

Gerber T, Lenz S, Holzhüter G, Götz W, Helms K, Harms C, Mittlmeier T
Nanostructured Bone Grafting Substitutes – A Pathway to Osteoinductivity
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Abstract. The comparative investigation of a highly nanoporous bone grafting material (NanoBone S, NBS) and a sintered hydroxyapatite ceramic (Cerabone, CB) aimed to show the influence of the structure of the material on osteoinductivity.

NBS consists of synthetic nanocrystalline hydroxyapatite embedded in a porous silica gel matrix. Its specific surface amounts 206 m²/g in contrast to CB with a specific surface of 0.4 m²/g.

The biomaterials were implanted in the neck region of 18 sheep and left there for the periods of 6, 12 and 26 weeks. In each case granulate was implanted superficially into the trapezius muscle and into the subcutaneous adipose tissue respectively.

The samples were analysed by micro-CT, histochemistry, immunohistochemistry and histomorphometry. In the case of NBS ossicles had developed. An intensive remodelling process was verifiable. The bone formation in CB was marginal.

As a basic phenomenon in NBS, the substitution of the original SiO₂ gel matrix by organic molecules forming an organic matrix around the embedded hydroxyapatite seems to be the key event causing these results.