

## Bone Formation with Improved Angiogenesis through 3-Dimensional Co-culture System

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It is well known that endothelial cells play very important roles in differentiation of osteoblasts as well as angiogenesis. In this study, our aim is an understanding that cell-cell interaction and cell-matrix interaction depending on inoculation cell density ratio and implantation period. So, we manufactured scaffolds, which were based on collagen and tricalcium phosphate. These biocompatible and porous scaffolds are suitable to bone regeneration and angiogenesis induction.

We co-cultured osteoblastic cells and HUVECs in the manufactured scaffolds. We varied inoculation cell density ratio. Capillary network formation and calcium deposition in the implanted scaffolds was observed using histological staining.

We found that inoculation cell density ratio was optimal at 1:1 and prolonged implantation period increased calcium deposition. As another result, we confirmed that there were more blood vessels under optimal condition than the other conditions. So we suggest that improved bone formation resulted from synergistic effects by cell-cell interaction. Also, we suggest that the increased ECM from intercommunication as well as endothelial cells promoted angiogenesis. Therefore these results demonstrate that the specific inoculation cell density ratio could improve the bone formation and moreover endothelial cells play very important role in bone formation.

### Reference

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