

The Promote® surface – a state of the art titanium surface for implant dentistry

Fact sheet

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Commercially pure titanium (or CPTi) is the material of choice for endosseous dental implants. It is recognized as an excellent implant material with high biocompatibility and has been the prime material for clinical use in implant dentistry for more than 40 years. Titanium offers a high mechanical strength combined with excellent corrosion resistance.

The discovery of the osseointegrative properties of titanium – defined as direct attachment of living bone to the implant surface – by Brånemark [1] was a landmark in dental implantology. Since then, the implant surface (topography) has been continuously refined for optimal osseointegration. The Promote® surface, a sand-blasted and acid etched surface, has been the surface of choice for the Camlog implants for more than 20 years.

Pure Titanium – a standard with ideal properties for dental implantology

CAMLOG®, CONOLOG®, and iSy® implants are manufactured from pure titanium. According to standard [2], pure titanium for implant applications contains at least 99% titanium and small, precisely limited amounts of the accompanying elements oxygen, iron, carbon and nitrogen. The high purity is achieved by special manufacturing processes including multiple remelting and is important for the corrosion resistance and biocompatibility of the implants.

Thanks to a dense, inert oxide layer (TiO₂) – also called passive layer – pure titanium resists the aggressive conditions in the human body far better than implant steel or other metal alloys. This could be proven in numerous studies [3, 4].

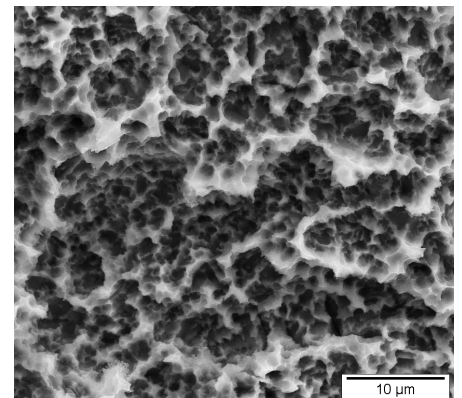
If the passive layer is damaged by scratching or injured by abrasion, the defect “heals” spontaneously by repassivation [3, 5]. In principle, the passive layer corresponds to a thin ceramic coating of TiO₂. Thanks to this dense protective oxide layer, titanium is called bioinert and has unique properties in terms of biocompatibility [6]. Titanium is one of few metals on whose surface the growth and proliferation of osteoblast and fibroblast cells are not inhibited [7]. For this reason, titanium is particularly suitable to serve as the base material for endosseous implants, allowing for bone and soft tissue integration.

The Promote Surface – Study results

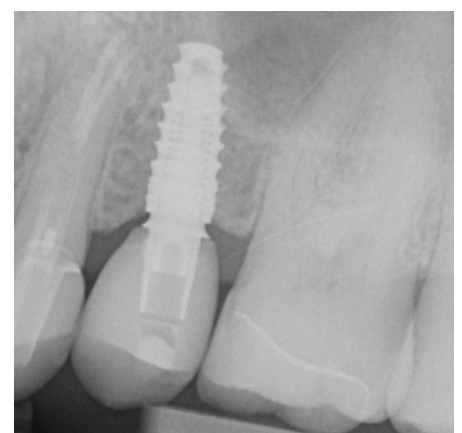
The Promote® surface favors rapid and stable osseointegration. This has been documented over the years by a large number of clinical trials in several indications and loading modalities providing a comprehensive documentation including outstanding clinical long-term results [8].

Long-term results on the performance of the Promote surface showed excellent survival and success rates [9], this was also reported independently of the time of implantation or the time of loading. More recently, excellent results of bone maintenance with implants using a platform switching restoration were reported in well-defined clinical studies [10,11] as well as in private practice [12,13] or with short implants [14, 15]. These results were in accordance with the publication of Knöfler et al. [16] who investigated the possible influencing factors on the survival rate of 10'000 implants over 20 years of different systems in private practices. The author reported the highest probability of survival for implants with a Promote surface [16].

Recently, increasing attention is paid to the cleanliness of the implant surface after the manufacturing process. Comparing the Promote surface with other sand blasted acid etched surfaces, the paper [17] reported that the Promote surface belong to the SLA surfaces showing the least number of alumina particles after etching.



SEM image of the PROMOTE® surface.



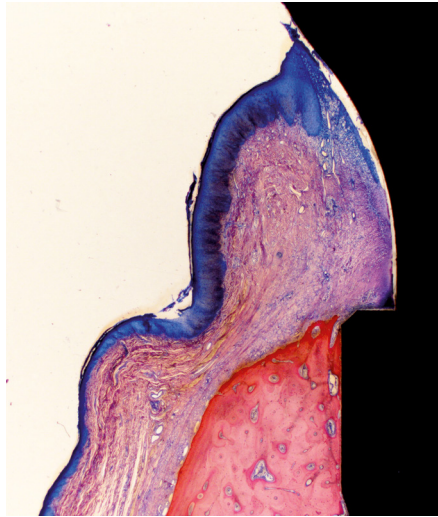
Bone maintenance of a CAMLOG® PROGRESSIVE-LINE implant, restored with a Titanium base PS. Courtesy of Dr. Frederic Hermann MSc.

Conclusion

Pure titanium combines in an ideal way an excellent corrosion resistance and biocompatibility with a high mechanical strength and ductility. Camlog implants with the Promote surface show excellent and reliable clinical results in different indications and if compared to other implant systems and surfaces – in clinical trials as well as in daily dental practice [8].

Take home messages:

- High biocompatibility
- Mechanical strength and ductility
- Excellent and reliable clinical results



Histology of an integrated CONELOG® SCREW-LINE implant. Courtesy of Prof. Dr. Frank Schwarz.

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