

Topography-induced alterations in adhesion structures affect mineralization in human osteoblasts on titanium

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Abstract

The influence of the surface topography of titanium on adhesion proteins like tensin was investigated to reveal a correlation between cellular structures and function in human osteoblasts. We investigated the following pure titanium surfaces: polished, machined, glass blasted, and corundum blasted with R_a values: 0.19, 0.54, 1.22, and 6.07 μm , respectively. Corundum-blasted titanium (CB) as the roughest surface with sharp edges inhibited the formation of fibrillar structures of tensin, impaired the colocalization of tensin and the $\beta 1$ integrin, and affected the organization of the actin cytoskeleton in MG-63 cells. These effects correlated with a reduced mineralization. We suggest that distinct alterations in adhesion structures due to the surface topography are responsible for differences in cell signaling, which lead to changes in the cellular function like mineralization.

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