Nanometer Scale Titanium Surface Texturing Are Detected By Pathways Involving Survival Signaling

Ferreira, M.R.[1]; Bezerra, F.[1]; Nascimento, A.S.[1]; Rossi, M.C.[1]; Zambuzzi, W.F.[1]

[1]Bioassays and Cell Dynamics Lab, Dept of Chemistry and Biochemistry, Bioscience Institute, UNESP, Botucatu-SP, 18618-683. Email: wzambuzzi@ibb.unesp.br

Introduction: Cell adhesion has been widely studied in biological processes. It is known an adequate interaction of osteoblasts in the biomaterial surface ensures a rapid osseointegration, particularly by sequential cellular processes such as cell adhesion, proliferation and differentiation, which are controlled by signal transduction mechanisms responding to various stimuli, such as those chemical properties of surfaces of materials. **Objectives:** Evaluate the signal transduction mechanisms involved in the response to different nanometer scale titanium surfaces. **Material and Methods:** Pre-osteoblasts (MC3T3-E1) were cultured on different biomaterials and, after 4 hours, were evaluated: Cytotoxicity (MTT assay), cell adhesion (Crystal Violet) and proteins involvement in cell survival/death and proliferation (Western Blotting). To evaluate differentiation, osteoblasts were grown on discs up to 14 days when it was collected to detect alkaline phosphatase activity. **Results and Discussion:** Our results showed that the analyzed surfaces do not promote cytotoxic effects while cell adhesion was promoted. Moreover, osteoblasts differently respond to different titanium surfaces by triggering intracellular mechanisms governing cell adhesion and proliferation, here investigated by ERK pathway. In addition, all the analyzed surfaces promoted cell differentiation. **Conclusions:** Our results show that different titanium surfaces can be detected by biological signal transduction mechanisms, serving as biosensors on these events.

Keywords: Cell adhesion, Proliferation, Osteoblast, Biomaterials.
Financial support: FAPESP, CNPq and CAPES