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The Effect of Low Level Laser Therapy on Wound Healing

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Abstract

Introduction: Tissue healing is a complex process and comprises vascular and cellular alterations, epithelial and fibroblasts proliferation, synthesis and deposition of collagen, elastin and proteoglycan production, revascularization and wound contraction. Low-level laser therapy (LLLT) has been promoted for its beneficial effects on tissue healing and pain relief. Low doses of laser were found to stimulate the regeneration not only of mechanically induced wounds but also of burns. This study reviews the basic principles of biostimulation of wound healing by low-energy lasers.

Methods: A chemically induced diabetic foot ulcer rat model was used for studying the wound healing effect *in vivo*. In the *in vitro* mechanistic studies, human fibroblast cells, human umbilical vein endothelial cells and mouse macrophage cells were assessed for tissue regeneration, angiogenesis and anti-inflammatory activities, respectively.

Results and discussion: *in vivo* results demonstrated a significant reduction of wound area in laser group as compared to control. Laser could significantly stimulate proliferation in a dose dependent manner. Besides, low level laser could significantly increase the cell migration and tube formation of HUVEC in the angiogenesis study. Furthermore, significant inhibition of nitric oxide production was found in laser-treated macrophage cells, suggesting its anti-inflammatory activity.

Conclusion: Low-level laser can be safely applied to accelerate the resolution of cutaneous wounds, although this fact is closely related to the election of parameters such as dose, time of exposure and wavelength.

Keywords: Low Level Laser, Wound Healing, regeneration, angiogenesis and anti-inflammatory

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