EVALUATION OF TITANIUM DENTAL IMPLANTS WITH A BIOACTIVE SURFACE TREATMENT:
HISTOLOGICAL COMPARATIVE STUDY USING A MINIPIG MODEL

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Dental implant coating materials as well as new techniques of coating deposition are being developed for the improvement of osseointegration. The aim of this investigation is to histologically analyze the interface between the bone and surface modified dental implants surgically placed on vietnamese minipig as an animal model. Wollastonite (CaSiO$_3$) and titanium dioxide (TiO$_2$) have been evaluated as coating materials in previous in vitro tests, showing a beneficial behavior on the titanium alloy Ti6Al4V surface sintered by the incidence of laser CO$_2$. For the experiment, 48 screw type Ti6Al4V alloy dental implants were specially fabricated by Mageotec ®. Samples were divided in 4 groups and inserted in the lower jaws of four vietnamese minipigs with an average bodyweight of 18 kg and 10 months of age according to FELASA guidelines. After operation, animals were monitored daily to evaluate their general health until the day of euthanasia 1 month later. Thereafter, slides from each sectioned block of the jaw-bones were subjected to histological investigations. After tissue processing, samples were observed under a light microscope. These showed lamellar bone at the bone-implant interface, which is characteristic of the second stage of osseointegration from the 6 weeks of recovery time. Histologic results confirmed that these implants with different surfaces maintained a good level of osseointegration with a continuous remodeling at the interface in the bone structure around the thread. Coated samples with both materials, CaSiO$_3$ and TiO$_2$, sintered at different levels of CO$_2$ laser power presented high bone-implant contact percentage and similar histological outcomes.

Keywords: Osseointegration, histology, dental implant

References:

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