

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 LASER-INDUCED 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 Radiancey. 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 HYPERSENSITIVITY

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This work was achieved *in vivo* and *in vitro* to evaluate the efficiency of Er:YAG laser in the cervical dentinal hypersensitivity 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 provoke 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 movements and without using anaesthetics. The fifth was evaluation. The patients were evaluated and registered in a subject scale of pain 0 to 3, in the beginning 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 beginning of each session and between. For the control group didn't occur significant differences in the beginning 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 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 ($\lambda = 670 \text{ nm}$; $P = 15 \text{ mW}$; $D = 8 \text{ J/cm}^2$) 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 ($\lambda = 2.94 \mu\text{m}$), 300 mJ, 3 Hz, handpiece 2051, energy density 86 mJ/cm^2 + composite resin; Group 4 (G4) prepared using Er:YAG laser ($\lambda = 2.94 \mu\text{m}$), 300 mJ, 3 Hz, handpiece 2051, energy density 86 J/cm^2 + glass ionomer cement. After the preparation and restoration the specimens were 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 ($\lambda = 904 \text{ nm}$)

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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 procedures of 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.