

## **PR-II-16. The effect of alkali- and heat-treated titanium surfaces on differentiation of osteoblast**

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### **Purpose**

The purpose of this study was to elucidate cellular events that followed cell adhesion to alkaline-treated titanium surface and some of the cellular pathways that regulated some cytokine releases by MTT assay, ELISA, alkaline phosphatase activity assay, and RT-PCR methods.

### **Materials and methods**

Osteoblast-enriched cell preparations were obtained from Sprague-Dawley 21 day fetal rat calvaria by sequential collagenase digestion. Polished Grade-II titanium (cp-Ti) disks or alkali-heat-treated titanium disks or titanium 6-aluminum 4-vanadium (15 mm in diameter, 1 mm in thickness) were placed in a 12-well plate. To investigate the cell attachment and proliferation, cells (50,000/ml) were seeded and allowed to attach onto each titanium dishes for 72 hrs in bGJb solution containing 10 % FBS. Cells seeded onto cp-Ti disks were served as the positive control. The biological response of fetal rat calvarial cells on alkali- and heat-treated titanium was assessed by cell proliferation, enzyme-linked immunoabsorbent assay (ELISA), alkaline phosphatase activity, and reverse transcription polymerase chain reaction (RT-PCR) analysis.

### **Results**

Cell proliferation on alkali- and heat-treated surfaces showed significantly higher level than on Ti-6Al-4V surface ( $p < 0.01$ ). In ELISA analysis, concentration of IL-1  $\beta$  and IL-6 were raised on the alkali- and heat-treated surfaces when the cells were grown to day 7. In comparison to cp-Ti and Ti-6Al-4V alloy, alkali- and

heat-treated titanium enhanced alkaline phosphatase activity ( $p < 0.001$ ). In RT-PCR analysis, alkaline phosphatase (ALP), bone sialoprotein (BSP), receptor activated nuclear factor ligand (RANKL) mRNA expression was increased on alkali- and heat-treated titanium but osteoprotegerin (OPG) mRNA expression did not show any difference.

### Conclusion

Alkali- and heat-treated titanium stimulates osteoblasts differentiation and facilitates bone remodeling.