**THE EFFECT OF ALENDRONATE AND INTERMITTENT PTH ON IMPLANT FIXATION IN OVX RATS**

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**Introduction:** Continuous exposure to parathyroid hormone (PTH) typically results in bone resorption in vivo. However, administration at intermittent doses will lead to bone formation by increasing osteoblast numbers and activity levels. Animal studies have shown that intermittent PTH administration increases bone mass and bone formation in cancellous and cortical bone, leading to increased compressive bone strength. The purpose of this study was to analyze the osseous incorporation of a polymethylmethacrylate-implant in osteoporotic bone, while specimens were treated with systemic administration of intermittent PTH or the bisphosphonate alendronate.

**Materials and Methods:** Forty-eight female Wistar rats were randomized into four groups and ovariecotomies (OVX) were performed in three groups with a sham operation in one group. After 12 weeks, polymethylmethacrylate cemented rods were implanted in the tibia and femur. The three OVX groups received PTH (60 μg/kg BW), alendronate (200 μg/kg BW) or sodiumchloride (0.5 ml/kg BW) alone, whereas, the sham-group was treated solely with sodiumchloride for two weeks. After harvesting the tibiae and femora, the cemented rods were analyzed for bone volume density (BVD) and bone mineral density (BMD). All measurements were tested for significance using one-way analysis of variance (ANOVA) followed by Scheffe’s post-hoc test at the 0.05 significance level.

**Results:** The results of the bone volume density (%) showed significant differences in the specimens treated with PTH compared to the other three groups. Intermittent PTH led to a 20 % improvement in BVD compared to the group treated with alendronate (p = 0.173). Compared with the OVX-Group, intermittent PTH led to a 50 % increase in BVD (p < 0.0001) and compared with the control-group, PTH led to a 30 % improvement (p = 0.030). The bone mineral density measurements showed a significant increase in the specimens treated with intermittent PTH (p = 0. 0227) compared to the OVX-group. PTH established an implant bone contact of 54.4% – approximately three times the contact fraction of the OVX and the controls, and almost double the contact fraction compared to the group treated with alendronate.

**Discussion:** These findings suggest that intermittent dosing of parathyroid hormone increases bone formation and thereby enhances implant fixation in bone. The clinical significance of these findings might be that application of intermittent PTH may be beneficial for implant fixation in fractures, non-unions, and cementless prosthetic replacements.

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