

# Effects of different setting of diode laser on the mRNA expression of growth factors and type I collagen of human gingival fibroblasts

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**Abstract** The aim of this study was to analyze the influence of non-surgical applications of diode laser (940 nm) on the cell proliferation and mRNA expressions of type I collagen and growth factors in human gingival fibroblasts (GF). Gingival fibroblasts were isolated from human gingival connective tissue of systemically healthy individuals. Cells were treated with different laser parameters as follows; (1) Infected pocket setting (power: 2 W, pulse interval: 1 ms, pulse length: 1 ms, 20 s/cm<sup>2</sup>); (2) Perio-pocket setting (power: 1.5 W, pulse interval: 20 ms, pulse length: 20 ms, 20 s/cm<sup>2</sup>); and (3) Biostimulation setting (power: 0.3 W in continuous wave, 20 s/cm<sup>2</sup>). Proliferation of GF was evaluated after different laser applications using a real-time cell analyzer. Total RNA was isolated on day 2 and cDNA synthesis was performed. Type I collagen, insulin-like growth factor (IGF), vascular endothelial growth factor (VEGF) and transforming growth factor-beta (TGF-β) mRNA expressions were determined with quantitative RT-PCR. In a proliferation experiment, no significant differences were observed in the different laser applications when compared to the control group. Statistically significant increases in IGF, VEGF, and TGF-β mRNA expressions were noted in the laser groups when compared to the untreated control group (p < 0.05). A significant increase in collagen type I mRNA expression was noted in

only biostimulation set-up of diode laser (p < 0.05). The results of this study demonstrate that non-surgical laser applications modulate behavior of gingival fibroblasts inducing growth factors mRNA expressions and these applications can be used to improve periodontal wound healing.

**Keywords** Diode laser · Low-level laser therapy · Gingival fibroblasts · Growth factors · Type I collagen · Proliferation

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