

**0385**

**TITLE: The Influence of a Laser Modified Zirconia Implant Surface on Human Osteoblast In-vitro Behavior**

Beatriz F. Fernandes<sup>1</sup>, Mariana B. Cruz<sup>1</sup>, Joana Marques<sup>1</sup>, Sara Madeira<sup>2</sup>, Óscar Carvalho<sup>2</sup>, Filipe Silva<sup>2</sup>, António Mata<sup>1</sup>, João Caramês<sup>1</sup>

<sup>1</sup>Universidade de Lisboa, Lisboa, Portugal, <sup>2</sup>Universidade do Minho, Guimarães, Portugal

**Objectives** To evaluate the influence of laser passes in groove-texture zirconia implant surfaces on the in vitro response of human fetal osteoblasts

**Methods** Laser manufactured, meso-scale groove textured zirconia (YTZP) discs were produced using press-and-sintering techniques. All surfaces were treated with Nd:YAG laser to produce 25µm-spaced grooves. Each group had different number of laser passes (group A: 1; B: 2, C: 4 and D: 8 passes) in each groove site. Untextured zirconia discs were used as controls (UT). Sandblasted and acid-etched (SB-AE) protocol was applied to all samples to achieve  $2.25 \pm 0.42 \mu\text{m}$  mean surface micro-scale roughness. Human osteoblasts were cultured for 14 days by previously described methods. Cell morphology and adhesion were observed using scanning electron microscopy (SEM). Cell viability was evaluated at pre-defined time-points (1,3,7 and 14 days) using a commercial resazurin-based method. Alkaline phosphatase (ALP) activity of human osteoblasts was evaluated at 7 and 14 days using an enzymatic colorimetric assay. Collagen type I were evaluated at 3 days using enzyme-linked immunosorbent assay. All results were presented as mean  $\pm$  standard deviation (SD). Group comparisons were tested using Anova (Tukey's post-hoc) using appropriate statistical software and significance was set at  $p < 0.05$ .

**Results** Cell viability and proliferation increased over time for all groups, although without statistically significant differences between them ( $p > 0.05$ ), but significantly higher when compared to UT control ( $p < 0.05$ ) for 7 and 14 days evaluation. Collagen I levels were higher for all groups when compared to UT control ( $p < 0.05$ ) and ALP activity was significantly increased in group D and UT control when compared to other groups at 14 days ( $p < 0.05$ ).

**Conclusions** Osteoblast viability, proliferation and differentiation were significantly enhanced by laser surface groove texturing. A tendency towards an enhanced osteoblast differentiation for higher number of laser passes should be further investigated.