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Infrared Laser Light Further Improves Bone Healing When Associated with Bone Morphogenic Proteins: An *in Vivo* Study in a Rodent Model

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ABSTRACT

Objective: **This study assessed histologically the effect of laser photobiomodulation (LPBM) on the repair of surgical defects created in the femurs of Wistar rats treated or not treated with bone morphogenic proteins (BMPs) and organic bovine bone graft.** ***Background Data:*** **This paper is part of an ongoing series of works in which biomaterials are used in association with LPBM. Several previous reports by our group have shown that the use of laser photobiomodulation improves the treatment of bone defects.** ***Materials and Methods:*** **Forty-eight adult male Wistar rats were divided into four randomized groups: group I (control, n = 12); group II (LPBM, n = 12); group III (BMPs + organic bovine bone graft, n = 12); and group IV (BMPs + organic bovine bone graft + LPBM, n = 12). The irradiated groups received seven irradiations every 48 h, beginning immediately after the surgical procedure. The laser therapy (λ = 830 nm, 40 mW CW, ϕ = ~0.6 mm) consisted of 16 J/cm^2 per session divided equally over four points (4 J/cm^2 each) around the defect. The subjects were sacrificed after 15, 21, and 30 d, and the specimens were routinely embedded in wax, stained with hematoxylin and eosin and sirius red, and analyzed under light microscopy.** ***Results:*** **The results showed histological evidence of increased deposition of collagen fibers (at 15 and 21 d), as well as an increased amount of well-organized bone trabeculae at the end of the experimental period (30 d) in the irradiated animals versus the non-irradiated controls.** ***Conclusion:*** **The use of LPBM with BMPs and organic bovine bone grafts increases the positive biomodulating effects of laser light.**

INTRODUCTION

MODERN DENTISTRY is challenged daily by the need to recover bone loss due to several etiologic factors. Several autologous and xenographs have been used to provide a framework or stimulate new bone formation, and many times these grafts respond positively to the use of certain wavelengths of laser energy.[1] The use of bone morphogenic proteins (BMPs) is not new,[2–4] and they have been widely used in the reconstruction of the alveolar ridge,[5] for the recovery of bone loss, and on several types of bone defects.[6–13] Despite the growing successful application of laser photobiomodulation (LPBM) in bone repair, there are few studies assessing the association of laser light with biomaterials.[1,8–10,12] Thus there is a need for further studies to determine the most effective ways to apply LPBM combined with different biomaterials for this new type of treatment.

MATERIALS AND METHODS

This study was approved by the Animal Ethics Committee of the School of Dentistry of the Federal University of Bahia.

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