Kirchhoff M, Lenz S, Henkel KO, Frerich B, Holzhüter G, Radefeldt S, Gerber T
Lateral augmentation of the mandible in minipigs with a synthetic nanostructured hydroxyapatite block
J Biomed Mater Res B Appl Biomater. 2011 Feb;96(2):342-50

Abstract: The purpose of this study was to evaluate biomaterial degradation and new bone formation after implantation of a nanostructured hydroxyapatite (HA) grafting block. Furthermore, physical characteristics of the biomaterial were measured. The biomaterial consists of nanostructured HA embedded in a porous matrix of silica (SiO2) gel. The blocks with two different contents of silica (group A: 24 wt % and group B: 39 wt %) were fixed with titanium screws at the lateral aspect of the mandible of minipigs (n ¼ 5). The specific surface areas of both blocks were measured using Brunauer–Emmett–Teller (BET) equation and mercury intrusion. In all animals, the wound healing was uneventful. After 5 weeks, the biomaterial percentage was 51.5% 6 12.1% for group A and 33.2% 6 5.9% for group B (p ¼ 0.017). New bone formation accounted to 7.6% 6 6.0% for group A and 15.3% 6 8.3% for group B (p ¼ 0.126) after 5 weeks. After 10 weeks, further resorption of the biomaterial led to percentages of 30.6% 6 10.0% for group A and 12.1% 6 6.7% for group B (p ¼ 0.000). After 10 weeks, new bone formations were measured to be 34.1% 6 10.8% in group A and 39.9% 6 13.5% in group B (p ¼ 0.383). The rate of degradation of the biomaterial is controlled by the composition of the material. A higher content of silica gel matrix leads to faster degradation of the biomaterial. The formation of new bone failed to show a significant difference between both groups. VC 2010 Wiley Periodicals,