



Stony Brook
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Biological In-Vitro Effects on the Wettability of Implant Surfaces

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Introduction

The hydrophilicity of implant surfaces is a significant factor in improving the affinity of biological proteins toward the implant surface. Implants have been modified with different material coatings to increase the overall wettability of proteins towards the implant.

Objective

The purpose of this study was to evaluate the wettability of biological proteins on various coated implant surfaces.

Methods

Four different implant surfaces were used for this investigation; (1) zircon surface - modified (Patent), (2) Cerid (Myplant), (3) Niob (Myplant), (4) smooth zircon surface (Patent). Contact angle evaluations were performed for saline, albumin, and PDGF droplets using the contact angle goniometer (Ossila[®] Co.) Each implant surface consisted of 45 droplets: 15 saline, 15 albumin, and 15 PDGF. Contact angle measurements were further evaluated between each surface (Figures 1 & 2) and paired t-test at the 5% statistical significance level.

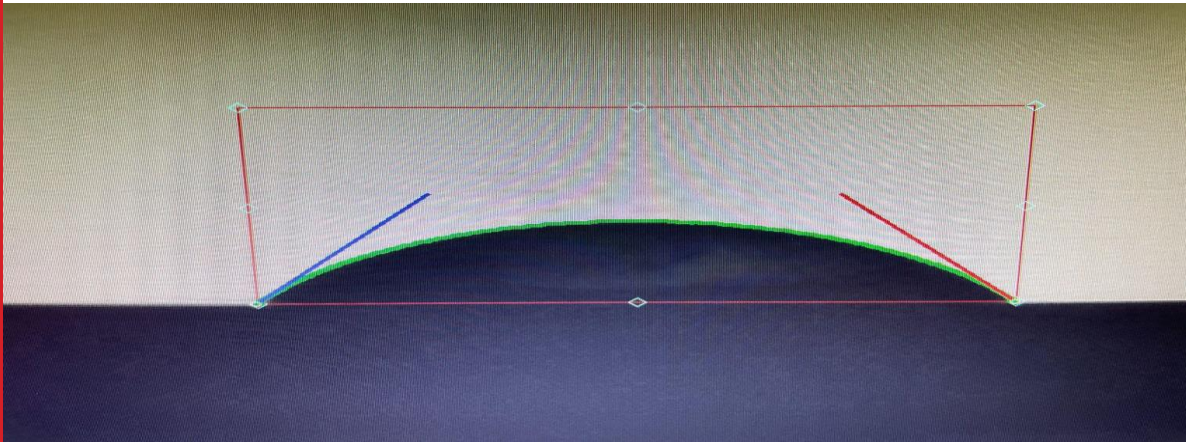


Figure 1. Contact Angle Evaluation of Albumin at (25°C) on Zircon (Modified) surface

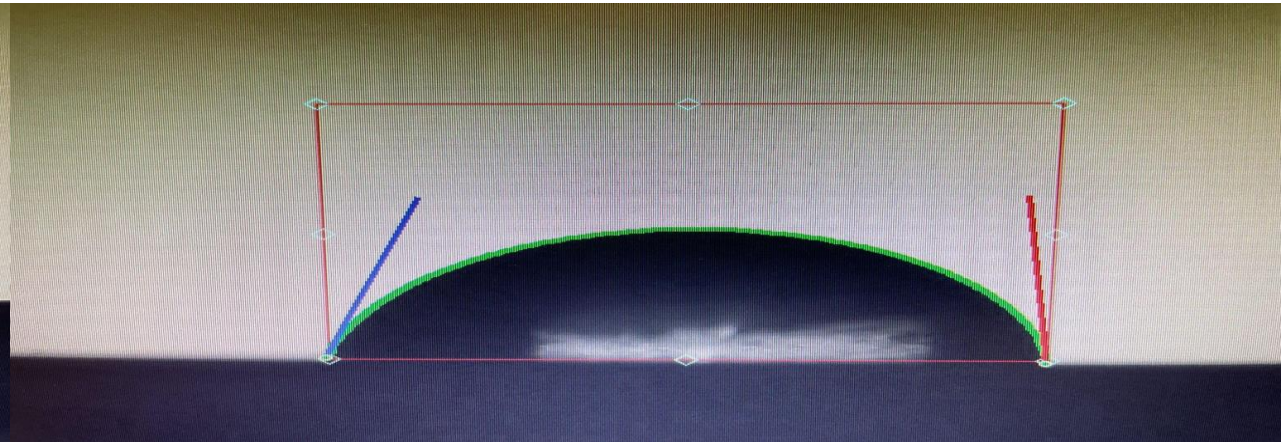


Figure 2. Contact Angle Evaluation of Albumin at (25°C) on Zircon (Smooth) surface

Results

Average contact angles were considerably lower on the Zircon (modified) surface, with a p-value < 0.05 for both saline and PDGF when compared to the other surfaces. Niob resulted in the lowest contact angle for albumin, with a p-value < 0.05 when compared to all other surfaces.

	Zircon (Modified)	Cerid	Zircon (Smooth)	Niob
Saline	54.95°± 2.65°	62.60° ±4.85°	74.89°±8.48°	85.61°±8.74°
Albumin	51.42°±6.80°	51.23°±7.68°	57.02°±9.94°	39.29°±6.89°
PDGF	39.25°±3.05°	62.34°±10.09°	77.97°±6.27°	44.99°±6.45°

Conclusion

The wettability of the proteins is different on various implant surfaces and increased for zirconia surfaces. The modified ceramic surfaces and coatings are more hydrophilic compared to unmodified zirconium or Niob surfaces. Niob surfaces presented high wettability for PDGF and albumin, a phenomenon contributing to the initial wound healing processes around dental implants.