

The DESS ZrN opportunity

Dental implant treatment is both complex and expensive and in most markets it is also entirely patient financed. In theory it is one of the most well researched and most predictable oral rehabilitations available and solves a normally irreversible problem of tooth loss for the patient. Common to both tooth loss and implant complications is patient compliance - ie oral hygiene. It is in everyones interest to maintain the well-documented treatment success of oral implants in order to avoid suffering and costly re-treatments.

To fully understand the ZrN opportunity for DESS there are a couple of factors that needs to be explained.

Peri-implant disease

The simplest definition is "inflammation caused by bacterial infection in the gingival tissues surrounding an implant". In fact no different than a bacterial infection around a natural tooth. Both types of infections will in the early stages lead to bleeding (mucositis) and if it goes untreated, loss of bone support (peri-implantitis).

The most important cause of Peri-implant disease is poor oral hygiene. Bacteria will colonize the gingival margin and cause inflammation that leads to break-down of the collagen that keeps the gingiva tight - *mucositis*. The loss of the collagen matrix opens the gingival entrance for even more bacteria and the destruction of tissue eventually reach the bone at which stage the disease is called *peri-implantitis*.

There are a large number of studies looking at the prevalence of peri-implant disease, its various stages, progression and optimal treatment. One of the most thorough retrospective studies is the one by Jan Derks at the University of Gothenburg, Sweden. Sweden is one of the best countries to conduct epidemiological studies in, since all citizens are registered with social security numbers and addresses tied to this number. Sweden has a dental insurance system and an implant registry to facilitate the measurement and follow up of clinical outcome. This is a truly epidemiological study in that it covers patients that are treated in ordinary practices by both general dentists and specialists - not just in very controlled clinical academic settings.

- 2765 patients selected from 800 clinicians -> 596 examined after 9 years
- 23% of all implants were healthy
- 32% of all implants had mucositis
- 45% of all implants had Peri-implantitis >0,5mm bone loss
 - 14,5% of these had moderate to severe PI >2mm bone loss
- 7,6% of all patients had lost at least 1 implant
- Clinical signs of PI disease appeared already after 3 year



Other studies both in Sweden and elsewhere show similar results. In other words the longevity of this remarkable treatment option has its limitations and is at risks.

Detection and prevention

Since the prevalence and the link to clinical consequences are well known it should be quite possible to prevent or limit the damage. The fundamental remedy is of course to encourage and motivate the patients to manage their oral hygien so bacteria never settles. Easy to say but very difficult to achieve. Patients willingness to change behavior doesn't really increase until they see tangible signs of problems. When a concrete clinical sign like bleeding occurs a peri-implant problem is already established.

The MMP8 diagnostic tool is a proven and highly accurate way of predicting peri-implant disease. The MMP8 biomarker appears in the peri-implant fluid as a bi-product from collagen break-down. The collagen break-down starts long before any clinical signs can be detected. In fact increased MMP8 levels was found 24 months before a reduction of bone-levels could be seen. (Guarneri et al.) Early detection is critical and the sooner a personalized prevention program can be initiated the better since the early stages, that only affect the gingiva, can be reversed.

ZrN

ZrN is a surface treatment of the titanium associated with very well documented clinical advantages. The patented ZrN surface on the titanium component, combines the very favorable biocompatible features of Zirconia vs gingival tissues, with the well known and established properties of an all-titanium implant/abutment post. The DESS patent describes the manufacturing process and the particular clinical claims and features are verified in clinical studies:

- ZrN prevents biofilm from establishing on the abutment surface. Biofilm normally forms very quickly on a TiO abutment surface and becomes a substrate for bacteria and plaque.
- Less biofilm means less plaque and the surface is also easier to clean for the patient.
- ZrN promotes adhesion of fibroblasts on the surface forming a tighter seal around the gingival margin.

- ZrN is about 6 X stronger than the titanium surface which increases the wear and scratch resistance during professional cleaning and everyday use.
- ZrN properties also makes it corrosion resistant. Gingival plaque produces acid that will corrode the TiO surface, making it rougher and even more retentive for bacteria.
- ZrN has a goldish warm hue which has esthetic advantages compared to the grey TiO.

Two systems together

Peri-implant disease is by many clinicians and researchers described as the most problematic complication related to dental implants. During the DSO meeting in Cascais finding a solution and tool to combat peri-implant complications was #1 on the list of wishes from clinicians to the industry.

I have described both MMP8 as the standard for detection of the problem and ZrN with proven features that can limit the cause for peri-implant disease. Combining these methods is a way to secure the health and longevity of the implant treatment.