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In vitro evaluation of cytotoxicity and surface properties of Ti–6Al–4V alloy implants

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The Ti-6Al-4V alloy, is an α + β titanium alloy with high strength, low density, high fracture toughness, excellent corrosion resistance and biocompatibility. Thus, commercially Ti–6Al–4V alloys are often the preferred materials for many orthopedic and dental applications. However, insufficient osseo-integration and fibrous tissue formation are some of the prominent problems encountered during service which necessitate application of bioactive surface modifications. Anodizing is a well-known electrochemical oxidation process for producing thick and stable oxide film on metals and alloys to improve their biocompatibility and bioactivity for bioengineering applications. In this experimental study, modification of Ti–6Al–4V alloy surfaces with different layer thicknesses were investigated using anodization process. The cytotoxicity were evaluated by MTT test. The interactions between Ti–6Al–4V alloy surfaces with cells in terms of cellular adhesion, proliferation and differentiation were examined. The cell cytotoxicity studies showed that anodized Ti–6Al–4V materials with high layer thickness create unique surface features to increase osteoblast adhesion and proliferation. These results supported that anodized Ti–6Al–4V alloys can be a good candidate for biomedical applications.

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