

**Ministry of Higher Education
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Effect of Storage Methods and UV- photofunctionalization on Biomechanical Behavior of Commercially Pure Titanium

A Thesis

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Abstract

Background: dental implants are one of the most important methods to replace lost teeth, to increase the effectiveness of bone–implant connection to provide early loading after placement, implant is treated with ultraviolet (UV) light and stored in different mediums. The mechanisms of UV photofunctionalization and storage medium seemed to be independent on enhancing the bioactivity of titanium implants, and together was much more overwhelming.

Objectives of the study: Evaluation of the influence of storage method and ultraviolet (UV) photofunctionalization on biomechanical behavior of commercially pure titanium (CP Ti) implant and disks.

Materials and methods: forty-six titanium screws and fifty disks were prepared and then stored by using different storage methods (air or vacuum), with or without UV treatment. The disks were stored for 2,4 weeks and then surface characteristics for disks were evaluated with scanning electron microscopy in addition to surface roughness and contact angle measurements. The implant screws were stored for 4 weeks and then divided into two groups according to the healing periods 2 and 4 weeks (16 screws for each group).

Results: vacuum storage and air storage treated with ultraviolet light disks showed insignificant differences in contact angle test after storage in both period of test (2 and 4 weeks) and the disks remained hydrophilic, while air storage disks showed significant differences in contact angle in both period of test and the disks became highly hydrophobic after storage in air. Vacuum treated with ultraviolet light disks after both storage periods showed highly hydrophilic surface.

The titanium screw that stored in vacuum treated with UV show highly torque removal with mature bone present in histological examination and for screws that stored in air treated with UV or vacuum required moderate torque removal with histological examination showed an increase in the growth of bone cells while the air only group lesser torque removal required.

Conclusion: the vacuum storage and treated with UV light have synergistic effects on the surface biological properties of aged titanium surfaces. vacuum storage method and air storage with UV light treated had the same effect on torque removal and histological examination.