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Bromelain and Bone Grafting Material Impact on Implant Surface Wettability

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Introduction

- Successful implant therapy depends on **effective osseointegration**
 - Early biological events are influenced by **implant surface wettability**
 - Improved wettability enhances:
 - Protein adsorption
 - Cell adhesion
 - Blood clot formation
 - **Natural bioactive agents**, such as **bromelain**, may improve surface characteristics
 - **Aim:**
To evaluate the effect of **bromelain**, alone and combined with **bone grafting material**, on implant surface wettability.
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Materials & Methods

- **Implant surfaces tested:**

- Machined titanium alloy
- Ti-SLA
- Zirconia

- **Surface treatments:**

- Saline (control)
- Bromelain (pineapple extract; 400 mg / 30 ml saline)
- Bromelain + bovine deproteinized bone mineral (Bio-Oss® S) supernatant

- **Wettability assessment:** Contact angle measurement (goniometer)

- **Statistical analysis:** One-way ANOVA, paired t-tests

- **Significance:** $p < 0.05$



Results: Wettability

Reminder:

Lower contact angle = better wettability

Wettability generally favorable < 90°

Bromelain alone:

Machined Ti-alloy: 82.2° → 66.6° (p = 0.004)

Ti-SLA: 88.2° → 50.5° (p < 0.001)

Zirconia: 80.4° → 50.0° (p < 0.001)

Bromelain + bone graft:

Machined Ti-alloy: 85.0° → 53.7° (p < 0.001)

Ti-SLA: 58.0° → 50.7° (p = 0.026)

Zirconia: **Increased contact angle** 53.8° → 82.1° (p < 0.001)

Conclusions & Significance

- Bromelain **significantly enhances implant surface wettability** by reducing contact angles
- The effect of bromelain in combination with bone grafting material is **substrate-dependent**
- Improved wettability was observed on **titanium surfaces**, while **zirconia showed reduced hydrophilicity**
- Bromelain shows potential as a **bioactive surface-modifying agent** in implant dentistry
- Further clinical studies are required to confirm these findings on different implant surfaces