学位論文内容の要約

学位論文題目

Biocompatibility and bone conductive ability dose effects of beta-TCP nanoparticles applied on 3D scaffold.

（リン酸カルシウムナノ粒子含有量の違いがスキャフォールドの生物学的特性と骨伝導性に及ぼす効果）

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Nanoparticle bioceramics have become anticipated for bone tissue engineering. For this study, three-dimensional collagen scaffold was modified with different doses of TCP nanoparticles. Then dose effects on biocompatibility and bone forming ability were examined. Collagen scaffold was applied, respectively, with 1, 5, 10, and 25 wt % TCP nanoparticle dispersion and was labeled as TCP1, TCP5, TCP10, and TCP25. In SEM images, the application of TCP nanoparticles provided the nanostructure on the scaffold. Compressive strength, calcium ion release, and enzyme resistance of scaffold applied with TCP nanoparticles were promoted in TCP dose-dependently. Bioactive effects of TCP nanoparticles were exerted in the optimal application dose. In the assessment of rat subcutaneous tissue response, TCP5 showed excellent cell-ingrowth behavior as well as new blood vessel formation. When TCP10 was applied, osteoblastic E1 cell proliferation and rat bone augmentation of cranial bone were greater than in any other scaffold. The bone area of TCP10 was 7.7-fold greater than that of non-treated scaffold. In contrast, TCP25 consistently exhibited adverse biological effects. These results suggest that application dose of TCP nanoparticles affected the scaffold biocompatibility and bone conductive ability.