

R-18. Biocompatibility of Ti-8Ta-3Nb alloy with fetal rat calvarial cells

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background

β -titanium alloys are useful in biomedical application because of their excellent mechanical properties. Titanium-8Tantalum-3Niobium (Ti-8Ta-3Nb) has recently developed as a new implant material. Ti-8Ta-3Nb alloy is composed of non-toxic elements and has better mechanical properties than commercially pure titanium (cp-Ti) or other $\alpha + \beta$ titanium alloys. However, its biocompatibility has not been adequately characterized.

materials & methods

In this study, the biocompatibility of a new β -type Ti-8Ta-3Nb alloy was assessed by scanning electron microscopy (SEM), cell proliferation, alkaline phosphatase analysis, and reverse transcription polymerase chain reaction (RT-PCR) method.

results & conclusion

Proliferation rate on Ti-8Ta-3Nb implant surface was equivalent to cp-Ti implant surface and showed better results than on titanium-6aluminum-4vanadium (Ti-6Al-4V) implant surface. However, when compared to confluent cultures of cells on plastic, proliferation rate was reduced on all test implant surfaces. In comparison to Ti-6Al-4V alloy, cp-Ti and Ti-8Ta-3Nb alloy enhanced alkaline phosphatase activity in vitro ($p < 0.001$). In RT-PCR analysis, COL-1 and BSP mRNA were expressed in cp-Ti and Ti-8Ta-3Nb alloy.

The present study did not show any difference in vitro biocompatibility between Ti-8Ta-3Nb alloy and cp-Ti as evaluated by osteoblast proliferation and differentiation. These properties could make Ti-8Ta-3Nb alloy a new implant material for medical and dental fields.