Laser PBM Therapy for Skin Burns

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Effect of treatment with an 80 Hz pulsed infrared diode laser on mast cell number and degradation in a rat model of third-degree burn

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short version

Objective: We conducted a study of the influence of LLLT on mast cells in a rat model of third degree burn.

Background data: Low-level laser therapy (LLLT) has been reported to be able to change mast cell count and degranulation in experimental burns in rats.

The Methods: In this study we divided 48 rats equally into two groups of 24 rats each. Third degree burns were inflicted at three different sites on each rat in each group. The first burn site in rats in group I was treated with a pulsed laser with 890 nm, 75 W peak, 80 Hz, 180 ns, average power 1 mW, illuminated area 1 cm2, 1 mW / cm2, 856 s, 0.924 J / cm2 . The second burn site on both groups of rats was treated with 0.2% nitrofurazone cream. The mast cell number and degranulation at each burn site in each group of rats were then scored 4, 8, 13 and 20 days after the burn.

Results: The analysis of variance on day 4 showed that the total number of mast cells at the laser-treated burn sites was significantly lower in both groups of rats than at other burn sites. On day 8 the total number of mast cells at the laser-treated burn sites was again significantly lower than at other burn sites, and on day 13 the number of mast cells of type 1 and 2 at the laser-treated burn sites was significantly lower than at other burn sites.

Conclusions: We conclude that LLLT can significantly reduce the total number of mast cells during the proliferation and remodeling phase of healing in a rat model of a third degree burn.

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Visible lasers were better than invisible lasers at speeding burn healing in diabetic rats

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short version

Objective: This study was designed to evaluate and compare the effectiveness of accelerated burn healing in diabetic rats with low power visible and invisible lasers.

Background data: Low-level laser therapy (LLLT) has been used in a number of animal and human studies in diabetics with both positive and no effects.

Materials and Methods: Male Sprague-Dawley rats were used in the study. Streptozotocin (70 mg / kg) was given to induce diabetes. A burn wound was made on the shaved backs of the animals using

a metal rod heated to 600Â ° C. The study was carried out with 532, 633, 670, 810 and 980 nm diode lasers. Incident doses of 5, 10, 20 and 30 J / cm2 and a treatment regimen of three times per week were used in the experiments. In all rats, the burned areas were measured and plotted on a graph, and the slope values (mm2 / d) and percentages of burn healing were compared.

The results: The percentage of burn healing in diabetic rats after LLLT was 78.37% for the visible lasers and 50.68% for the invisible lasers. There was a significant difference (p 0.005) between visible and invisible lasers in relation to the percentage of burn healing in diabetic rats after laser therapy.

Conclusions: With the appropriate treatment parameters, LLLT can accelerate the healing of burns in diabetic rats with both visible and invisible lasers. In this study, the effects of visible lasers in accelerating burn healing in diabetic rats were better than those of invisible lasers.

J Photochem Photobiol B. 2005 Feb 1; 78 (2): 171-7.
Effect of Low-Level Laser Therapy on Second Degree Burn Healing in Rats: A Histological and Microbiological Study
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This paper presents the results of a study on the effects of two different doses of low-level laser therapy on the healing of deep second degree burns. Sixty rats were randomly assigned to one of four groups. A deep second degree burn was inflicted on each rat. In the control group, the burns remained untreated; In two laser-treated groups, the burns were irradiated daily with a low-level helium-neon laser with energy densities of 1.2 and 2.4 J / cm2, respectively. In the fourth group, the burns were treated topically with 0.2% nitrofurazone cream daily. Response to treatments was assessed histologically at 7, 16, and 30 days after the burn and microbiologically on day 15. The number of macrophages on Jan.

Staphylococcus epidermidis was found in the 70% of the rat wounds in the laser-treated groups compared to 100% of the rats in the control group. S. aureus was found in the 40% of the rat wounds in the nitrofurazone-treated group, but not in the wounds of the laser-treated and control groups. It is concluded that low-level laser therapy for deep second degree burns caused a significant decrease in the number of macrophages and the depth of the new epidermis. It also reduced the incidence of S. epidermidis and S. aureus.

J Clin Laser Med Surg. 2004 Feb; 22 (1): 59-66.
Effects of Low Intensity Polarized Visible Laser Radiation on
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Objective: This study was carried out to investigate the influence of low-intensity polarized, visible laser radiation on the acceleration of skin wound healing. Background data: Low-level laser therapy (LLLT) with adequate wavelength, intensity and dose can accelerate tissue repair. However, there is still unclear information about the properties of light, such as coherence and polarization. Some studies suggest that linearly polarized light can survive long distances in biological tissue.

The Methods: Three burns about 6 mm in diameter were made on the back of rats with liquid N (2). The lesion "L (//)" was irradiated with a He-Ne laser (lambda = 632.8 nm), D = 1.0 J / cm (2), with linear polarization parallel to the spine of the rat. The lesion "L (inverted v)" was irradiated with the

same laser and the same dose, but the light polarization was oriented perpendicular to the relative orientation. Lesion "C" was not irradiated to be considered a control. The animals were sacrificed on days 3-17 after lesion formation. Samples were taken and prepared for histological analysis.

Results: The histological analysis showed that irradiated wounds healed faster than non-irradiated wounds. In addition, it has been observed that the wound healing of the skin depends on the polarization orientation in relation to a reference axis such as the animal's spine.

Burns. 2004 Jun; 30 (4): 362-7.
Low-Level Laser Therapy - A Conservative Approach To The Burn Scar?
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Burn scars are known to be difficult to treat because they tend to worsen with hypertrophy and contractures. Various experimental and clinical efforts have been made to mitigate their effects, but the problem has not been solved. Because patients keep asking about low-level laser therapy (LLLT) and believing in its effectiveness on burn scars, and since previous studies show conflicting results on the impact of LLLT on wound healing, this prospective study was designed to assess the effects of LLLT can be objectified on burn scars.

Nineteen patients with 19 burn scars were treated twice a week with a 400 mW 670 nm soft laser over a period of 8 weeks. A control area that was not irradiated was defined for each patient. The Vancouver Scar Scale (VSS) for macroscopic evaluation and the Visual Analogue Scale (VAS) for itching and pain were evaluated as parameters. Photographic and clinical assessments were recorded for all patients. Seventeen out of 19 scars showed improvement after treatment. The average rating on the VSS sank in the treated areas from 7.10 +/- 2.13 to 4.68 +/- 2.05 points, while the VSS in the control areas fell from 6.10 +/- 2.86 points 5.88 +/- 2.72 points fell. A correlation could be found between scar duration and improvement through LLLT.

The present study shows that the 400 mW 670 nm soft laser has a positive, but sometimes limited effect on burn scars in terms of macroscopic appearance, itching and pain.
