



ORIGINAL ARTICLE

Expression of receptor activator of nuclear factor - κ B ligand, receptor activator of nuclear factor - κ B, and osteoprotegerin, following low-level laser treatment on deproteinized bovine bone graft in rats

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Abstract

The aim of this study was to investigate by immunohistochemistry the effects of low-level laser (LLL) irradiation on the expression of the receptor activator of nuclear factor - κ B ligand (RANKL), osteoprotegerin (OPG), and the receptor activator of nuclear factor - κ B (RANK) in deproteinized bovine bone grafts in rats. Twenty-four male Sprague-Dawley rats aged 15 weeks were allocated to either an experimental group that underwent LLL irradiation during bone healing at the bone graft sites of the rats' calvarial bone defects or a control group. In the experimental group, gallium-aluminum-arsenide (Ga-Al-As) diode LLL (wavelength 808 nm; output 96 mW) was used to irradiate three areas on and around bone defects. The radiation was administered by the contact method for 10 s at 8.3 J/cm², once a day for 7 days. The total dose over the complete schedule was 40.32 J. The animals were killed on days 7, 14 or 21.

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The results of immunohistochemical analysis showed that the expression of RANKL ($P=0.199$), OPG ($P=0.035$), and RANK ($P=0.020$) in the experimental group significantly increased from day 7, with a more even distribution than in the control group, and that this difference prevailed until the end of the experiment. Bone density of the experimental group after trichrome staining was also higher than in the control group. These results suggest that LLL irradiation facilitates bone metabolism during bone healing at the sites of deproteinized bovine bone grafts in rats.

Keywords Receptor activator of nuclear factor kappa B ligand - Receptor activator of nuclear factor kappa B - Osteoprotegerin - Low-level laser therapy (LLLT) - Deproteinized bovine bone

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