

Growth Behavior of Osteoblasts on Biodegradable Implants

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Summary:

Mainly, β -TCP as part of a composite implant seems to offer good ultrastructural properties for cell adhesion according to this in vitro study and cell numbers seem to be influenced by the degradation behaviour with higher cell numbers in the composite groups.

Abstract:

Introduction:

This study investigates the adhesion and proliferation behaviour of human osteoblast-like cells over time when incubated on surfaces of biodegradable screws and pins used for graft fixation in ACL reconstruction.

Methodology:

2 mm-sized-wedges of four bioresorbable implants [1. poly-L: -lactide acid (PLLA) screw, 2. PLLA/ β -tricalciumphosphate (PLLA/TCP) (70 %/30 %) screw, 3. poly-L: -lactide-co-glycolic acid/ β -tricalciumphosphate (PLGA/TCP) (70 %/30 %) screw and 4. PLLA pin] were incubated with human osteoblast-like cells. All probes were evaluated after 3, 7, 14 and 21 days by cell number count, determination of cell proliferation, observation of cell adhesion of human osteoblast-like cells under an environmental scanning electron microscope (ESEM), and by a live-dead assay.

Results:

Cell numbers were lower at all stages in both PLLA groups compared to the composite materials (PLLA/TCP and PLGA/TCP). A significant difference in cell proliferation was found after 21 days. The cells on both composite screws (PLLA/TCP and PLGA/TCP) maintained more contact points with the screw surface compared to the cells on PLLA screws under ESEM. No cytotoxicity could be observed in the live-dead assay.

Conclusion:

Mainly, β -TCP as part of a composite implant seems to offer good ultrastructural properties for cell adhesion according to this in vitro study. Cell numbers seem to be influenced by the degradation behaviour with higher cell numbers in the composite groups.