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Enhancement of bone formation in rat calvarial bone defects using low-level laser therapy.

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OBJECTIVE: To evaluate the effect of low-level laser therapy (LLLT), using a GaAlAs diode laser device, on bone healing and growth in rat calvarial bone defects. **STUDY DESIGN:** An animal trial of 4 weeks' duration was conducted using a randomized blind, placebo-controlled design. Standardized round osseous defects of 2.7 mm diameter were made in each parietal bone of 20 rats (n=40 defects). The animals were randomly divided into an experimental and a control group of 10 animals each. In the experimental group, a GaAlAs diode laser was applied immediately after surgery and then daily for 6 consecutive days. The control group received the same handling and treatment, but with the laser turned off. Five rats from each group were killed on day 14 and the remainder on day 28 postoperatively. From each animal, tissue samples from one defect were prepared for histochemistry and samples from the contralateral defect for histology. Levels of calcium, phosphorus, and protein were determined by using atomic absorption spectrometry, colorimetry, and photometry, respectively. Student t-test and Mann-Whitney were used for statistical analyses. **RESULTS:** At both time points the tissue samples from the experimental animals contained significantly more calcium, phosphorus, and protein than the controls. Similarly, histological analyses disclosed more pronounced angiogenesis and connective tissue formation, and more advanced bone formation in the experimental group than in the controls. **CONCLUSION:** LLLT may enhance bone formation in rat calvarial bone defects. Copyright 2004 Elsevier Inc.