

Low-Level Laser Therapy on Bone Repair of Rat Tibiae Exposed to Ionizing Radiation

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Abstract

Objective: The purpose of this study was to evaluate the effects of low-level laser therapy (LLLT) on the repair of rat tibiae exposed to ionizing radiation (IR). **Background data:** IR causes structural changes that delay bone tissue repair. Properly dosed, LLLT improves the bone repair process. **Methods:** Seventy-two healthy Wistar rats were distributed into the following groups: Group I, sham control; Group II, LLLT; Group III, IR; and Group IV, IR and LLLT. Groups III and IV received a single dose (30 Gy) of gamma radiation and underwent surgery 28 days later. A noncritical sized bone defect (diameter 2.5 mm) was surgically created in all groups. Groups II and IV received three applications of postsurgical LLLT (GaAlAs, 808 nm, 100 mW, 0.028 cm², 3.57 W/cm², 20 sec, 2 J, \cong 71.4 J/cm²) on alternate days. Histomorphometry was assessed following digital image analysis. **Results:** The samples were evaluated on days 7, 14, and 21 after surgery; the IR protocol resulted in a significant reduction ($p < 0.018$) in bone formation in Group III compared with Group I. Significant increases ($p < 0.006$) in newly formed bone were noted in Group IV compared with Group III. No significant differences were observed between Group I and Group IV. **Conclusions:** LLLT increased the newly formed bone area during the initial phase of the tibiae repair process in rats exposed to IR.