



Scientific Review for Straumann® SLA® implant surface.

The Straumann SLA® surface is one of the best documented surfaces in dental implantology. Over the last 20 years more than 100 clinical and preclinical SLA® studies have been published in peer-reviewed journals including clinical studies with more than 10 years of observation time.

REDUCING HEALING TIME TO 6 WEEKS WITH HIGH CLINICAL SUCCESS

Micro-rough implant surfaces are commonly used as bone anchorage surfaces for dental implants today. These surfaces have demonstrated superior osseointegration properties compared to smooth or polished surfaces (**Buser et al. 1991**). It has been shown in many studies that the bone-to-implant contact increases significantly with a higher surface roughness (**Shalabi et al. 2006**). Optimal results are achieved in a narrow range for moderately rough surfaces with Ra/Sa values of 1.0–2.0 µm (**Wennerberg & Albrektsson 2009**). The Straumann® SLA® surface is a moderately rough surface (Sa value of about 1.5 µm) which is optimal to enhance bone-to-implant contact according to the consensus paper of **Lang & Jepsen 2009**.

Because of these enhanced osseointegration properties, the healing time from implant placement to implant loading could be reduced from 3 to 6 months of uninterrupted healing to 6 weeks until the implant can be prosthetically loaded. The following clinical studies impressively demonstrated the successful use of SLA® Implants in early loading protocols after 6 weeks:

- **Roccuzzo et al. 2008:** 100 % success rate with 53 implants in 27 patients after 5 years
- **Bornstein et al. 2005:** 99 % success rate with 100 implants in 102 patients after 5 years, crestal bone loss of less than 0.2 mm per year

- **Cochran et al. 2011:** 99 % success rate with 385 implants in 120 patients after 5 years
- **Cochran et al. 2007:** 97 % success rate with 990 implants in 590 patients after 5 years
- **Salvi et al. 2004:** 100 % survival rate with 67 implants in 27 patients after one year

LONG-TERM RELIABILITY SUPPORTED BY STRONG EVIDENCE

Fischer & Stenberg 2012 documented 10-year follow-ups of 102 implants in 23 patients. The average bone loss was 1 mm after 10 years which is far below the success criteria defined by **Albrektsson et al. 1986**. Peri-implant mucositis was reported only for one patient with a history of peri-implant disease.

Roccuzzo et al. 2013 documented the performance of 252 implants with the SLA® surface. They compared the long-term outcome (10 years) of 126 periodontally compromised patients with periodontally healthy patients. No implant was lost in the group of periodontally healthy patients. In the groups of periodontally compromised patients only 6 implants were removed due to biological complications. In 96 patients with moderate periodontitis only 3 implants were lost and the same number of implants was lost in 102 patients with severe periodontitis, leading to a survival rate of 97 % in these groups.

In a large study, **Buser et al. 2012** documented data of 511 implants placed in 303 patients. In this group of patients only 6 implants were lost; in 9 cases the patients showed signs of suppuration or had a history of peri-implant mucositis. The strict success criteria of **Buser et al. 1991** have been met for 496 implants, relating to a success rate of 97%.

In conclusion, it can be stated that the SLA® surface is one of the best documented surfaces in dental implantology. Very high implant survival and success rates of 97 % to 100 % can be reached after 5 years if the implant is loaded after 6 week or later. The high long-term survival rates of 97 % after 10 years in function impressively demonstrate the strong performance of SLA® implants over a long period of time. A chemically modified SLA® surface has been developed to further improve this excellent implant surface. This advanced surface allows even shorter healing times and helps to reach predictable treatment outcomes in challenging cases. The SLActive® surface is combining the clinical proven excellent long-term performance of the SLA® surface with a fast and reliable osseointegration process supported by the chemical modification of this well-established surface.

REFERENCES

Albrektsson T, Zarb G, Worthington P, Eriksson AR.: The long-term efficacy of currently used dental implants: a review and proposed criteria of success. Int J Oral Maxillofac Implants. 1986 Summer;1(1):11-25 Bornstein MM, Schmid B, Belser UC, Lussi A, Buser D.: Early loading of non-submerged titanium implants with a sandblasted and acid-etched surface. 5-year results of a prospective study in partially edentulous patients Clin Oral Implants Res. 2005 Dec;16(6):631-8. Buser D, Janner SF, Wittneben JG, Brägger U, Ramseier CA, Salvi GE.: 10-year survival and success rates of 511 titanium implants with a sandblasted and acid-etched surface: a retrospective study in 303 partially edentulous patients. Clin Implant Dent Relat Res. 2012 Dec;14(6):839-51. Buser D, Schenk RK, Steinemann S, Fiorellini JP, Fox CH, Stich H.: Influence of surface characteristics on bone integration of titanium implants. A histomorphometric study in miniature pigs. J Biomed Mater Res. 1991 Jul;25(7):889-902 Cochran D, Oates T, Morton D, Jones A, Buser D, Peters F.: Clinical field trial examining an implant with a sand-blasted, acid-etched surface. J Periodontol. 2007 Jun;78(6):974-82. Cochran DJ, Jackson JM, Bernard JP, ten Bruggenkate CM, Buser D, Taylor TD, Weingart D, Schoolfield JD, Jones AA, Oates TW Jr.: A 5-year prospective multicenter study of early loaded titanium implants with a sandblasted and acid-etched surface. Int J Oral Maxillofac Implants. 2011 Nov-Dec;26(6):1324-32 Fischer K, Stenberg T.: Prospective 10-year cohort study based on a randomized controlled trial (RCT) on implant-supported full-arch maxillary prostheses. Part 1: sandblasted and acid-etched implants and mucosal tissue. Clin Implant Dent Relat Res. 2012 Dec;14(6):808-15 Lang NP, Jepsen S; Working Group 4.: Implant surfaces and design (Working Group 4). Clin Oral Implants Res. 2009 Sep;20 Suppl 4:228-31 Rocuzzo M, Aglietta M, Bunino M, Bonino L.: Early loading of sandblasted and acid-etched implants: a randomized-controlled double-blind split-mouth study. Five-year results. Clin Oral Implants Res. 2008 Feb;19(2):148-52 Rocuzzo M, Bonino L, Dalmaso P, Aglietta M.: Long-term results of a three arms prospective cohort study on implants in periodontally compromised patients: 10-year data around sandblasted and acid-etched (SLA) surface Clin Oral Implants Res. 2013 Jul 19 Salvi GE, Gallini G, Lang NP.: Early loading (2 or 6 weeks) of sandblasted and acid-etched (SLA) ITI implants in the posterior mandible. A 1-year randomized controlled clinical trial Clin Oral Implants Res. 2004 Apr;15(2):142-9. Shalabi MM, Gortemaker A, Van't Hof MA, Jansen JA, Creugers NH.: Implant surface roughness and bone healing: a systematic review. J Dent Res. 2006 Jun;85(6):496-500. Wennerberg A, Albrektsson T. Effects of titanium surface topography on bone integration: a systematic review. Clin Oral Implants Res. 2009 Sep;20 Suppl 4:172-84.



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

www.straumann.com