

Surface characterisation of dental implants by confocal laser scanning microscopy

Language: English

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Objectives

Recent data suggests an influence of both surface roughness and surface topography on in vivo osseointegration of implants (Buser et al. 1998). As metrical and topographical characterisation depends on the underlying method a comparative study of recent implant types is desirable.

Materials & Method

37 different dental implants were studied by confocal laser scanning microscopy. Images (125*125µm) of 5 different positions were obtained. Roughness value Sa and the developed surface area (ratio) Sdr were calculated. Implants were grouped according to the type of surface treatment.

Results

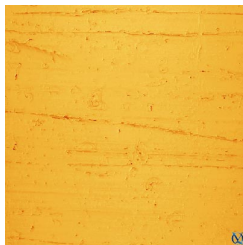


Fig. 1:
SEMADOS
machined
SA = 0.37 ±0.07

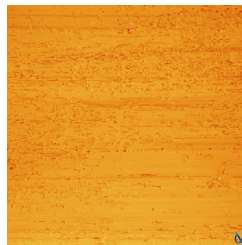


Fig. 2:
Branemark Mk III
machined
SA = 0.75 ±0.22

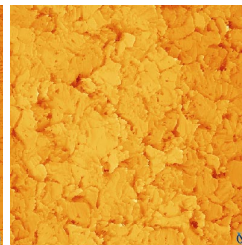


Fig. 3:
SteriOss Uncoated
double etched
SA = 1.67 ±0.30

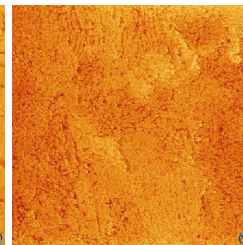


Fig. 4:
3i
double etched
SA = 1.82 ±0.08

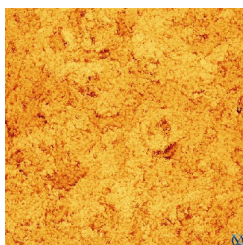


Fig. 5:
ASTRA fST
TiO2 blasted
SA = 1.91 ±0.22

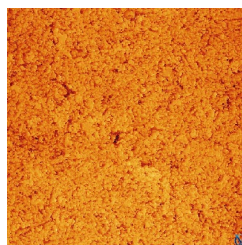


Fig. 6:
ASTRA fTiOBI
TiO2 blasted
SA = 1.95 ±0.24



Fig. 7:
BICON uncoated
SA = 1.96 ±0.05

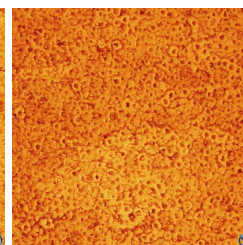


Fig. 8:
ZL Ticer
anodic oxidation
SA = 2.90 ±0.22

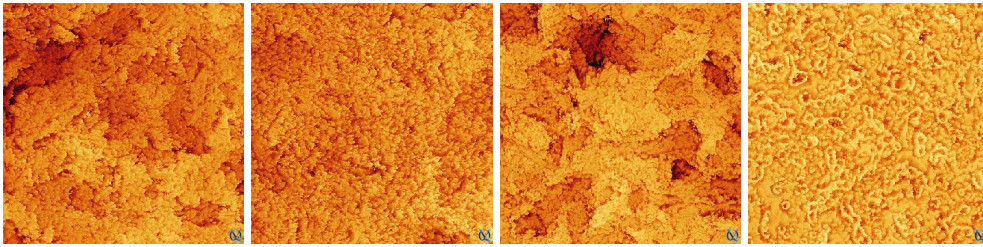


Fig. 9:
PARAGON SBM
etched & HA blasted
SA = 2.91 ±0.26

Fig. 10:
Lifecore RBM
CaPhosphate blasted
SA = 2.95 ±0.20

Fig. 11:
BIO HORIZON D2
CaPhosphate blasted
SA = 3.12 ±0.39

Fig. 12:
Branemark TiUnite
anodic oxidation
SA = 3.14 ±0.11

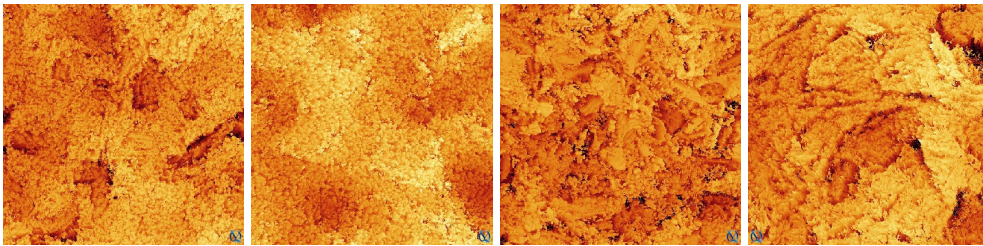


Fig. 13:
CALCITEK MTX
MTX blasted
SA = 3.30 ±0.22

Fig. 14:
ITI SLA
blasted & etched
SA = 3.32 ±0.22

Fig. 15:
SEMADOS rauh
Al2O3 blasted
SA = 3.57 ±0.18

Fig. 16:
Frialit-2 Tiefenstr
blasted & etched
SA = 3.94 ±0.38

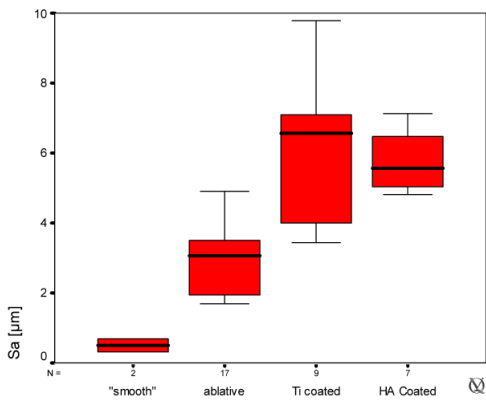


Fig. 17: Table 1

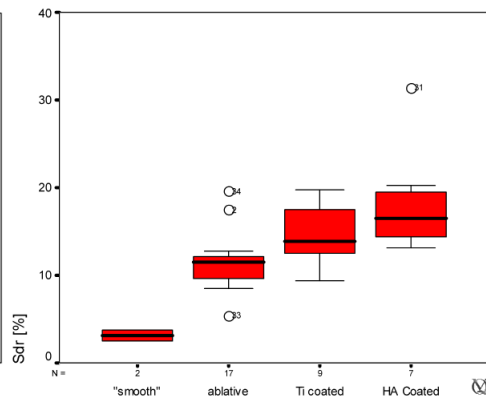


Fig. 18: Table 2

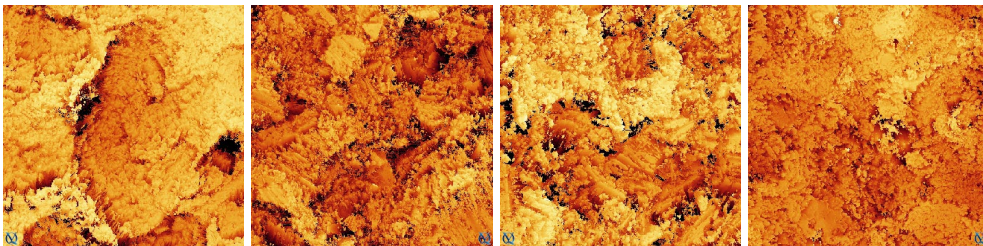


Fig. 19:
IMZ Tiefenstr
blasted & etched
SA = 4.53 ±0.23

Fig. 20:
TIOLOX
Al2O3 blasted
SA = 4.94 ±0.28

Fig. 21:
ANKYLOS
blasted
SA = 4.97 ±0.32

Fig. 22:
ORALTRONICS kit
TPS
SA = 3.60 ±0.30

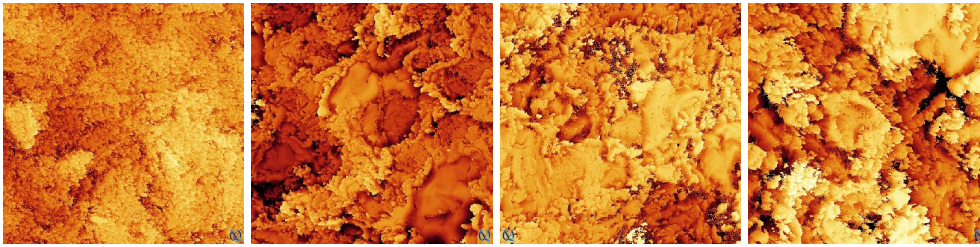


Fig. 23:
ORALTRONICS
Pitteasy
FBR: TPS&CaP
coatedSA = 3.67
±0.48

Fig. 24:
BICON TPS
TPS
SA = 4.05 ±0.48

Fig. 25:
ITI TPS
TPS
SA = 4.28 ±1.37

Fig. 26:
Frialit-2 TPS
TPS
SA = 6.63 ±0.36

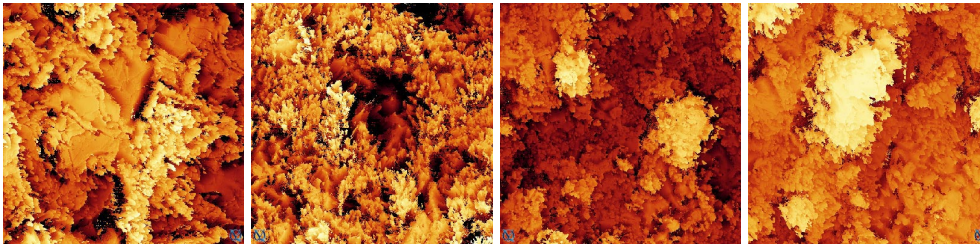


Fig. 27:
IMZ TPS
TPS
SA = 6.65 ±0.35

Fig. 28:
SteriOss TPS
TPS
SA = 7.14 ±0.58

Fig. 29:
BIO HORIZON D3
TPS
SA = 8.71 ±2.16

Fig. 30:
PARAGON TPS
TPS
SA = 9.90 ±1.06

Conclusion

With relation to the metrical roughness values the "classical" grouping of dental implants by type of surface treatment ("smooth", ablative, TPS and HA coated) can be confirmed. The additional value of the ratio (Sdr) as a hybrid parameter including both spatial and amplitude aspects of the surface could not be confirmed in this study. However wide topographical differences of the surfaces require an additional visualisation of the surface.

This poster was submitted by Dr. med. Dr. med. dent. Bilal Al-Nawas.

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Objectives

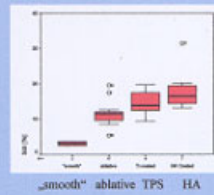
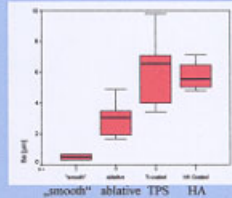
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Results

SEMADOS machined Sa = 0.37 ± 0.07	Braemark ML III machined Sa = 0.75 ± 0.22	StenOn Uncoated double etched Sa = 1.67 ± 0.30	3i double etched Sa = 1.82 ± 0.08
ASTRA IST TiO2 blasted Sa = 1.91 ± 0.22	ASTRA TIOBI TiO2 blasted Sa = 1.95 ± 0.24	BICON uncoated Sa = 1.96 ± 0.05	ZI Ti-coat anodic oxidation Sa = 2.96 ± 0.22
PARAGON SBM etched & HA blasted Sa = 2.91 ± 0.26	Lifecore RBM Calcium phosphate blasted Sa = 2.95 ± 0.20	BIO HORIZON D2 Calcium phosphate blasted Sa = 3.12 ± 0.39	Braemark Ti nitride anodic oxidation Sa = 3.14 ± 0.11
CALCITEK MTK MTK blasted Sa = 3.30 ± 0.22	ITI SLA blasted & etched Sa = 3.32 ± 0.22	SEMADOS mach Al2O3 blasted Sa = 3.37 ± 0.18	Fractal-2 Ti/Titanium blasted & etched Sa = 3.94 ± 0.38



IMZ Ti/Titanium Blasted & etched Sa = 4.51 ± 0.23	TITELIX Al2O3 blasted Sa = 4.94 ± 0.28	ANKYLOS blasted Sa = 4.97 ± 0.32	ORALTRONICS kit TPS Sa = 3.60 ± 0.30
ORALTRONICS Blaste FRC:TPS & Coated Sa = 1.67 ± 0.48	BICON TPS TPS Sa = 4.03 ± 0.48	ITI TPS TPS Sa = 4.28 ± 1.37	Fractal-2 TPS TPS Sa = 6.63 ± 0.54
IMZ TPS TPS Sa = 6.65 ± 0.35	StenOn TPS TPS Sa = 7.14 ± 0.58	BIO HORIZON D3 TPS Sa = 8.71 ± 2.16	PARAGON TPS TPS Sa = 9.90 ± 1.06

Conclusion: With relation to the metrical roughness values the "classical" grouping of dental implants by type of surface treatment ("smooth", ablative, TPS and HA coated) can be confirmed. The additional value of the ratio (Sdr) as a hybrid parameter including both spatial and amplitude aspects of the surface could not be confirmed in this study. However wide topographical differences of the surfaces require an additional visualisation of the surface.

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