSE DYE LASER (PHOTOGENICA V-STAR)

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Purpose: Short Pulse Dye Lasers [PDL] have been shown to alter the metabolism of structural proteins in scars and photodamaged skin, in addition to their effects on dermal vasculature. Use of the PDL has become an option in the continuum of care for treatment of photodamage. While improvements to skin texture are generally modest when compared to ablative resurfacing, the PDL offers a treatment with little risk of side effects. A number of methods have been proposed in an effort to improve treatment outcomes. These range from single, low fluence treatment with no purpura to multiple treatment sessions with purpuric doses. Judicious use of multi-pass treatments has been used to limit collateral damage in the treatment of vascular lesions. Low-fluence, multi-pass treatment may provide a method to improve treatment outcomes without an increase in the risk of side-effects.

Methods: A total of 20 patients presenting with photodamage were separated into two groups of 10. One group received a series of 4 single-pass treatments, at 2 week intervals. The second group received a series of 4 double-pass treatments, at similar intervals. The treatments were done using a 595-nm PDL and a 585-nm PDL at a pulse duration of 0.5-msec (PhotoGenica V-Star), using a 10-mm handpiece. Treatment fluences were maintained below the individual's purpuric threshold and ranged from 3 to 4 J/cm^2. Photos were taken prior to treatment and during follow-up. Efficacy of treatment was based on subjective grading of before and after photos and by patient self-reporting.

Results: Multiple treatments resulted in improvements to skin tone and texture including, to varying degrees, a reduction in the appearance of rhytids and improved pigmentary evenness. No side-effects were noted. The proper utilization of multi-pass treatments, along with possible mechanisms for photorejuvenation will be discussed.

315

INTENSE PULSED LIGHT PHOTOREJUVENATION FOR THE TREATMENT OF ROSACEA

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Rosacea is a disease that affects millions of men and women. Conventional treatment consists of topical and oral antibiotics. Many people have suboptimal control of their flushing and erythema even while on maximal medical therapy. We are investigating the use of intense pulsed light photorejuvenation for control and reduction of the symptoms and signs of rosacea. 50 consecutive patients underwent 3–5 treatments with intense pulsed light and were assessed for degree of reduction in erythema, incidence and severity of flushing episodes and ability to tolerate flare factors before or after treatment. The Vasculight Plus Laser/Intense Pulsed Light Source was utilized with a 570 nm cutoff filter and a double pulse of 2.4 and 4.0 ms with a 20 ms delay time at a fluence of 32–38 J or a 560 nm cutoff filter with the same pulse duration at 27–32 J. Refrigerated gel was used as a cooling agent; occasional cases received dynamic cooling with a chilled collar, if they appeared to be tanned. Exclusion criteria included Accutane therapy within the past year and unprotected sun exposure within 3 weeks of treatment. 33 patients were recruited and were allowed to continue their medical therapy as long as this had remained unchanged for the previous three. Results were determined by clinical evaluation by the treating physician and patient evaluation via questionnaire. At the time of abstract submission, 12 patients have completed the study. 6 of 12 patients felt their flushing was much better, 4 felt it was better, and 2 thought their flushing hadn't improved. 7 of 12 patients felt their breakouts were much better, 1 felt they were better, 3 thought they were the same and one thought she was worse (but she had concurrently discontinued her oral antibiotic therapy). 8/12 patients felt the texture of their skin was much better, 212 thought it is was better and 2 felt it was unchanged. One patient experienced "footprinting" but this resolved with further treatment; so other side effects were experienced. 2 patients were able to discontinue their oral antibiotic therapy. These preliminary results suggest this is a highly effective treatment for the signs and symptoms of rosacea. Our completed 3 month follow-up data will be presented at the meeting.

316

HAIR REMOVAL USING THE 3 msec ALEXANDRITE LASER IN SKIN TYPES IV–VI: SAFETY, EFFICACY AND THE ROLE OF TOPICAL CORTICOSTEROIDS IN MINIMIZING SIDE EFFECTS

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Purpose: The purpose of this study was to establish both the efficacy and safety of a single treatment using the 3 msec Alexandrite laser with dynamic cooling (Gentlelase, Candela Corp., Wayland, Mass) in patients with skin types IV-VI using the larger spot sizes, and the role of topical corticosteroids in preventing side effects.

Methods: Twenty seven patients with skin types IV-VI were recruited. The treatment fluence was selected to result in

perifollicular erythema and edema at the test site using the 18 mm spot size. Treatment and control areas with similar hair density and skin color were selected, the hair counted and clipped for measurement of the thickness at the base. The selected fluence varied between 8 and 20 J/cm^2 and was used to treat two areas. One of the two areas was pretreated 10 minutes prior to laser therapy with a class I topical corticosteroid cream and twice a day for 5 days post-laser. Ice was applied to both treatment sites post-treatment. Patients were followed-up on days 1 and 7, and 1, 3, 6 and 9 months. Histological samples from both treatment and control areas were available in 5 patients. Patients were instructed to follow strict sunprotection and were given hydroquinone 4% cream to be applied bid to the skin when hyperpigmentation or persistent erythema were found on day 1.
Results: All patients tolerated the treatment well. Twelve patients developed fine arcuate crusting at the treatment sites with the DCD spray settings of 90 msec duration and 90 msec delay. Crusting was not seen when the spray delay settings were decreased to 20 msec. Eleven patients had mild hyperpigmentation at 1 week, and only two had persistent mild hyperpigmentation at 4 weeks. A trend towards lesser hyperpigmentation was noticed in the corticosteroid treated areas. Short term hair counts and thickness at the base were reduced 32 and 30% respectively, but long term results are still pending. H&E stained sections showed hair shaft necrosis with thermal damage of the inner layers of the perifollicular epithelium, seen only with fluences >10 J/cm^2. Bulbar damage of some hairs was appreciated. No perifollicular vascular damage was found. Melanin clumps were seen in the upper epidermis and stratum corneum without basal membrane damage or pigment incontinence.
Conclusion: Preliminary results indicate that the 3 msec alexandrite laser can be used safely and effectively in skin types IV and V. Using the above parameters, fluences that are effective for long term hair removal may not be appropriate in all skin type VI patients. Further research in this study will aim at optimizing treatment parameters of this subgroup. Shorter spray delay parameters are important for optimal cooling of the epidermis. Topical corticosteroids used for 5 days post-laser appear to have a modest effect in minimizing post-laser hyperpigmentation.

317

SUCCESSFUL TREATMENT OF DISCOID LUPUS ERYTHEMATOSUS UTILIZING THE 595 nm PULSED DYE LASER

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Purpose: To evaluate the efficacy and safety of the 595 nm pulsed dye laser (Scleroplus, Candela, Wayland, MA) in the treatment of Discoid Lupus Erythematosus (DLE).
Methods: Two patients with histologically-confirmed DLE and skin types II-III were treated with the 595 nm pulsed dye laser utilizing low fluences. Epidermal cooling was achieved with the dynamic cooling device. Each patient received three treatments. Pre- and post-operative photographs were obtained.
Results: 595 nm pulsed dye laser photocoagulation of DLE lesions resulted in significant clearance of the vascularity and improvement of the atrophy. Purpura, erythema and crusting were observed for both patients and were short-lived. No blistering or hyperpigmentation were noted. Permanent adverse effects were not noted.
Conclusions: 595 nm pulsed dye laser photocoagulation may be an effective, novel treatment of early DLE with a good safety profile.

318

MATHEMATICAL MODEL OF NON-ABLATIVE RF HEATING OF SKIN

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Non-ablative lasers deliver a thermal injury deep within the dermis, while protecting the superficial skin layers with a cooling agent; however, the depth of this thermal damage is dependent on the wavelength of laser light used. The Thermage non-ablative radio frequency (RF) treatment tip was designed to deliver a thermal injury to the skin while simultaneously cooling the skin surface. The area of the treatment tip determines the penetration depth of the RF energy. Therefore, the depth of heating can be tailored to meet specific treatment goals by varying treatment tip surface area. The purpose of this study was to calculate the temperature profiles within human skin due to the Thermage device. We developed a three-dimensional mathematical model of the temperature distribution within human skin. RF heat generation was determined by measuring the potential field in a skin-like saline solution using a custom 3D field mapping system. The three-dimensional bioheat equation was solved using the central finite-difference approximation. Results of this study show that this treatment tip design induces volumetric heating deep within the dermis while still protecting the superficial skin layers from thermal injury. Penetration depth of RF energy varies with the area of the treatment tip, while heat generation depends on the electrical impedance of the tissue. Therefore, heating profiles depend on the tissue electrical properties, size of the treatment tip, and amount of surface cooling. This combination of volumetric RF heating coupled with surface cooling, may offer an alternative to optical non-ablative tissue heating.

319

TOPICAL V-TAR REPIGMENTS LASER INDUCED HYPOPIGMENTATION

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The purpose of this clinical study was to see if a topical agent alone could repigment laser induced hypopigmentation which otherwise might not repigment or would be expected to take many months to repigment naturally. Patient with hypopigmentation from laser hair removal, tattoo removal and resurfacing were treated in a controlled manner with weekly physician applications or in an uncontrolled manner usually with morning patient self applications. Remarkable and usually complete repigmentation was seen after a few applications. V-Tar* was allowed to remain in contact with the skin for three to twelve hours. U.V. exposure was not used.
V-Tar washed off with soap and water without staining the skin. Some partial failures occurred in patients with depigmentation scars where most follicular structures were destroyed and the area was over one centimeter in diameter. Patient acceptance of the treatment was high as V-Tar application produces an

immediate cosmetic improvement after application. The subsequent repigmentation appears to be permanent.

*V-Tar (30% crude coal tar in an optimized base) is recently commercially available from Dermasave Labs, Inc. 1-800-277-7099.

320

LONG PULSED DYE LASER (LPDL) TREATMENT OF RESISTANT TELANGIECTATIC MATTING OF THE LEGS

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One of the major side effects after sclerotherapy of telangiectasias particularly around the knee is telangiectatic matting, occurring in up to 30% of patients. Although spontaneous resolution is the rule, some areas of matting remain beyond six months. The purpose of this report is to present clinical data using a new long pulse yellow dye laser (595 nm) with specific parameters for reduction or elimination of resistant telangiectatic matting without the purpura typically associated with previous 0.5 millisecond PDL. A series of 20 patients, skin types I-IV, underwent treatment for resistant telangiectatic matting present for greater than six months. A single treatment was performed using the Photogenica V-Star (Cynosure, Chelmsford, MA) which emits a train of pulses at 595 nm for a cumulative millisecond duration pulses. Parameters utilized were a 20 millisecond pulse at 7 J/cm^2, 7 mm spot size for a total of three stacked pulses with simultaneous air-cooling. Purpura was graded as absent, slight, moderate or severe both one minute and ten minutes post-treatment. Images from before and after the single treatments were judged for improvement. Eighteen of out 20 patients noted significant improvement of treated telangiectasias (50% reduction or greater) at 3 months follow-up. Immediate purpura was noted in 5 patients, purpura was absent in 15 patients at one minute post-treatment but judged as slight after 10 minutes in 8 of these patients. Purpura cleared within 10 days. This study demonstrates that a new long pulse PDL is an effective treatment for telangiectatic matting with marked reduction or elimination of purpura typically associated with PDL.

321

PHOTOERADICTION OF GASTRIC HELICOBACTER PYLORI (HP) USING 5-ALA: PRELIMINARY HUMAN IN VIVO STUDIES

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Purpose: HP is a pathogenic bacterium causing chronic gastritis and implicated in gastric cancer. In vitro studies have shown considerable photosensitivity of HP after incubation with different photosensitizers, including 5-ALA. We report the first in vivo studies.

Methods: In 13 volunteers with gastric HP infection proven by culture, urease test, C^{13} breath test and histology a zone of gastric antrum was irradiated with 410 nm light (Krypton laser, 50 J/cm^2 for 500 s) using a diffuser positioned endoscopically in 7 subjects, or with the normal endoscopic white light source (Olympus CLV U20, 10 J/cm^2 for 400 s) in 6 subjects. Irradiation in both groups began 45 minutes after oral 5-ALA 20 mg/kg. HP-eradication was assessed in the irradiated and non-irradiated control zones by culture and urease tests. Lansoprazole 30 mg was given pre-irradiation to enhance the effect of 5-ALA.

Results: Four hours post-irradiation biopsy cultures had become HP-negative in 85% of the laser exposed zones and in 66% of the direct white light exposed zones. In the respective control zones without direct light irradiation 58% and 33% of the cultures were HP-negative. These results were confirmed by urease test. Minor histological mucosal damage was seen in a total of 3 irradiated zones and one control zone.

Conclusions: We conclude HP is highly photosensitised by low doses of 5-ALA *in vivo*. Endoscopic photoeradication from the irradiated areas of gastric antrum was effectively achieved with 410 nm light and 5-ALA. White light was less effective, but still showed considerable phototoxic effects. The photosensitivity of HP was further demonstrated by the bactericidal effects due to light scattering and reflectance in the control zones with direct light irradiation. Photoeradication of HP appears feasible, but further light dosimetry and the development of application methods are required.

323

PHOTOTHERMAL TIME-RESOLVED IMAGING OF THERMAL EFFECTS IN LASER MICROSURGERY

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The aim of this study is to test a new method of photothermal imaging (PTI) for precise control of tissue temperature with high spatial and temporal resolution during laser microsurgery. PTI temperature control is based on time-resolved monitoring of temperature-dependent variations of the refractive index in irradiated tissue. Monitoring is realized with a phase-contrast imaging of a second laser pulse that probes the tissue heated by the first (surgical) laser. A probe beam pattern is obtained without spatial scanning with high-speed CCD camera and represents two-dimensional, depth-integrated temperature distribution in an irradiated area. This image, referred to as PT provides information of temperature, heat diffusion (cooling) effects and thermal relaxation time as a function of laser parameters, absorbing target size and distance from laser beam. The distinctive features of PTI offer the possibility to study coagulation effects through analyzing of the temporal shape of pulsed PT signals. PT lifetime imaging allow to study local laser-induced temperature effect on nano-scale absorbing targets such endogenous chromophores or incorporated dyes and metal spheres. The capabilities of the new imaging modality were demonstrated for study of temperature dynamics during interactions of pulsed YAG:Nd laser (8 ns, 532 nm, 1–1000 μJ) with different living cells including spermatozoa, basic blood cells, tumor and embryo cell lines. The obtained data and comparison of differences in PT schemes including parallel and perpendicular geometry of probe and pump beams, show that PTI lends perspective for guiding laser cell microsurgery, laser PT cancer therapy with PT probes, laser dosimetry with controlling local temperature in broad range from 10^{-1}°C to 400°C with high spatial (up to 35 nm) and temporal (up to 10 ns) resolution.

324

KINETIC THERMAL RESPONSE AND DAMAGE IN LASER COAGULATION OF TISSUE

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Laser induced interstitial thermotherapy is now widely used in remedial treatment. Conventional model of the photocoagulation is normally conducted in three steps: calculation of the light distribution, calculation of the temperature rise, and calculation of the extent of thermal damage. In fact, the photocoagulation process is much more complicated than what previous models describe because tissue optical properties, thermal properties and blood perfusion rate change dynamically during coagulation.
In this work, we developed a full dynamic theoretical model to describe laser coagulation of tissue, which accounted for the dynamics of the temperature-dependent and thermal damage-dependent optical properties, thermal properties and blood perfusion rate based on measurements. The corresponding nonlinear arithmetic was developed to simulate the dynamic evolution of laser-irradiated tissue. The calculated results from the dynamic model were compared with partial dynamic or static models.
Studies showed that photocoagulation conduced increase of scattering coefficient. Ignoring the transient spatial of variations of optical properties resulted in a considerable overestimation of the temperature and the depth of damage. Temperature rise induced increase of blood perfusion rate, but thermal damage induced decrease of blood perfusion. If the dynamics of blood perfusion was ignored, significant underestimate of temperature rise and damage occurs in a smaller area. If blood perfusion was ignored, hysteresis of damage was very big. Thermal properties decreased with temperature rise. Ignoring the dynamics of thermal parameters, the temperature rise and the depth of damage were bigger.
In conclusion, the full dynamic theoretical model could describe the process of photocoagulation of tissue well and truly because it took into account dynamic parameters of tissue. Therefore, it is very important to investigate thermally induced changes in tissue properties.

325

TREATMENT OF SUPERFICIAL CUTANEOUS VASCULAR LESIONS—EXPERIENCE OF THE KTP/532 nm LASER

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We have used a KTP/532 nm laser (Laserscope Aura™) for the treatment of superficial vascular lesions for over three years. 232 patients (age range 9 months to 72 years) have been treated for 275 diagnoses including: spider angioma (114/275; 41%), facial telangiectasia (discrete and matted) (80/275; 29%), rosaceal telangiectasia (small and large vessel) (30/275; 11%), congenital haemangioma (20/275; 7%), venous lakes (single or multiple) (6/275; 2%), port wine stains (5/275; 2%), acquired cherry angioma (single or multiple) (5/275; 2%), steroid telangiectasia (2/275; 1%), angiokeratoma (1/275; 0.4%) and unspecified (11/275; 4%). Outcome is assessed by patient from photographic records. For completed treatments clearance or marked improvement was achieved for 67/70 (96%) with spider angioma, 61% (41/67) clearing in 1 or 2 treatments. For completed treatments clearance or marked improvement was achieved for 42/53 (79%) with telangiectasia, 67% (28/42) clearing within 4 treatments. Diffuse facial erythema (2 cases) with a minimal telangiectatic component has proved resistant to treatment and further referrals have been discouraged. Treatment is well tolerated by all patients and adverse effects, excluding the post treatment inflammatory response, have been few.
In conclusion, we have achieved excellent results treating spider angioma and telangiectasia with no significant adverse reactions using the Laserscope Aura KTP laser.