

# Evaluation of Collagen Membranes Coated with Testosterone and Alendronate to Improve Guided Bone Regeneration in Mandibular Bone Defects in Minipigs

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## ABSTRACT

**Objectives:** The purpose of the present *in vivo* study was to evaluate whether pericard collagen membranes coated with ancillary amounts of testosterone and alendronate in a poly-lactic glycolic acid (PLGA) carrier as compared to uncoated membranes will improve early bone regeneration.

**Material and Methods:** In each of 16 minipigs, four standardized mandibular intraosseous defects were made bilaterally. The defects were filled with Bio-Oss<sup>®</sup> granules and covered with a non-coated or coated membrane. Membranes were spray-coated with 4 layers of PLGA containing testosterone and alendronate resulting in 20, 50 or 125 µg/cm<sup>2</sup> of testosterone and 20 µg/cm<sup>2</sup> alendronate (F20, F50, F125). Non-coated membranes served as controls (F0). Animals were sacrificed at 6 and 12 weeks after treatment. Qualitative and quantitative histological evaluations of bone regeneration were performed. Differences between groups were assessed by paired Student's t-test.

**Results:** Light microscopical analysis showed new bone formation that was in close contact with the Bio-Oss<sup>®</sup> surface without an intervening non-mineralized tissue layer. Histomorphometric analysis of newly formed bone showed a significant 20% increase in area in the F125 coated membrane treated defects (40 [SD 10]%) compared to the F0 treated defects after 6 weeks (33 [SD 10]%, P = 0.013). At week 12, the total percentage of new bone was increased compared to week 6, but no increase in newly formed bone compared to F0 was observed.

**Conclusions:** The data from this *in vivo* study indicate that F125 collagen membranes coated with testosterone and alendronate resulted in superior bone formation (+24%) when normalized to control sites using uncoated membranes.

**Keywords:** bone regeneration; bone substitutes; mandible; surgery; membranes; minipig.

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