

The relationship between the bone response and surface modification of Ti implants by micro-arc oxidation-a mini review

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Abstract

Background: In recent years, micro-arc oxidation (MAO) plasmolytic treatment (MAPET) of the surface of valve metals, such as aluminum, magnesium, and titanium alloys, has gained increasing attention since it is a simple and rapid surface modification technology. The aim of the study was to discuss the surfaces of titanium discs which were treated by MAO technology; changes in the surface structure and chemical composition; biological effects like the attachment, spread, proliferation, and differentiation of osteoblastic cells; removal torque test results in an animal study; and histological examinations. Through the preliminary in vitro tests, we hoped to estimate the potential for the application of MAO technology to implant research by examining its clinical performance. Materials and methods: We summarized the results of the preliminary in vitro and in vivo tests from several articles to discuss the biological effects of MAO surface modification technology, and estimated its further development. Results: Titanium discs surface-treated by MAO technology exhibited excellent porosity and roughness. Changes in the microstructure may further promote hydroxyl apatite generation. Results of the preliminary tests showed that surfaces modified by the MAO technology had excellent biocompatibility. They had positive effects on bone tissue regeneration, but the mechanisms through which the macro-topography and microstructure result in cell responses are still unclear. Conclusions: In the present study, MAO surface modification technology had positive effects on osseoregeneration, and may have high potential for improving implant research.