学位論文内容の要約

学位論文題目

Periodontal tissue engineering by nano beta-TCP scaffold and fibroblast growth factor 2 in 1-wall infrabony defects of dogs
（イヌ 1 壁性骨欠損におけるナノ β-TCP スキャフォールドおよび FGF 2 を用いた Periodontal tissue engineering）

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Background and Objective: Nanoparticle bioceramics are being investigated for biomedical applications. We fabricated a regenerative scaffold comprising type I collagen and nano-sized beta-tricalcium phosphate (β-TCP). Fibroblast growth factor-2 (FGF-2) is a bioeffective signaling molecule, stimulating cell proliferation and wound healing. The aim of this study was to examine the effects of a nano-β-TCP/collagen scaffold loaded with FGF-2 on bioactivity, particularly on periodontal tissue wound healing.

Material and Methods: β-TCP was pulverized into nano-sized particles (84.4 nm) and dispersed. Nano-β-TCP scaffold was prepared by coating nano-β-TCP dispersion into a collagen sponge. Scaffolds were characterized by scanning electron microscopy (SEM), compressive testing, cell seeding and rat subcutaneous implant testing. Subsequently, the nano-β-TCP scaffold, nano-β-TCP scaffold loaded with FGF-2, and collagen sponge were implanted into the dog 1-wall infrabony defect model. Histological observations were made at 4 wk postsurgery.

Results: Nano-TCP particles were found to be attached to the fibers of the collagen sponge on SEM observation. Scaffold coated with nano-TCP showed higher compressive strength, and cytocompatibility when compared with non-coated collagen sponge. After coating, high porosity (> 95%) was maintained. Cell and tissue ingrowth into the nano-β-TCP scaffold and FGF2-loaded scaffold was frequently observed in rat subcutaneous implant tests. Histological samples from the periodontal defect model showed significant periodontal tissue repair following implantation of the nano-β-TCP scaffold loaded with FGF-2.

Conclusion: Nano-β-TCP coating strongly improved the bioactivity of collagen sponge. Nano-β-TCP scaffolds loaded with FGF-2 are useful for periodontal tissue engineering.