



Laser Florence 2002 had speakers of 38 different countries and five continents. There are usually between 250-300 participants. Information about Laser Florence 2003 can be found at www.laserflorence.org. All the abstracts can be found in Laser in Medical Science 2002; 17 (4), [Springer Verlag](http://www.springer-verlag.com).

EFFICACY of LOW POWER LASER GaAlAs (630 nm) in THE TREATMENT of VITILIGO PATIENTS

Leila Ataie M.D., Gholamreza Esmaeeli Djavid

Vitiligo patches were treated by using a 630-nm GaAlAs laser (20 mW & 1 J/cm²), twice a week for a maximum of 24 treatments. Patients were followed for 9 months and the effect of treatment was evaluated. Six patients could be evaluated for the purposes of this analysis. Their ages ranged from 11 to 46 years. Decreases in surface area of depigmented lesions were seen ranging between 25% and 75%. Pigmented stippling within depigmented lesions occurred in all patients. In two patients of repigmented of previously depigmented hair were seen. Only one patient experienced arrest of progression of disease after 24 sessions of treatment. LPLT is without side effects and probably effective in repigmentation of vitiligo but has minimal effect of progression of disease.

LOW LEVEL LASER ASSISTED LIPOPLASTY, L.A.L. A NEW TECHNIQUE. NEIRA 4L TECHNIQUE

Rodrigo Neira, C.Ortiz, J.Arroyabe et al.

This study describes the scientific basis for a new lipoplasty technique based on the use of a low-level energy laser diode beam. A multidisciplinary team studied fat samples randomly taken from ten patients that underwent a liposculpture procedure.

Fat samples were processed as follows:

Application of tumescent technique and exposure to laser beam for 4 minutes. Partial disruption of the adipose cell was observed; several cells without disruption of the cellular membrane were preserved. The adipose cells lost their round shape, and fat spread into the intercellular space.

Application of tumescent technique and exposure to laser beam for 6 minutes. Transitory pores were observed in the cell membrane. There was found microscopic evidence that fat was outside the adipose cells, and remained in the interstitial space. Structures such as the capillaries and the remaining interstitial space, were however preserved.

Without the use of tumescent solution, in vitro exposure of adipose tissue to laser beam for 4, and 6 minutes was performed and compared with samples without laser exposure (Zero minutes). Laser penetration through adipose tissue decreased when the tumescent solution was not utilized. The Scanning and Transmission Electron Microscopic findings after six minutes laser exposure without the use of tumescent solution correspond to those observed at 4 min. laser exposure by equal intensity (10 mW) combined with the use of a tumescent solution, suggesting that the application of the tumescent solution is a important enhancement factor. Adypocyte cultures confirmed what is happening with the adipose cell after irradiating it with the laser beam. These cells remain alive in spite of the membrane deformation generated by the exposure to the laser beam for 6 minutes

LOW – LEVEL- LASER THERAPY IN MILD AND MODERATE CTS – A DOUBLE BLIND, RANDOMISED STUDY

Th. Rappl, Ch. Laback, St Quasthoff, M. Auer-Grumbach, R. Gumpert, E. Scharnagl

The aim was to evaluate the LLLT in CTS (ENG: < 6,9 ms) monitored by EMG and VAS (Visual Analogous Scale) recordings. 72 hands with CTS treated by LLLT (15 sessions/30 min, over a period of 5 weeks) were evaluated by a double blind – randomised study. ENG and VAS (visual analogous scale) were performed prior to and after LLLT.

LLLT (wavelength 830 nm, 400 mW) with an energy of 3J per point focused on the Carpal – tunnel, on trigger and acupuncture – points was performed in 38 cases, in 38 cases (control – group) we used a red light pen. Follow-up ranged from 8 to 12 months. ENG and VAS improved in 66%, didn't change in 8% and got worse in 26% in the LLLT group after a 12 month period. No improvement was recorded in the control group. The results suggest that LLLT can be recommended in mild or average CTS (ENG < 4,9 ms) especially if a conservative treatment is required.

THE EFFECT OF LOW POWER LASER THERAPY ON OSTEOARTHRITIS OF THE KNEE

Basirnia A., Sadeghipoor G., Esmaeeli Djavid G. et al.

Treatment was performed on 20 patients, aging from 42 to 60 years. All patients had received conservative treatment with poor results. Laser device used for this treatment was pulsed IR diode laser; 810 nm wavelength once per day for 5 consecutive days, followed by a 2-day interval. The total number of

applications was 12 sessions. Irradiation was performed on 5 periarticular tender points, each for 2 min. The treatment outcome (pain relief and functional ability) was observed and measured according to the following methods: 1) Numerical rating scales (NRS), 2) Self assessment by the patient, 3) Index of severity for osteoarthritis of the knee (ISK), 4) Analgesic requirements. We achieved significant improvement in pain relief and quality of life in 70% of patients, comparing to their previous status ($p < 0.05$). There was no significant change in range of motion of the Knee.

THE USE OF LOW LEVEL LASER THERAPY (LLLT) IN THE TREATMENT OF TRIGGER POINTS THAT ARE ASSOCIATED WITH ROTATOR CUFF TENDONITIS.

Al-Shenqiti, J Oldham

60 patients were randomly allocated to either sham or laser therapy. The active laser parameters included a wavelength 820 nm, power output 100 mW, frequency 5000 Hz (modulated) and energy density 32 J/cm². 12 treatments were given over four weeks. The blinded outcome measures were pain, range of motion (ROM), functional activities and pressure pain threshold (PPT). Outcome measures were carried out pre and post treatment, then 3 months later. Considerable improvement in pain ($p < 0.001$) was seen for the laser compared to sham group post treatment, and at follow-up (6 points on a 10 VAS compared to 2 points respectively). Similarly, significant differences in favour of laser were seen for ROM ($p < 0.01$), functional activities ($p < 0.001$) and PPT ($p < 0.05$).

THE INFLUENCE OF LOW LEVEL INFRA RED LASER THERAPY ON THE REGENERATION OF CARTILAGE TISSUE

P.Lievens, Ph.van der Veen

This study concerns the influence of Laser treatment on the regeneration process of cartilage tissue. There is no need saying that the regeneration of cartilage tissue is a very big problem in rheumatic diseases for example. The lack of blood supply is one of the most important factors involved. Lots of previous publications give us proof of the regeneration capacities of Laser therapy (in wound healing, bone repair etc.)

In this study we have chosen to experiment on cartilage tissue of the ear of mice. We are aware of the fact that the elastic cartilage tissue of the ear is not totally comparable with the hyaline cartilage of articulations. For technical reasons however and because of the fact that the chondrocytes are comparable, we decided to use mice ears in our experiment. A 0,4 mm hole was drilled in both ears on 30 mice. The right ears remain untreated, while the left ears were treated daily with IR-Laser (904 nm) for 3 minutes. Macroscopical as well as histological evaluations were performed on the cartilage regeneration of both ears.

Our results show that after one day postsurgery no differences were found between the irradiated and the non-irradiated group. After the second day, only in the irradiated group there is a clear activation of the perichondrium. After four days, there is a significant ingrowth of the perichondrium into the drill hole in the experimental group and there is only an active perichondrium zone in our control group.

THE INFLUENCE OF IR-LASER ON THE PROLIFERATION OF FIBROBLASTS: AN IN-VITRO STUDY

Ph.van der Veen, Y de Rop, P. Lievens

To control the reproductability, the inter-and intra reliability, we cultivated cells coming from the abdomen of two different (NMRI) mice and we divided 4 groups per mouse. Two were irradiated, two were not. Then we did a BrdU-labeling with 4 flasks (2 were irradiated, 2 were control). Differences between the experimental and control groups were examined by means of a t-test and a non-parametric Mann-Whitney test. The results show a significant ($p < 0,05$) increase of fibroblasts proliferation after IR-irradiation. The BrdU-labeling showed an increased DNA activity. There is also a perfect match between the increased number of fibroblasts and the DNA activity.

PHOTOBIMODULATION OF HUMAN T-LYMPHOCYTE PROLIFERATION IN VITRO

M Dyson, A Agaiby, L Ghali

The biomodulatory action of low level laser therapy (LLLT) on human T-lymphocyte proliferation was investigated in vitro at energy densities ranging from 1.2 to 13.2 J/cm². The wavelength, pulsing frequency and power output were maintained constant at 820 nm, 5000Hz and 50 mW respectively. The T-lymphocytes used in these experiments were separated from human peripheral blood; monocytes obtained from the same blood samples were added to suspensions of the T-lymphocytes to induce proliferation. Cell suspensions of 10⁶ cells/ml were divided into 2 aliquots, one of which was treated with the mitogen phytohaemagglutinin (PHA). The mitogen treated and non-mitogen treated cells were either exposed to coherent infrared radiation or were sham-irradiated. The cells were then cultured for 3 days after which their ability to incorporate 3H-thymidine was used as a measure of proliferation. Exposure of non-mitogen treated T-lymphocytes to energy densities of either 1.2 or 3.6 J/cm² stimulated their proliferation, whereas energy densities of 10.8 and 13.2 J/cm² were inhibitory. In contrast, the proliferation of the mitogen treated T-lymphocytes was inhibited by all the energy densities tested in the 1.2 to 13.2 J/cm² range. The results indicate that the sensitivity of these cells to LLLT varies according to their proliferative level, only non-mitogen treated cells being capable of increased proliferation. Although cell

proliferation can be increased in non-mitogen treated (i.e. resting) T-lymphocytes by exposure to low energy densities, there appears to be an energy density limit above which inhibition of cell proliferation occurs. Cells whose mitotic activity had been stimulated by PHA had their proliferation inhibited by energy densities, which stimulated proliferation in resting cells. If the photobiomodulation of T-lymphocyte proliferation observed in vitro also occurs in vivo, then LLLT could be of clinical value in the treatment of various lymphoproliferative disorders.

AN IN VITRO STUDY OF THE EFFECTS OF LOW-LEVEL LASER RADIATION ON HUMAN BLOOD

Dan G. Siposan

In the last time the study of the effects of Low-Level Laser Radiation (LLLR) on the blood is considered to be a subject of great importance in elucidating the mechanisms of action between LLLR and biologic tissues. Different methods of blood phototherapy have been developed and used in clinical purposes with benefic effects. This study investigates some in Vitro effects of LLLR on some selected rheologic indices of human blood. After establishing whether or not damaging effects could appear due to laser irradiation of the blood, we tried to find a new method for rejuvenating the blood preserved in haemonetics-type bags. Blood samples were obtained from adult regular donors (volunteers). HeNe laser and laser diodes were used as radiation source, in a wide range of wavelengths, power densities, doses and other parameters of irradiation protocol. In the first series of experiments we established that LLLR does not alter the fresh blood from healthy donors, for doses between 0 and 10 J/cm³ and power densities between 30 and 180 mW/cm³. In the second series of experiments we established that LLLR does have, in some specific conditions, a revitalizing effect on the erythrocytes in preserved blood. We concluded that laser irradiation of the preserved blood, following a selected protocol of irradiation, could be used as a new method to improve the performances of preservation: prolonging the period of storage and blood rejuvenation before transfusion.

SEM AND AFM STUDIES OF RAT INJURED TIBIAE AFTER HeNe RADIATION.

Cruz-Höfling A, Garavello Freitas Z, Baranauskas I B.

Atomic Force Microscopy (AFM) and Scanning Electron Microscopy (SEM) were used to quantify bone morphology during post-injury ossification in rat tibiae and characterise the differences induced by laser compared with the naturally occurring regenerative process. A 1.5 diameter hole was done surgically in the tibia and two different doses of laser were applied during 7 or 14 consecutive days, starting 24 hrs after lesion. The collagen fibre lamellar organisation in the matrix, typical of mature bone, was promoted by the HeNe laser at doses of either 31.5 J/cm² or 94.5 J/cm².

LLLT ON DAMAGED MUSCLE CAUSED BY BOTHROPS MOOJENI SNAKE VENOM.

Dourado DM, Cruz-Höfling MA.

The venom of the bothrops moojeni snake was injected into the gastrocnemius of mice to mimic the effect of a snakebite. Traditional therapies for this snakebite have proven less effective. Three groups were tested: A=saline, B=venom and C=venom+ laser. Two sessions of HeNe laser at 4 J/cm² during 1 m 32 s were administered and the animals were sacrificed at 24 h, 3 d and 7 d, respectively. The analysis showed myonecrosis with inflammation and an extensive area of degenerated fibres. In the laser group there was, by day 3, an incipient number of regenerating fibres. Laser accelerated the phagocytosis of fibre remnants and recovery of the tissue, decreasing the oedema and increasing regeneration.

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