

SURFACE CHARACTERIZATION OF A NEW CERAMIC DENTAL IMPLANT

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ABSTRACT

This research compares the polished surface of two commercially available Straumann® dental implants, made in zirconia and in titanium grade IV. The analysis was done on a Confocal Profilometer at 50x. Results from this analysis show a similar average roughness over the surface (SA value) of the titanium (1,9234 µm) and zirconia implant (1,8585 µm).

Keywords: dental implant, zirconia, titanium, surface characterization, roughness.

INTRODUCTION

Success or failures of dental implants are directly related to the degree of integration of the implant material by surrounding soft and hard tissue (Zhao, 2014). So-called rough dental implant surfaces have become an important issue mainly because numerous experimental reports from animal studies have pointed to a more rapid bone response to roughened surfaces than to smoother polished or turned surfaces (Wennerberg, 2000).

According to the literature, 3D evaluations like average roughness over a surface (the SA value) are preferable than 2D measurements. This SA value presents information about average height deviations from a given surface area. Thus the SA parameter provides a considerably more consistent and reliable value and is not influenced by the measurement direction. In general, a positive correlation is found between an increasing SA value and stronger bone or tissue integration, at least up to a certain level of roughness. According to Wennerberg (2009) there is a stronger bone response to the sandblasted/acid-etched surface.

Dental implants are usually made in titanium. However, due to biological and esthetic issues, dental implant manufacturers have recently developed implants made in a ceramic material, zirconia. This material is believed to promote a better biological response of the surrounding tissues (bone and gingiva).

In this way, the research here presented consisted on a surface test (with a Confocal Profilometer, 50x) of the polished part of two types of implants:

- Titanium implant, type 4, Straumann SLA® (sandblasted, large-grit, acid-etched)
- Zirconia implant Straumann Pure Ceramic ZLA™ (MIC: 4.1mm; 8mm; AH 4mm).

RESULTS AND CONCLUSIONS

The results of the profilometer analysis, comparing titanium and zirconia surfaces, are presented in Fig. 1. Higher roughness is visualized in reddish colour.

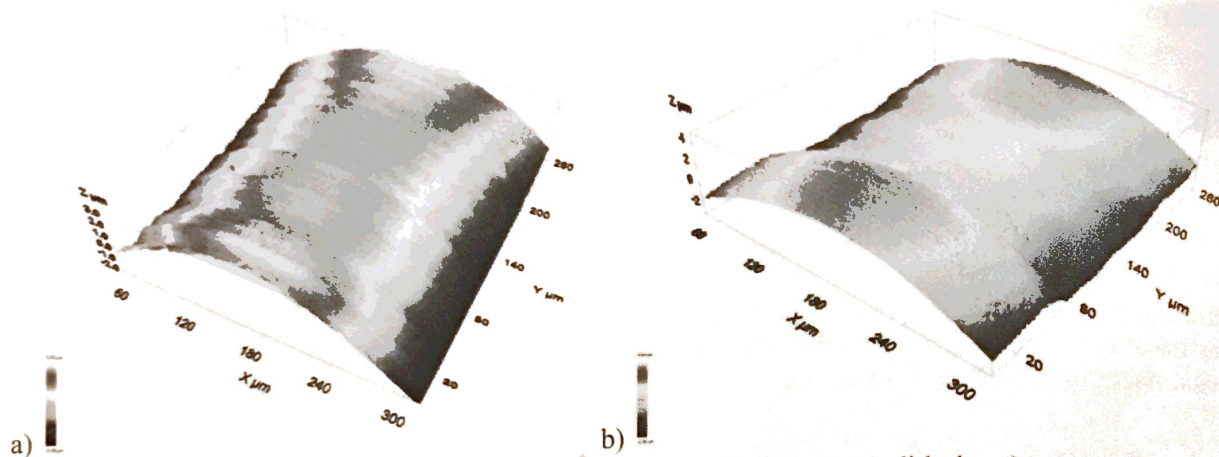


Fig. 1 - a) Confocal Profilometer results of titanium implant (polished part)
b) Confocal Profilometer results of zirconia implant (polished part)

Although the analysis was done on the “polished part” of the implants, it seems that this area is not absent of roughness. Table 1 presents the SA values for titanium and zirconia implants.

Table 1 - SA values of the titanium and zirconia dental implants

	Titanium implant	Zirconia implant
SA Values	1,9234 μm	1,8585 μm

It can be concluded from the results presented that the roughness of the polished titanium implants (slightly higher), is similar to that of the zirconia implant.

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