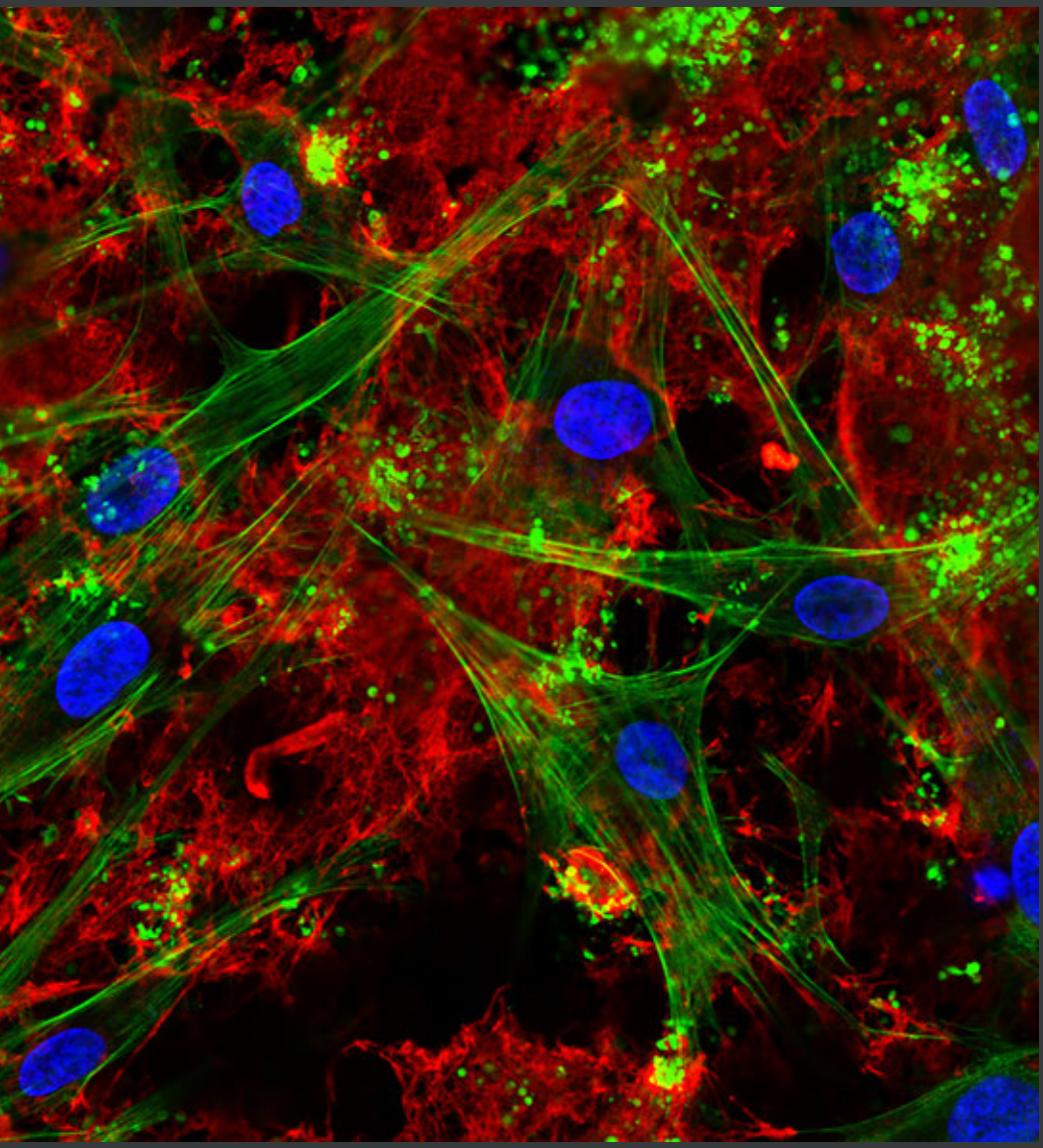
Straumann® PURE Ceramic Implant System
Clinical Review.

straumann



Confocal laser scanning microscopy visualizing seeded bone cells and pronounced fibrin network on the ZLA® surface after incubation in human whole blood. Fibrin network (red), actin cytoskele-ton (green), nuclei (blue). (Image courtesy: Dr. M. Rottmar)

Strong and reliable

Outstanding esthetics

Clinically proven

Nowadays, patients are more esthetic and health conscious than ever before **(Montero et al., 2014)**. Healthy-looking oral soft tissues and bright teeth are considered a prerequisite for a beautiful smile and self-esteem, adding directly to health-related quality of life **(Bennadi and Reddy, 2013; Klages et al., 2004; Pithon et al., 2014)**. The Straumann® PURE Ceramic Implant System is colored like a natural tooth root and provides a highly esthetic and metal-free alternative to implants made out of titanium.

DID YOU KNOW?

Zirconium ≠ Zircon ≠ Zirconia

- Zirconium is a grayish white metal
- Zircon is a mineral
- Zirconia (Zirconium dioxide, ZrO_2) is a ceramic powder

The Straumann® PURE Ceramic Implant is made out of 100 % metal-free yttria-stabilized Zirconia.

STRONG AND RELIABLE

Ceramic components have been used successfully in orthopedic surgery for over 35 years **(Bhandari et al., 2011)** and are also valued by the aerospace industry for their enhanced toughness and dimensional stability even in high temperatures. However, the stability of ceramic dental implants has long been questioned. To overcome these objections, Straumann® has established an innovative manufacturing process followed by a rigorous 100 % proof test in which every single implant from the Straumann® PURE Ceramic Implant System is tested mechanically before leaving the production site. Here, forces that exceed the maximum human bite capability are applied, and only implants that pass the test are delivered to the dentist. The reliability of the Straumann® PURE Ceramic Implant Monotype has been clinically verified in a multicenter study, where zero implant fractures were reported during a follow-up period of 3 and 5 years **(Bormann et al., 2018; data on file).**

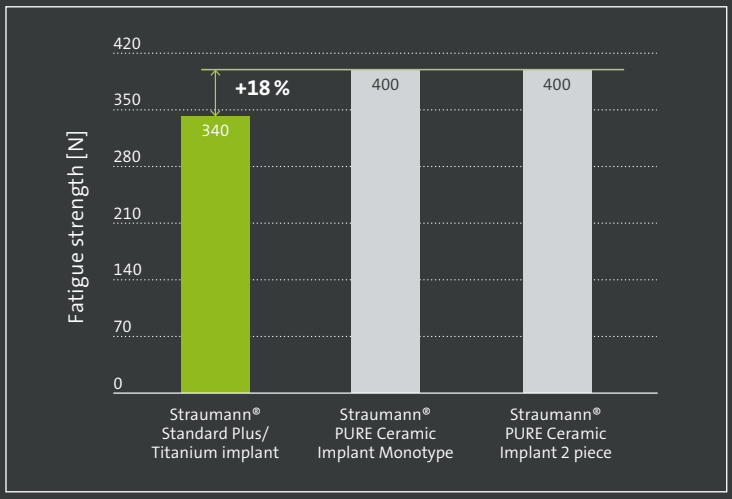


Fig. 1: FATIGUE STRENGTH is the long-term capability of the implant to withstand normal masticatory forces. Next to excellent static strength, the Straumann® PURE Ceramic Implant exceeds the requirements of an extreme fatigue strength test that corresponds to over 20 years of implant use. (Data on file)

OUTSTANDING ESTHETICS

Most patients perceive a treatment as successful when they are satisfied with the overall dentofacial appearance after treatment. Unlike other white ceramics, the Straumann® PURE Ceramic Implant System is ivory-colored, which most closely resembles natural tooth roots – an advantage in patients with a thinner mucosal biotype or a high lip line smile **(Bidra and Rungruanganunt, 2013; Gahlert et al., 2016; Jung et al., 2008).**

Favorable soft tissue attachment

Zirconia ZLA® shows a favorable formation of the epithelial attachements, as well as significant lower bacterial accumulation compared to titanium SLA surfaces **(Röhling et al., 2017; Fig. 2)**. This is an important observation since bacterial adhesion to implant surfaces can lead to inflammation and bone loss in the tissues surrounding the implants. In addition, compared to titanium implants, a higher degree of soft tissue integration around the PURE Ceramic Implant was observed **(Liñares et al., 2016; Fig. 3)**.

Less human plaque biofilm around Straumann® zirconia ZLA®

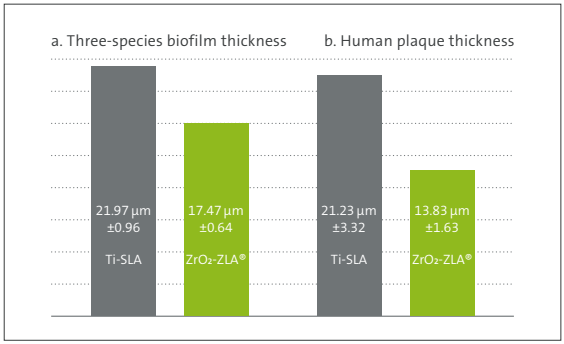


Fig. 2: Zirconia ZLA® showed a statistically significant reduction in three-species biofilm and human plaque thickness compared with titanium SLA. SD = Standard Deviation. (Adapted from Roehling et al., 2017)

Excellent esthetic outcomes and papilla formation around the Straumann® PURE Ceramic Implant Monotype have been reported in several clinical studies **(Gahlert et al., 2015; Kniha et al., 2014; Kniha et al., 2018)**, even for challenging indications.

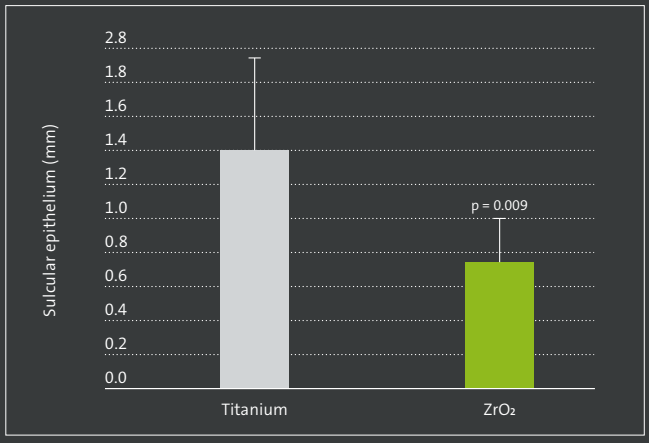


Fig. 3: Soft tissue organization around PURE Ceramic Implants was different when compared to the titanium as manifested by significant difference in size of sulcular epithelium. (Adapted from Liñares et al., 2017)

CLINICALLY PROVEN

Surface modifications play an important role in the osseointegration process and thereby influence implant strength as well as aging resistance **(Buser et al., 1991; Shalabi et al., 2006).** The surface of the Straumann® PURE Ceramic Implant System, Straumann® ZLA® (Fig. 4), is characterized by roughness values close to those of conventionally produced titanium implants e.g. Straumann implants with SLA® surface, widely known from its optimal topography that enhances bone-to-implant contact (BIC), and hence facilitates osseointegration **(Abi Najm et al., 2018; Amorfini et al., 2018; Beger B et al., 2018; Bormann et al., 2012; Buser et al., 1991; Gahlert et al., 2012; Verardi et al., 2018;)**

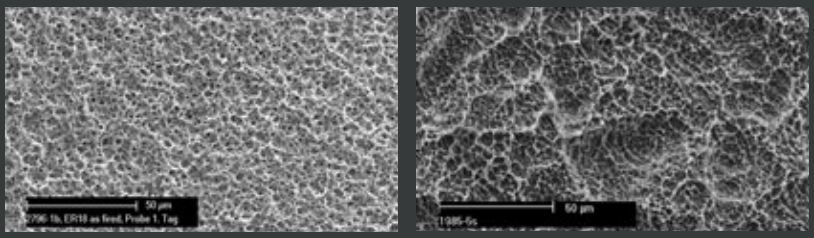


Fig. 4: The ZLA® surface combines the micro- and macro-roughness of the SLA® surface with reliable osseointegrative properties. The torque-out value of the Straumann® PURE Ceramic Implant System is equivalent to SLA® implants from titanium.

In preclinical studies, the ZLA® surface demonstrated similar healing patterns, healing times and osseointegration in terms of peri-implant bone density and bone-to-implant contact as seen for the SLA® surface **(Gahlert et al., 2010 and 2012; Janner et al., 2017).** Also torque-out values were shown to be equivalent to titanium SLA® implants **(Gahlert et al., 2012).** Another study observed even no difference in bone tissue integration between ceramic ZLA® implants compared to titanium SLActive® implants **(Liñares et al., 2016).** These reports were further confirmed by clinical investigations demonstrating survival rates of the Straumann PURE Ceramic Implant Monotype from 97.6 % to 100 % after 1 year which is a value within the range of reported one-year survival and success rates for titanium or titanium alloy implants **(den Hartog L. et al., 2008; Gahlert et al., 2015; Kniha et al., 2018; Kniha et al., 2017)**. A recent multi-center study found survival and success rates of 97.2 % after 5 years (manuscript in preparation).

Abi Najm S et al. (2018) Implant Dent. 2018 Aug;27(4):439-444. **Amorfini L. et al. (2018)** Int J Prosthodont. 2018 July/August;31(4):359–366. Beger B et al. (2018) Int J Implant Dent. Apr 26;4(1):13 **Bennadi D et al. (2013)** J Int Soc Prev Community Dent 3(1):1-6. **Bhandari M et al. (2011)** Evidence-Based Orthopedic. Oxford, UK: Wiley-Blackwell. **Bidra AS et al. (2013)** J Esthet Restor Dent 25(3):159-176. **Bormann KH et al. (2012)** Clin Oral Implants Res 23(10):1210-1216. **Buser D et al. (1991).** J Biomed Mater Res 25(7):889-902. **den Hartog L et al. (2008)** J Clin Periodontol 35(12):1073-1086. **Gahlert M et al. (2016).** Clin Oral Implants Res. 27(12):e176-e184. **Gahlert M et al. (2012)** Clin Oral Implants Res 23(3):281-286. **Gahlert M et al. (2010)** Clin Implant Dent Relat Res 12(4):297-305. **Janner SFM et al. (2018)** Clin Oral Implants Res. 29(3):277-289. **Jung RE et al. (2008)** Int J Periodontics Restorative Dent 28(4):357-365. **Klages U et al. (2004)** Eur J Orthod 26(5):507-514. **Kniha K et al. (2018)** Int J Oral Maxillofac Surg. Apr;47(4):492-498. **Kniha K et al. (2017)** Eur J Oral Implantol;10:443-51. **Kniha K (2014)** ITI World Symposium, Geneva. **Liñares A t al. (2016)** J Clin Periodontol; 43: 538–546. **Montero J et al. (2014)** J Oral Rehabil 41(10):768-782. **Pithon MM et al. (2014)** Am J Orthod Dentofacial Orthop 146(4):423-429. **Roehling S et al. (2017)** J Periodontol. 2017 Mar;88(3):298-307. **Shalabi MM, Wolke JG, Jansen JA (2006)** Clin Oral Implants Res 17(2):172-178. **Verardi S. et al. (2018)** Implant Dent. 2018 Feb;27(1):5-9.

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