

Scars

Lasers Surg Med. 2004;34(5):451-7.

Evaluation of the use of low level laser and photosensitizer drugs in healing.

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BACKGROUND AND OBJECTIVES: In the last decade, many different kinds of therapies have emerged as a consequence of advances in the field of applied technology. It is known that low level laser therapy contributes to tissue healing; however, the use of photodynamic therapy (PDT) in healing and the scar formation processes has not been fully explored. The present study analyses the effect of low level laser InGaAlP (685 nm), radiation, either alone or combined with a phthalocyanine-derived photosensitizer (PS) in a gel base delivery (GB) system, on the healing process of cutaneous wounds in rats. **STUDY DESIGN/MATERIALS AND METHODS:** The rats were divided into six groups: control (untreated) (CG), gel base (GB), photosensitizer (PS), laser (LG), laser+photosensitizer (LPS), and laser+photosensitizer in a GB (LPSG). Standardized circular wounds were made on the dorsum of each rat with a skin punch biopsy instrument. After wounding, treatment was performed once daily and the animals were killed at day 8. Tissue specimens containing the whole wound area were removed and processed for histological analysis using conventional techniques. Serial cross-sections were analyzed to evaluate the organization of the dermis and epidermis as well as collagen deposition. **RESULTS:** The animals of groups LG, PS, LPS, and LPSG presented higher collagen content and enhanced re-epithelialization as compared to CG (control) and GB rats. Connective tissue remodeling was more evident in groups LPS and LPSG. **CONCLUSIONS:** The results clearly indicated a synergetic effect of light+photosensitizer+delivery drug on tissue healing. PDT did not cause any healing inhibition or tissue damage during the healing process. Copyright 2004 Wiley-Liss, Inc.

J Photochem Photobiol B. 2003 Apr;70(1):39-44.

The effect of 880 nm low level laser energy on human fibroblast cell numbers: a possible role in hypertrophic wound healing.

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Low level lasers (LLLs) have been shown to induce therapeutic effects in wound healing. However, there have been few LLL studies on burn wounds which may become unsightly, hypertrophic and impair function. Inhibitory effects on the healing of fibrotic wounds, prone to hypertrophy may be expected to reasonably reduce the problems accompanying hypertrophic scarring. The effects of LLL wavelengths and treatment parameters on wound healing cells in vitro often demonstrate meaningful results and without concurrent ethical difficulties of clinical trials. This experiment investigated the effect of an 880 nm, 16 mW GaAlAs diode at 2.4 and 4 J/cm² on cell numbers of two human fibroblast cell lines, derived from hypertrophic scar (HF) and normal dermal explants (NF), respectively. After irradiation by 880 nm LLL, cell numbers were measured utilising methylene blue bioassay and read by the spectrophotometer in the same microculture plates. HF and NF exhibited decreased cell numbers as compared to sham-irradiated controls. HF cell number, after 2.4 J/cm², was significantly lower on day 5 (P<0.05). The NF cell numbers were significantly lower on day 4 and/or day 5 (P<0.05). The results have implications on hypertrophic wound healing and further studies are required.

Lasers Surg Med. 1998;22(5):294-301.

Stimulatory effect of 660 nm low level laser energy on hypertrophic scar-derived fibroblasts: possible mechanisms for increase in cell counts.

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BACKGROUND AND OBJECTIVE: Varying effects of red light wavelengths on in vitro cells have been reported. Low level lasers (LLL) are employed to assist wound healing especially for indolent ulcers. On healing, burn wounds may become hypertrophic, resulting in excessive wound contraction, poor cosmesis, and functional impairment. This study enquired whether 660 nm LLL affected hypertrophic scar-derived fibroblasts. **STUDY DESIGN/MATERIALS AND METHODS:** The experiments investigated the effect of a 660 nm, 17 mW laser diode at dosages of 2.4 J/cm² and 4 J/cm² on cell counts of two human fibroblast cell lines, derived from hypertrophic scar tissue (HSF) and normal dermal (NDF) tissue explants, respectively. The protocol avoided transfer of postirradiated cells. Estimation of fibroblasts utilized the methylene blue bioassay. **RESULTS/CONCLUSION:** The post-660 nm-irradiated HSFs exhibited very significantly higher cell counts than controls P < 0.01 on days 1-4 (Mann-Whitney U-test), and P < 0.01 on days 1-3 for similarly irradiated NDFs.