Format: Abstract

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Metrical and histological investigation of the effects of low-level laser therapy on orthodontic tooth movement.

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Abstract

The aim of this study was to evaluate the effects of 820-nm diode **laser** on osteoclastic and osteoblastic cell proliferation-activity and RANKL/OPG release during orthodontic tooth movement. Thirty-eight albino Wistar rats were used for this experiment. Maxillary incisors of the subjects were moved orthodontically by a helical spring with force of 20 g. An 820-nm Ga-Al-As diode **laser** with an output power of 100 mW and a fiber probe with spot size of 2 mm in diameter were used for **laser** treatment and irradiations were performed on 5 points at the distal side of the tooth root on the first, second, and 3rd days of the experiment. Total **laser** energy of 54 J (100 mW, 3.18 W/cm(2), 1717.2 J/cm(2)) was applied to group II and a total of 15 J (100 mW, 3.18 W/cm(2), 477 J/cm(2)) to group III. The experiment lasted for 8 days. The number of osteoclasts, osteoblasts, inflammatory cells and capillaries, and new bone formation were evaluated histologically. Besides immunohistochemical staining of PCNA, RANKL and OPG were also performed. No statistical difference was found for the amount of tooth movement in between the control and study groups ($p > 0.05$). The number of osteoclasts, osteoblasts, inflammatory cells, capillary vascularization, and new bone formation were found to be increased significantly in group II ($p < 0.05$). Immunohistochemical staining findings showed that RANKL immunoreactivity was stronger in group II than in the other groups. As to OPG immunoreactivity, no difference was found between the groups. Immunohistochemical parameters were higher in group III than in group I, while both were lower than group II. On the basis of these findings, low-level **laser** irradiation accelerates the bone remodeling process by stimulating osteoblastic and osteoclastic cell proliferation and function during orthodontic tooth movement.

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