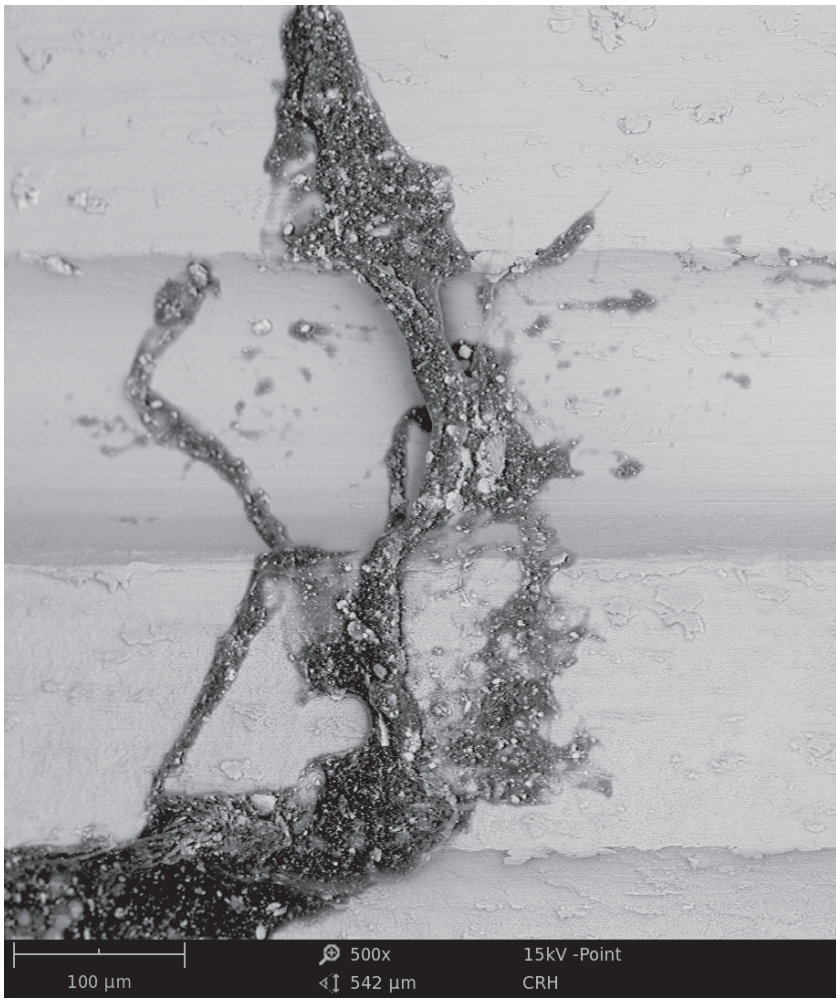
Implant contamination ex-factory— The widely underestimated risk factor for early implant failures

In the search for the causes of peri-implant bone loss, poor oral hygiene, smoking, pre-existing diseases, or existing periodontitis are often identified. A largely neglected factor that may influence an implant's short- and long-term survival is likely to be factory-related particulate and film-like contaminants on the sterile implant surface.

This is the conclusion of recent analyses by the non-profit CleanImplant Foundation. Elaborate SEM and ToF-SIMS analyses were performed at two independent, accredited testing laboratories on implant types sent to the CleanImplant Foundation for review by concerned dentists. These reported conspicuous early failures in individual implant systems. Sterile packaged samples of the same type then showed in the analyses, inter alia, significant contamination of the implant shoulder with so-called polysiloxanes. Residues of cell-toxic cleaning agents were also identified as a possible cause of implant losses.

Organic contaminants are associated in the literature with peri-implant bone loss and peri-implantitis.[1] Foreign bodies with a size of 0.2 to 7.2 µm are considered to be particularly pro-inflammatory.[2-4] Macrophages take up the particles by phagocytosis if these detach from the surface during implant placement. Subsequently, activated macrophages release pro-inflammatory cytokines such as TNF-α, IL-1b, and IL-6. These not only stimulate the differentiation of osteoclast precursors into mature osteoclasts but also lead to the expression of matrix metalloproteinase (MMP-8).[5] The result is an expanding zone of soft tissue damage and inflammation at the site of implant placement as well as peri-implant bone resorption.

At the IDS in Cologne, visitors can not only obtain information on the CleanImplant Foundation's quality assessment studies. A team of experts from the Foundation will be conducting analyses directly at the exhibition booth using a scanning electron microscope on-site. Interested visitors can bring sterile-packaged samples of their preferred implant system and attend the live quality assessment. Over the past few years, more than 300 implant systems have been examined for residues in the SEM, so the majority of systems are already recorded in the CleanImplant Foundation database. Dental trade show visitors can learn more in Hall 10.2, Booth O042.



Sterile packaged implant with significant organic contaminants (SEM 500x).

References

Corresponding author
Dr Dirk U. Duddeck
CleanImplant Foundation
Founder and Head of Research
duddeck@cleanimplant.org