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Comparison of bone substitutes in a tibia defect model in Wistar-rats
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Various bone graft substitutes were used in clinical practise in the treatment of bone defects after trauma or osteoporosis. Many synthetic biomaterials were developed in recent years primarily based on hydroxyapatite (HA). NanoBone® is a nanocrystalline hydroxyapatite (HA) embedded in a porous matrix of silica (SiO₂). The ratio of HA:SiO₂ varied between 76:24 (wt%; NanoBone®) and 61:39 (wt%; Nanobone® S). The two bone substitutes NB and NB S and a natural bovine bone substitute Bio-Oss® (BO) were evaluated by means of implantation in the tibia of the rat. The aim of this study was to analyze the remodelling process and to measure new bone formation and degradation after implantation of these biomaterials.

A tibia defect model was used for all investigations with testing periods of 12, 21 and 84 days. (n=5 for each time point).

The results showed, that all bone grafts were well accepted by the host tissue without inflammatory reactions. In comparison to the biomaterial BO, NanoBone® and NanoBone® S were quickly degraded, whereas autologous proteins were incorporated into nanopores. New bone formation was statistically higher in NanoBone® S compared to Bio-Oss® in defect area after 84 days implantation. The presence of osteoclasts in tissue sections were demonstrated by TRAP- and ED1-immunohistology.