

Comparative study on bone regeneration in dehiscence-type defects at chemically modified hydrophilic (SLActive®) or nanostructured (NanoTite®) titanium implants

An experimental study in dogs. Presented at the EAO 2008, Warsaw.

F. Schwarz, D. Ferrari, M. Wieland, M. Sager, J. Becker

Introduction

The aim of the present study was to evaluate and compare the influence of hydrophilic (SLActive® Bone Level Implant, Institut Straumann AG, Basel, Switzerland) and nanostructured (NanoTite® Certain Prevail®, Biomet 3i, FL, USA) titanium implant surfaces on bone regeneration in dehiscence-type defects.

Materials and Methods

Standardized buccal dehiscence-type defects (height: 4 mm; width: 4 mm; depth: 2 mm) were surgically created following implant site preparation in both upper and lower jaws of twelve beagle dogs. Both SLActive® and NanoTite® implants were randomly assigned in a split-mouth design and left to heal in a submerged position. After 4 and 8 weeks, dissected blocks were processed for histomorphometrical [coronal extension of newly formed bone in contact with the implant surface (CBI), area of new bone fill (BF), and percent of bone to implant contact in the defect (BIC) area] analysis. For the statistical evaluation of the changes within groups, the paired t-test was used. For the comparisons between groups, the unpaired t-test was used.

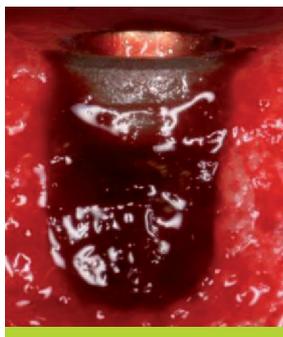


Fig. 1a: Stabilized blood clot at the SLActive® Bone Level Implant



Fig. 1b: A collapse of the blood clot was commonly observed at NanoTite® Certain Prevail®

Results

At the time of implant placement a stabilized blood clot was always observed at the SLActive® implants, whereas a collapse of blood clot was commonly observed at NanoTite® implants (Fig. 1). After 4 and 8 weeks, wound healing at NanoTite® implants were mainly characterized by the formation of a dense connective tissue. New bone formation was only observed occasionally and limited to the basal compartment of the defect area.

SLActive® implants revealed significantly higher mean BIC-D values at 4 and 8 weeks resulting in a nearly complete resolution of the defect area by either newly formed trabecular (4 weeks) or parallel fibered woven bone (8 weeks) (Figs. 2 and 3). In addition, SLActive® demonstrated significantly higher BF and CBI at 4 and 8 weeks.

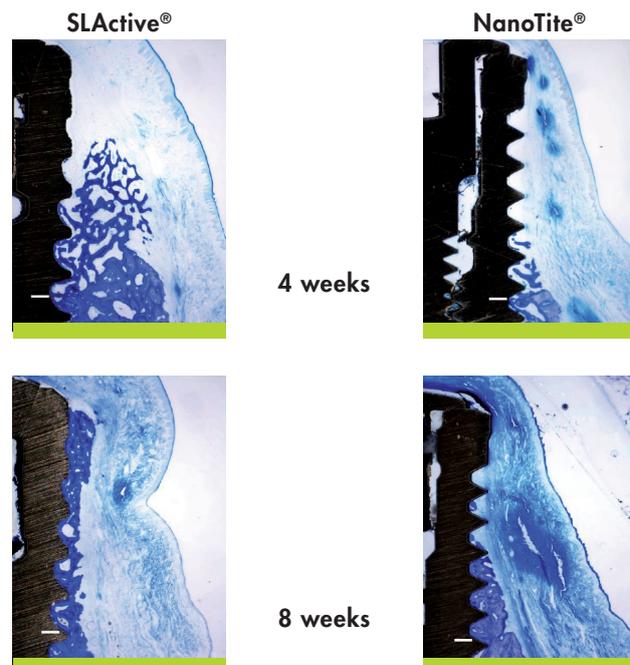


Fig. 2: Histological views after 4 and 8 weeks of submerged healing. Original magnification x30. The bar indicates the bottom of the defect.

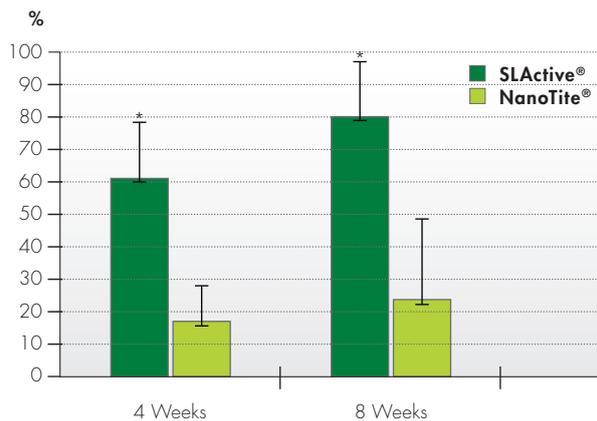


Fig. 3: Histomorphometrical analysis of BIC-D

BIC-D = percent of bone to implant contact in the defect area

* $\alpha < 0.05$

Conclusions

- Significantly higher bone-to-implant contact for SLActive® after 4 and 8 weeks
- Bone regeneration in dehiscence-type defects is supported by surface hydrophilicity rather than by nanotopography

www.straumann.com

International Headquarters

Institut Straumann AG
 Peter Merian-Weg 12
 CH-4002 Basel, Switzerland
 Phone +41 (0)61 965 11 11
 Fax +41 (0)61 965 11 01

NanoTite® and Prevail® are registered trademarks of BIOMET 3i, Inc., Palm Beach Gardens, USA.

© Institut Straumann AG, 2009. All rights reserved.

Straumann® and/or other trademarks and logos from Straumann® that are mentioned herein are the trademarks or registered trademarks of Straumann Holding AG and/or its affiliates. All rights reserved.