Cell adhesion study to new endosteal implant by atomic force microscopy

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Till now, commercially pure titanium has been the most successful and widespread material used for these implants [1]. We tested morphological and mechanical properties of cell lines of alveolar fibroblasts placed on newly developed materials. We used the following modified titanium targets as a substrate for cells: 1. polished titanium; 2. rough machined titanium; 3. rough machined and alkalic corroded titanium; 4. rough machined, sandblasted and acid corroded titanium; 5. rough machined, sandblasted, acid and alkalic corroded titanium; 6. rough machined titanium covered by zirconium nitride. We used cell lines plased on Thermanox plastic discs as a control group. We imaged these cell lines on individual new material targets and we tested mechanical and adhesive properties of these cells by atomic force microscopy (AFM) and scanning electron microscopy (SEM). Measuring was performed with 0.1% glutaraldehyde fixation in air or in liquid and without chemical fixation in liquid. This study demonstrated that AFM can be used to obtain high resolution topographical images of cells, and to quantify the tip–cell interaction force and the surface elasticity or cell adhesity to the substrate [2]. With SEM we show control images of adhesive and topographic arrangement of cells and current results show that cells grow along topographic changes on substrate. AFM measuring determined the best properties of tested materials according to value of adhesive forces between cells and substrates.

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Reference

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