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# Efficacy of Photodynamic Therapy in Minimizing Bisphosphonate-Related Osteonecrosis of the Jaws After Dental Extraction: A Preliminary Animal Study.

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## Abstract

**PURPOSE:** Except for a few case reports, there is no study on the efficacy of photodynamic therapy (PDT) in decreasing or preventing bisphosphonate-related osteonecrosis of the jaws (BRONJ). This preliminary animal study assessed the effectiveness of this clinical treatment.

**MATERIALS AND METHODS:** Zoledronic acid was administered to 20 rats for 5 weeks. Two weeks later, a first molar was extracted from each rat. The rats were randomized to control and PDT groups. PDT was performed in the experimental group after **surgery** and at weeks 1, 2, 3, 4, 5, 6, and 7 after **surgery**. In the 8th week, BRONJ signs were evaluated by an observer blinded to randomization. Rats were euthanized and underwent histopathologic and histomorphometric evaluations. Clinical signs were compared using the Fisher test. Histomorphometric parameters were compared using the Mann-Whitney U test ( $\alpha = 0.05$ ).

**RESULTS:** Two rats were lost from each group. Bone exposure decreased from 7 rats in the control

group to 1 rat in the PDT group ( $P = .010$ ). The stage of BRONJ decreased significantly from 7 rats in stage 1 to only 1 rat in stage 1 ( $P = .010$ ). PDT decreased inflammation considerably for gingival eosinophils and lymphocytes and bone neutrophils, eosinophils, and lymphocytes. A larger percentage of live bone and smaller percentages of necrotic bone, empty lacunae, and neovascularization were observed in the PDT group. PDT also maintained bone remodeling, indicated by a large number of osteoclasts ( $P \leq .001$  for all comparisons by Mann-Whitney U test).

**CONCLUSIONS:** Within the limitation of this preliminary animal study, PDT was found to be considerably effective clinically and histopathologically in decreasing or preventing BRONJ in rats. Future human studies are needed to verify these results.

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