



## Scientific Highlights of the Month

SHORT OVERVIEWS ON RECENTLY PUBLISHED SCIENTIFIC EVIDENCE.

March 2018

<b>FEATURED VIDEO</b>	<b>3</b>
<b>WHAT'S NEW IN STARGET</b>	<b>3</b>
<b>EDITOR'S CHOICE</b>	<b>4</b>
Wear and Corrosion Interactions at the Titanium/Zirconia Interface: Dental Implant Application.	4
<b>IMPLANT SOLUTIONS</b>	<b>5</b>
Osteogenic nanostructured titanium surfaces with antibacterial properties under conditions that mimic the dynamic situation in the oral cavity.	5
In vitro evaluation of controlled-release 14% doxycycline gel for decontamination of machined and sandblasted acid-etched implants.	5
Three-year analysis of zirconia implants used for single-tooth replacement and three-unit fixed dental prostheses: A prospective multicenter study.	6
Immediate Nonsubmerged Custom Root Analog Implants: A Prospective Pilot Clinical Study.	6
Evidence-based knowledge on the aesthetics and maintenance of peri-implant soft tissues: Osteology Foundation Consensus Report Part 1-Effects of soft tissue augmentation procedures on the maintenance of peri-implant soft tissue health.	7
Evidence-based knowledge on the aesthetics and maintenance of peri-implant soft tissues: Osteology Foundation Consensus Report Part 2-Effects of hard tissue augmentation procedures on the maintenance of peri-implant tissues.	8
Evidence-based knowledge on the aesthetics and maintenance of peri-implant soft tissues: Osteology Foundation Consensus Report Part 3-Aesthetics of peri-implant soft tissues.	9
A systematic review on the influence of the horizontal distance between two adjacent implants inserted in the anterior maxilla on the inter-implant mucosa fill.	10
Papilla height in relation to the distance between bone crest and interproximal contact point at single-tooth implants: A systematic review.	10
A Pilot Study on the Efficacy of a Treatment Algorithm to Detoxify Dental Implant Surfaces Affected by Peri-implantitis.	11
Comparison of early osseointegration between laser-treated/acid-etched and sandblasted/acid-etched titanium implant surfaces.	12
<b>PROSTHETIC SOLUTIONS</b>	<b>13</b>
Fracture strength of zirconia implant abutments on narrow diameter implants with internal and external implant abutment connections: A study on the titanium resin base concept.	13
Single-Tooth Replacement Using Dental Implants Supporting All-Ceramic and Metal-Based Reconstructions: Results at 18 Months of Loading.	14
Randomized Controlled Clinical Trial to Compare Posterior Implant-Supported Modified Monolithic Zirconia and Metal-Ceramic Single Crowns: One-Year Results.	14
<b>REFERENCES</b>	<b>15</b>

# Featured video



Treatment of a class I gingival recession with a coronally advanced flap technique in combination with botiss mucoderm® and Straumann® Emdogain®

Prof. Giovanni Zucchelli



## What's new in TARGET



### Icelandic Education Week in Reykjavik, Iceland

📅 19. Mar 2018    📎 Enablement and education

Well prepared for the practice



### Fully edentulous treatment with digital planning and guided surgery to achieve the optimum restoratively driven outcome

📅 15. Mar 2018    📎 Solutions for edentulous patients

Phillip Garrett and Kyle Trobough, Texas/USA



### The social factors of implant therapy

📅 11. Mar 2018    📎 Enablement and education

Addressing the non-biological factors that affect treatment outcomes



### Ceramic implants in esthetic cases: a new clinical possibility

📅 01. Mar 2018    📎 Ceramic Implants

A clinical case report by André Antonio Pelegrine

## EDITOR'S CHOICE



J Prosthodont. 2018 Mar 9

### WEAR AND CORROSION INTERACTIONS AT THE TITANIUM/ZIRCONIA INTERFACE: DENTAL IMPLANT APPLICATION.

Sikora CL, Alfaro MF, Yuan JC, Barao VA, Sukotjo C, Mathew MT

#### Study objectives

The aim of this in vitro study was to investigate the combined effect of both wear and corrosion on the materials at the implant and abutment interface. Using a simulated oral tribocorrosive environment, titanium (Ti) and zirconia (Zr) abutment materials were slid against titanium and Roxolid implant alloys. The four couplings (Ti/Ti, Ti/Rox, Zr/Ti, Zr/Rox) were selected for the tribocorrosion tests (N = 3). The testing was conducted for 25K cycles, and the coefficient of friction (CoF) and voltage evolution were recorded simultaneously. Following the tribocorrosion assays, the wear volume loss was calculated, and surface characterization was performed.

#### Results and conclusions

- Zr/Ti groups had the highest CoF (1.1647), and Ti/Ti had the lowest (0.5033).
- The Zr/Ti coupling generated significantly more mechanical damage than the Ti/Ti group ( $p = 0.021$ ).
- From the corrosion aspect, the Ti/Ti groups had the highest voltage drop (0.802 V), indicating greater corrosion susceptibility. In comparison, the Zr/Roxolid group had the lowest voltage drop (0.628 V) and significantly less electrochemical degradation ( $p = 0.019$ ).
- Overall, the Ti/Ti group had the largest wear volume loss ( $15.1 \times 10^7 \mu\text{m}^3$ ), while the Zr/Ti group had the least volume loss ( $2.26 \times 10^7 \mu\text{m}^3$ ). Both zirconia couplings had significantly less wear volume than the titanium couplings ( $p < 0.001$ ).
- This study highlights the synergistic interaction between wear and corrosion, which occurs when masticatory forces combine with the salivary environment of the oral cavity.
- Overall, the zirconia groups outperformed the titanium groups. In fact, the titanium groups generated 5 to 6 times more wear to the implant alloys as compared with the zirconia counterparts. The best performing group was Zr/Ti, and the worst performing group was Ti/Ti.

Adapted from Sikora CL et al., J Prosthodont. 2018 Mar 9, for more info about this publication click [HERE](#)

Biomater Sci. 2018 Mar 28.

## Osteogenic nanostructured titanium surfaces with antibacterial properties under conditions that mimic the dynamic situation in the oral cavity.

*Bierbaum S, Mulansky S, Bognár E, Kientzl I, Nagy P, Vrana NE, Weszl M, Boschke E, Scharnweber D, Wolf-Brandstetter C*

### Study objectives

The aim of this study was to assess the impact of different surface nanofeatures on otherwise smooth titanium surfaces on bacterial adhesion as well as on their osteogenic potential. Bacterial adhesion was assessed in the presence of saliva under static and dynamic conditions to approximate both sub- and supragingival conditions in the oral cavity as the gingival seal will be affected by implantation. Sandblasted/acid etched surfaces (SBAE) were used as a microrough reference.

### Results and conclusions

- While bacterial adhesion was reduced on all microsmooth surfaces to an average of 17% surface coverage compared to 61% on SBAE under static conditions, under dynamic conditions the nanopitted surface had a significant impact on bacterial adhesion. Here fluid flow removed all bacteria.
- By comparison, the reduction on the nanotubular surface was only similar to that of the SBAE reference.
- In addition, no negative influence on the osteogenic potential of the nanopitted surface could be determined by alkaline phosphatase activity, mineralization behaviour or gene expression; it remained on a par with the tissue culture plastic control.
- Thus, nanopitting seems to be a promising surface treatment candidate for dental implants to reduce infection related complications without compromising the implant integration.

*Adapted from Bierbaum S et al., Biomater Sci. 2018 Mar 28, for more info about this publication click [HERE](#)*

J Periodontol. 2018 Mar;89(3):325-330.

## In vitro evaluation of controlled-release 14% doxycycline gel for decontamination of machined and sandblasted acid-etched implants.

*Patianna G, Valente NA, D'Addona A, Andreana S*

### Study objectives

The aim of this study was to evaluate use of 14% doxycycline gel in implant surface decontamination. Twenty-one smooth and 21 rough implants, divided into four groups according to surface and treatment modality, were contaminated with *Streptococcus sanguinis* and incubated for 24 hours to allow the bacteria to grow. After 24 hours, the test groups were treated with controlled release 14% doxycycline gel injecting the gel circumferentially over the surface of the implant for 3 minutes, while the control groups were irrigated with sterile saline for 1 minute. The implants were then vortexed into triptych soy broth to allow the bacteria to detach from the surface, diluted 1:100 and plated. Colony forming units (CFU) were counted 48 hours after incubation.

### Results and conclusions

- The use of a 14% doxycycline gel minimized CFU counts compared to control groups, with the difference being statistically significant ( $P < 0.05$ ). The reduction of CFUs in the smooth test group is more marked than in the rough test group, but the difference doesn't reach statistical significance ( $P = 0.215$ ).
- The use of 14% doxycycline gel in implant surface decontamination was efficacious in this in-vitro study. Adjunctive use of locally delivered 14% doxycycline gel might be a viable option in the management of peri-implantitis and peri-implant mucositis considering its efficacy in reducing bacterial colonization.

*Adapted from Patianna G. et al., J Periodontol. 2018 Mar;89(3):325-330, for more info about this publication click [HERE](#)*

Clin Oral Implants Res. 2018 Mar;29(3):290-299

## Three-year analysis of zirconia implants used for single-tooth replacement and three-unit fixed dental prostheses: A prospective multicenter study.

Balmer M, Spies BC, Vach K, Kohal RJ, Hämmerle CHF, Jung RE

### Study objectives

The aim of this study was to evaluate clinically and radiographically the outcome of zirconia oral implants after 3 years in function. In 60 patients in need of either a single-tooth replacement or a three-unit fixed dental prosthesis (FDP), a total of 71 one-piece zirconia implants were placed and immediately restored with temporary fixed prostheses. The implants were clinically and radiologically examined at implant insertion, prosthetic delivery, at 6 months and then yearly up to 3 years.

### Results and conclusions

- Seventy-one implants (48 in the mandible, 23 in the maxilla) inserted in 60 patients were restored with 49 crowns and 11 FDP. One patient lost his implant after 5 weeks. Five patients with one implant each could not be evaluated after 3 years.
- Based on 55 patients with a total of 66 implants, the mean survival rate was 98.5% after 3 years in function.
- A statistically significant mean marginal bone loss ( $0.70 \text{ mm} \pm 0.72 \text{ mm}$ ) has been detected from implant insertion to the 3-year follow-up. The largest marginal bone loss occurred between implantation and prosthetic delivery ( $0.67 \text{ mm} \pm 0.56 \text{ mm}$ ). After delivery, no statistically significant bone level change was observed ( $0.02 \text{ mm} \pm 0.59 \text{ mm}$ ). None of the investigated prognostic factors had a significant influence on changes in the marginal bone level.

After 3 years in function, the investigated one-piece zirconia implant showed a high survival rate and a low marginal bone loss. The implant system was successful for single-tooth replacement and three-unit FDPs.

Adapted from Balmer M. et al., *Clin Oral Implants Res.* 2018 Mar;29(3):290-299, for more info about this publication click [HERE](#)

Int J Oral Maxillofac Implants. 2018 Mar/Apr;33(2):e37-e44

## Immediate Nonsubmerged Custom Root Analog Implants: A Prospective Pilot Clinical Study.

Moin DA, Hassan B, Wismeijer D.

### Study objectives

The aim of this study was to evaluate the feasibility of a commercially available immediate root analog implant system Replicate (Natural Dental Implants). Five consecutive patients in need of an implant in the premolar region were recruited for this pilot study. The designed root analog implant was fabricated using a five-axis computer-aided manufacturing machine. The root analog implants were inserted following flapless minimally invasive root extraction. Following 3 months of uninterrupted healing, definitive restorations were fabricated. Peri-implant clinical and radiographic measurements were obtained up to 12 months follow-up.

### Results and conclusions

- All patients functioned well following 12 months of functional loading. Within one patient, one of the two root analog implants failed early.
- Peri-implant clinical and radiographic measurements demonstrated a stable situation after 12 months of functional loading.

Adapted from Moin DA. et al., *Int J Oral Maxillofac Implants.* 2018 Mar/Apr;33(2):e37-e44, for more info about this publication click [HERE](#)

# Implant solutions

---

Clin Oral Implants Res. 2018 Mar;29 Suppl 15:7-10.

## Evidence-based knowledge on the aesthetics and maintenance of peri-implant soft tissues: Osteology Foundation Consensus Report Part 1-Effects of soft tissue augmentation procedures on the maintenance of peri-implant soft tissue health.

*Giannobile WV, Jung RE, Schwarz F; Groups of the 2nd Osteology Foundation Consensus Meeting.*

### Study objectives

The goal of Working Group 1 at the 2nd Consensus Meeting of the Osteology Foundation was to comprehensively assess the effects of soft tissue augmentation procedures on peri-implant health or disease. A systematic review and meta-analysis on the effects of soft tissue augmentation procedures included a total of 10 studies (mucosal thickness: n = 6; keratinized tissue: n = 4). Consensus statements, clinical recommendations, and implications for future research were based on structured group discussions and a plenary session approval.

### Results and conclusions

- Soft tissue grafting to increase the width of keratinized tissue around implants was associated with greater reductions in gingival and plaque indices when compared to non-augmented sites.
- Statistically significant differences were noted for final marginal bone levels in favor of an apically positioned flap plus autogenous graft vs. all standard-of-care control treatments investigated.
- Soft tissue grafting (i.e., autogenous connective tissue) to increase the mucosal thickness around implants in the aesthetic zone was associated with significantly less marginal bone loss over time, but no significant changes in bleeding on probing, probing depths, or plaque scores when compared to sites without grafting.
- The limited evidence available supports the use of soft tissue augmentation procedures to promote peri-implant health.

*Adapted from Giannobile WV. et al., Clin Oral Implants Res. 2018 Mar;29 Suppl 15:7-10., for more info about this publication click [HERE](#)*

Clin Oral Implants Res. 2018 Mar;29 Suppl 15:11-13.

## **Evidence-based knowledge on the aesthetics and maintenance of peri-implant soft tissues: Osteology Foundation Consensus Report Part 2- Effects of hard tissue augmentation procedures on the maintenance of peri-implant tissues.**

*Schwarz F, Giannobile WV, Jung RE; Groups of the 2nd Osteology Foundation Consensus Meeting.*

### **Study objectives**

One task of Working Group 1 at the 2nd Consensus Meeting of the Osteology Foundation was to comprehensively assess the effects of hard tissue augmentation procedures on peri-implant health or disease. One systematic review and meta-analysis on the effects of hard tissue augmentation procedures included a total of eight studies (n = 12 publications). Consensus statements, clinical recommendations, and implications for future research were based on structured group discussions and plenary session approval.

### **Results and conclusions**

- After 1-10 years of follow-up, lateral bone augmentation procedures were associated with peri-implant tissue stability, as evidenced by minimal and non-significant changes in bleeding on probing, probing depth, and marginal bone levels.
- Case definitions based on clinical and radiographic parameters to differentiate peri-implant health from disease have been inconsistently employed in the studies investigated.
- Lateral bone augmentation procedures are associated with peri-implant tissue stability on short-term (1-3 years) and midterm follow-ups to long-term (>3 years) follow-ups.

*Adapted from Schwarz et al., Clin Oral Implants Res. 2018 Mar;29 Suppl 15:11-13., for more info about this publication click [HERE](#)*

Clin Oral Implants Res. 2018 Mar;29 Suppl 15:14-17.

## Evidence-based knowledge on the aesthetics and maintenance of peri-implant soft tissues: Osteology Foundation Consensus Report Part 3- Aesthetics of peri-implant soft tissues.

*Jung RE, Heitz-Mayfield L, Schwarz F; Groups of the 2nd Osteology Foundation Consensus Meeting.*

### Study objectives

Working Group 2 at the 2nd Consensus Meeting of the Osteology Foundation had a focus on the influence of vertical implant placement on papilla height at single implants adjacent to teeth and on the inter-implant mucosa fill at two adjacent implants in the anterior maxilla. Consensus statements, clinical recommendations, and implications for future research were based on structured group discussions until consensus was reached among the entire expert group.

### Results and conclusions

- The systematic review about single-tooth implants included a total of 12 studies demonstrating that the vertical distance from the crestal bone level to the base of the interproximal contact point varied considerably from 2 mm up to 11 mm, and a partial or complete papilla fill was reached in 56.5% to 100% of the cases.
- For the systematic review regarding two adjacent implants, only four studies reported on horizontal inter-implant distances which ranged between 2.0 and 4.0 mm. More than half of the papilla presence was indicated in 21% to 88.5% of the cases.
- It was concluded that for single-tooth implants, the papilla height between an implant and a tooth is predominantly dependent on the clinical attachment level of the tooth. In cases with two adjacent implants, it was concluded that it is not possible to define the optimal horizontal distance between two adjacent implants restored with fixed dental prostheses.

*Adapted from Jung RE. et al., Clin Oral Implants Res. 2018 Mar;29 Suppl 15:14-17., for more info about this publication click [HERE](#)*

# Implant solutions

---

Clin Oral Implants Res. 2018 Mar;29 Suppl 15:62-70.

## A systematic review on the influence of the horizontal distance between two adjacent implants inserted in the anterior maxilla on the inter-implant mucosa fill.

Ramanauskaitė A, Rocuzzo A, Schwarz F.

### Study objectives

The aim of this study was to address the following focused question: "Does the horizontal distance between two adjacent implants inserted in the anterior maxilla affect the inter-implant mucosa fill?"

### Results and conclusions

- The initial search resulted in 208 publications. From 13 full-text articles reviewed, 4 were included in the final analysis.
- Depending on the reference points used, the horizontal inter-implant distance ranged between 2.01 and 4.0 mm.
- In 21 to 88.5% of the cases, inter-implant-mucosa filled more than half of the inter-implant space.
- When interpreting results of inter-implant mucosa fill, time of implant placement (immediate or delayed) and restoring (immediate or conventional) were taken into consideration. A tendency towards incomplete inter-implant mucosa fill at a distance of <3 mm was noted in the 3 included papers. One of the studies found this trend to be statistically significant ( $p = .008$ ).
- Based on the available evidence, it is not possible to define a precise threshold for the optimal horizontal distance between two adjacent implants.

Adapted from Ramanauskaitė A. et al., Clin Oral Implants Res. 2018 Mar;29 Suppl 15:62-70, for more info about this publication click [HERE](#)

Clin Oral Implants Res. 2018 Mar;29 Suppl 15:50-61

## Papilla height in relation to the distance between bone crest and interproximal contact point at single-tooth implants: A systematic review.

Rocuzzo M, Rocuzzo A, Ramanuskaite A.

### Study objectives

The aim of this study was to investigate the tooth-implant papilla formation in correlation with the distance between the interproximal bone level and the prosthetic contact point. A comprehensive search of the current literature (01/01/2000-01/01/2017) was performed to identify human trials that included 10 patients or more, with at least 12 months follow-up, in need of the replacement of one single tooth in the anterior maxillary region with an implant-supported single crown.

### Results and conclusions

- The vertical distance between the interproximal bone level and prosthetic contact point ranged between 2 and 11 mm, and the partial or complete papilla fill (Jemt's score 2-3) ranged between 56.5% and 100% of cases.
- There is limited evidence that the vertical distance from the base of the interproximal contact point to the crestal bone level seems to affect the interproximal papilla height; that is, the lower is the distance the higher is the percentage of papilla fill.
- Complete embrasure fill between an implant restoration and the adjacent tooth seems to be correlated with the integrity of the periodontal ligament of the tooth. To reduce the risk of aesthetic failures, interproximal probing on the adjacent teeth should be encouraged before implant placement.

Adapted from Rocuzzo M. et al., Clin Oral Implants Res. 2018 Mar;29 Suppl 15:50-61, for more info about this publication click [HERE](#)

Int J Periodontics Restorative Dent. 2018 Mar/Apr;38(2):261-267

### **A Pilot Study on the Efficacy of a Treatment Algorithm to Detoxify Dental Implant Surfaces Affected by Peri-implantitis.**

*Rosen PS, Qari M, Froum SJ, Dibart S, Chou LL.*

#### **Study objectives**

The aim of this study was to determine whether a treatment algorithm including mechanical debridement, followed by air powder abrasion with glycine, followed by citric acid conditioning with vigorous flushing of the surface with sterile water after each step, is capable of decontaminating an infected implant surface. A total of 14 dental implants that were deemed hopeless due to advanced peri-implantitis were extracted. Of these, 6 implants served as tests and had their exposed surfaces treated with the decontamination protocol, 6 served as untreated controls, and 2 were mechanically treated only, followed by rubbing the surface with sterile saline.

#### **Results and conclusions**

- The 6 test implants all demonstrated attachment and proliferation of the normal human osteoprogenitor cells on their prior exposed and decontaminated surfaces.
- All of the untreated control and the mechanically debrided, sterile water-treated implants failed to demonstrate this same success.
- The results suggest that this protocol can decontaminate an implant surface affected by peri-implantitis. Further studies are warranted to determine if this technique would demonstrate similar success over a greater number of implants and whether this outcome may occur in humans.

*Adapted from Rosen PS. et al., Int J Periodontics Restorative Dent. 2018 Mar/Apr;38(2):261-267, for more info about this publication click [HERE](#)*

J Mater Sci Mater Med. 2018 Mar 30;29(4):43

## Comparison of early osseointegration between laser-treated/acid-etched and sandblasted/acid-etched titanium implant surfaces.

Rong M, Lu H, Wan L, Zhang X, Lin X, Li S, Zhou L, Lv Y, Su Y.

### Study objectives

The aim of this study was to compare the early osseointegration of titanium surfaces prepared via laser-treated/acid-etched (LA) and sandblasted/acid-etched (SLA) in dogs. Titanium implants were divided into two groups: Surfaces of the experimental group were treated via LA, while in the control group, surfaces were treated via SLA. The physical and chemical properties of LA and SLA surfaces were tested and compared. The dogs were sacrificed two and four weeks after implant placement.

### Results and conclusions

- Scanning electron microscopy showed that both the LA and SLAs surface exhibited rough structures with micro pores sized 1-3  $\mu\text{m}$ . In the LA surface, regular melting points were observed. However, in the SLA surface, the structure was irregular and few oxide aluminum particles still remained. Only titanium and a small amount of titanium compounds were detected on LA surfaces, while Al was found of SLA surfaces.
- The LA surface roughness was above that of SLA surfaces (LA: Ra: 2.1  $\mu\text{m}$ ; SLA: Ra :1.53  $\mu\text{m}$ ;  $P < 0.01$ ). Both groups exhibited good osseointegration and no significant differences were found in the BIC% at two or four weeks between both groups ( $P > 0.05$ ).
- Both groups exhibited good osseointegration; however, the LA surface was cleaner and more uniform than the SLA surface, and no significant differences were found between both groups.

Adapted from Rong M. et al., J Mater Sci Mater Med. 2018 Mar 30;29(4):43, for more info about this publication click [HERE](#)

Clin Oral Implants Res. 2018 Mar 11

### Fracture strength of zirconia implant abutments on narrow diameter implants with internal and external implant abutment connections: A study on the titanium resin base concept.

Sailer I, Asgeirsson AG, Thoma DS, Fehmer V, Aspelund T, Özcan M, Pjetursson BE

#### Study objectives

The aim of this in vitro study was to compare the fracture strength of narrow diameter abutments with different types of implant abutment connections after chewing simulation. Hundred and twenty identical customized abutments with different materials and implant abutment connections were fabricated for five groups:

- 1-piece zirconia abutment with internal connection (T1, Cares-abutment-Straumann BL-NC implant, Straumann Switzerland),
- 1-piece zirconia abutment with external hex connection (T2, Procera abutment-Branemark NP implant, Nobel Biocare, Sweden),
- 2-piece zirconia abutments with metallic insert for internal connection (T3, Procera abutment-Replace NP implant, Nobel Biocare),
- 2-piece zirconia abutment on titanium resin base (T4, LavaPlus abutment-VarioBase-Straumann BL-NC implant, 3M ESPE, Germany)
- 1-piece titanium abutment with internal connection (C, Cares-abutment-Straumann BL-NC implant, Straumann, Switzerland).

#### Results and conclusions

- The mean bending moments were  $521 \pm 33$  Ncm (T4),  $404 \pm 36$  Ncm (C),  $311 \pm 106$  Ncm (T1)  $265 \pm 22$  Ncm (T3) and  $225 \pm 29$  (T2) for un-restored abutments and  $278 \pm 84$  Ncm (T4),  $302 \pm 170$  Ncm (C),  $190 \pm 55$  Ncm (T1)  $80 \pm 102$  Ncm (T3) and  $125 \pm 57$  (T2) for restored abutments.
- For un-restored abutments, C and T4 had similar mean bending moments, significantly higher than those of the three other groups ( $p < .05$ ).
- Titanium abutments (C) had significantly higher bending moments than identical zirconia abutments (T1) ( $p < .05$ ). Zirconia abutments (T1) with internal connection had higher bending moments than zirconia abutments with external connection (T2) ( $p < .05$ ). For all test groups, the bending moments were significantly reduced when restored with all-ceramic crowns.
- For narrow diameter abutments, the fracture strength of 2-piece internal connected zirconia abutments fixed on titanium resin bases was similar to those obtained for 1-piece titanium abutments. Narrow diameter zirconia abutments with internal connection exhibited higher fracture strength than zirconia abutments with an external connection. Titanium abutments with an internal connection were significantly stronger than identical zirconia abutments.

Adapted from Sailer I. et al., Clin Oral Implants Res. 2018 Mar 11, for more info about this publication click [HERE](#)

Int J Periodontics Restorative Dent. 2018 Mar/Apr;38(2):173-179

### Single-Tooth Replacement Using Dental Implants Supporting All-Ceramic and Metal-Based Reconstructions: Results at 18 Months of Loading.

Bösch A, Jung RE, Sailer I, Goran B, Hämmerle CH, Thoma DS.

#### Study objectives

The aim of this in vitro study was to compare customized zirconia and titanium abutments with respect to survival rates and technical, biologic, and esthetic outcomes. A total of 28 patients with single implants were randomly assigned to 12 customized zirconia (test, AC) and 16 customized titanium (control, MC) abutments. Technical, biologic, and esthetic outcomes were assessed after a mean follow-up time of 18 months.

#### Results and conclusions

- No biologic complications were observed, and no statistical difference for the bone-to-implant distance was found at 18 months (AC  $-0.05 \pm 0.51$  mm vs MC  $-0.28 \pm 0.77$  mm;  $P = .40$ ).
- A similar discoloration of the peri-implant mucosa was observed. The mean papilla score values evaluation presented no statistically significant differences between the test and control groups (AC  $2.07 \pm 0.94$ , MC  $1.96 \pm 0.84$ ).
- At 18 months, reconstructions based on zirconia and titanium abutments exhibited similar survival rates and similar clinical outcomes.

Adapted from Bösch A. et al., *Int J Periodontics Restorative Dent.* 2018 Mar/Apr;38(2):173-179, for more info about this publication click [HERE](#)

J Prosthodont. 2018 Mar 12

### Randomized Controlled Clinical Trial to Compare Posterior Implant-Supported Modified Monolithic Zirconia and Metal-Ceramic Single Crowns: One-Year Results.

Cheng CW, Chien CH, Chen CJ, Papaspyridakos P

#### Study objectives

The aim of this in vitro study was to investigate the prosthetic outcomes of posterior implant-supported single crowns (SCs) with a modified monolithic zirconia or metal-ceramic design at 1 year of loading. Forty participants with 73 dental implants in need of at least 1 maxillary or mandibular posterior implant-supported SC were consecutively selected for this study. The included participants were randomly divided into modified monolithic zirconia (MMZ) and metal-ceramic (MC) groups.

#### Results and conclusions

- A total of 38 participants with 70 posterior implant-supported SCs completed the 1-year follow-up examination. One implant failed in the MMZ group. The 1-year survival rates for implants and crowns were both 97.2% in the MMZ group. The survival rates for implants and crowns were both 100% in the MC group. One screw loosening event was observed in one screw-retained SC in the MMZ group; however, 8 complication events occurred in 7 SCs in the MC group.
- Therefore, the complication-free rates were 97.1% and 79.4% in the MMZ and MC SCs respectively. The most common complication in the MC group was screw loosening (14.7%), followed by loss of retention (5.9%), and ceramic fracture (2.9%). Significantly more technical complications were observed in the MC SCs than MMZ SCs.
- The modified monolithic zirconia design applied to the posterior implant-supported SCs had a significantly lower technical complication rate than did the metal-ceramic one.

Adapted from Cheng CW et al., *J Prosthodont.* 2018 Mar 12, for more info about this publication click [HERE](#)

## References

**Sikora CL et al.**, J Prosthodont. 2018 Mar 9 | **Bierbaum S et al.**, Biomater Sci. 2018 Mar 28 | **Patianna G. et al.**, J Periodontol. 2018 Mar;89(3):325-330 | **Balmer M. et al.**, Clin Oral Implants Res. 2018 Mar;29(3):290-299 | **Moin DA. et al.**, Int J Oral Maxillofac Implants. 2018 Mar/Apr;33(2):e37-e44 | **Giannobile WV. et al.**, Clin Oral Implants Res. 2018 Mar;29 Suppl 15:7-10 | **Schwarz et al.**, Clin Oral Implants Res. 2018 Mar;29 Suppl 15:11-13 | **Jung RE. et al.**, Clin Oral Implants Res. 2018 Mar;29 Suppl 15:14-17 | **Ramanauskaitė A. et al.**, Clin Oral Implants Res. 2018 Mar;29 Suppl 15:62-70 | **Rocuzzo M. et al.**, Clin Oral Implants Res. 2018 Mar;29 Suppl 15:50-61 | **Rosen PS.** et al., Int J Periodontics Restorative Dent. 2018 Mar/Apr;38(2):261-267 | **Rong M. et al.**, J Mater Sci Mater Med. 2018 Mar 30;29(4):43 | **Sailer I. et al.**, Clin Oral Implants Res. 2018 Mar 11 | **Bösch A. et al.**, Int J Periodontics Restorative Dent. 2018 Mar/Apr;38(2):173- 179 | **Cheng CW et al.**, J Prosthodont. 2018 Mar 12 | source: [www.pubmed.com](http://www.pubmed.com)

# More than evidence. A commitment to science.

In collaboration with leading clinics, research institutes and universities around the world, Straumann is committed to research and scientific evidence in the field of implant dentistry and oral tissue regeneration. This commitment is reflected in the constantly increasing number of scientific publications documenting the performance of Straumann® products.

*Click on one of banners below to find out more.*



## Scientific evidence on Straumann products

Selected literature from peer-reviewed journals.



## Congresses: previews and reviews

Hand in hand with science.



## Partnerships and collaborations

Evolving together.



## Research activities

Ongoing studies initiated by Straumann or by independent investigators.

