

Effect of Laser Phototherapy (660 nm) on Type I and III Collagen Expression During Wound Healing in Hypothyroid Rats: An Immunohistochemical Study in a Rodent Model

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Abstract

Objective: The aim of this study was to assess, immunohistochemically, the impact of hypothyroidism and the effect of laser phototherapy on the expression of type I and III collagen during wound healing.

Background data: Hypothyroidism has been associated with the disruption of the body's metabolism, including the healing process. Laser phototherapy has been shown to be effective in improving wound healing, but its usefulness on enhancing wound healing under hypothyroid condition remains unknown.

Materials and methods: Using general anesthesia, a standard surgical wound (1 cm²) was created on the dorsa of 48 Wistar rats divided into four groups of 12 animals each: control euthyroid (EC), euthyroid plus laser (EL), control hypothyroid (HC), and hypothyroid plus laser (HL). The irradiation with laser GaAlAs (660 nm, 40 mW, 1 W/cm², continuous wave [CW], $\phi = 0.04$ cm²) started immediately after surgery and was repeated every other day until end-point of study was reached, and animals were euthanized (i.e., 7 and 14 days). Laser light was applied on four different points (6 J, 150 sec and 150 J/cm² per point). Hypothyroidism was induced in rats with propylthiouracil (0.05 g/100 mL) administered orally for 4 weeks and maintained until the end of the experiment. Immunohistochemistry for collagen I and III was performed with EnVision™ in the specimens removed.

Results: Seven days after the surgery EC, EL, and HL groups showed higher immunoeexpression of collagen I and lower immunoeexpression of collagen III in the newly formed tissue. There was increased immunoeexpression of collagen I in EC when compared with HC ($p = 0.019$). The immunoeexpression of collagen III was significantly lower in EL than in EC ($p = 0.047$) and HL ($p = 0.019$). No significant difference was found in the experimental period of 14 days among the groups.

Conclusions: Laser light therapy performed with the parameters of this investigation increased immunoeexpression of collagen type I during tissue repair, and improved the quality of newly formed tissue in the presence of hypothyroidism.