

# Guideline on Ceramic Implants:



## The German Association of Oral Implantology presents internationally the first guideline on this topic

“One-piece ceramic dental implants based on zirconium dioxide, whose success and survival rates have been positively evaluated in scientific studies, are a valid and mature therapy method and can be recommended as an alternative therapy option.” This is recommendation number one from experts from 18 scientific societies and organisations under the leadership of the German Association of Oral Implantology (Deutsche Gesellschaft für Implantologie—DGI e.V.), who have developed the world’s first guideline on ceramic implants.

**T**itanium implants as dental prostheses have been scientifically recognised in Germany since 1982 and have become an established option for patients following tooth loss. Extensive prospective long-term studies and experience have made them the gold standard in oral implantology. Nevertheless, many patients desire alternative treatment concepts with ceramic implants. Today, zirconia is the standard material for these implants.

Important: The manufacturer’s competence. Unlike titanium implants, the essential properties of ceramic implants depend on the individual production processes of the manufacturers and the type and number of chemical additives used. Zirconium dioxide stabilised with the chemical element yttrium is now the most commonly used variant due to its special mechanical properties. The latest generation of ceramic implants also contains small amounts of aluminium oxide to increase flexural strength. However, the manufacturing process is equally important. “The manufacturer’s expertise plays a significant role in ceramic implants,” emphasise the experts.

The problem: lack of long-term data. The biggest issue when experts want to assess the quality and stability of ceramic implants is the lack of long-term data from studies. Advanced production methods, successor models with altered material compositions, and the discontinuation of implant types used in studies delay the acquisition of knowledge.

Research continues. “Despite promising material properties, the development of even more powerful ceramics does not seem to be complete,” write the authors of the guideline. Optimised manufacturing processes and methods to provide implants with microrough surfaces, for example, appear to have a

crucial impact on their long-term stability. Challenging conditions for guideline development. As positive as the continuous development of implant systems is, it poses problems for guideline work. The first statement of the experts in the new guideline states: “The long-term stability of zirconium dioxide-based ceramic implants beyond five years cannot be conclusively assessed due to the lack of clinical prospective long-term study data yet.”

The second statement provides the rationale: the material composition, like the respective workpiece quality, is manufacturer-dependent and thus multivariate. Dynamic material modernisations and design changes often lead to replaced product innovations, reducing the value of existing study data.

The good news in Statement 3, a setback in Statement 4: Pre-clinical and clinical studies point to a similar behaviour in the osseointegration of ceramic and titanium implants (Statement 3). However, due to the current scientific evidence, an evidence-based statement regarding plaque accumulation and peri-implantitis risk in treatment with ceramic implants is not possible (Statement 4).

Ceramic implants can be recommended as an alternative therapy option. Despite all the difficulties, the experts emphasise in their first of two recommendations that commercially available monolithic ceramic implants based on zirconium dioxide, with success and survival rates positively evaluated in scientific studies, are a valid and mature therapy method and can be recommended as an alternative therapy option.

No final judgement on two-piece ceramic implants. Regarding the still “young” two-piece ceramic implants, the experts have formulated their second recommendation: “Commercially avail-



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**01**  
DGI guideline conference 2021: Prof. Dr Dr Knut A. Grötz, Wiesbaden, Germany (right), coordinates the development of the guideline on ceramic implants, assisted by Prof. Dr Christian Walter, Mainz, Germany.



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**02**  
Ceramics also play a role in a new DGI guideline, which was developed in 2024 and coordinated by Prof. Stefan Wolfart, Aachen, Germany. However, this is about the choice of material for fixed implant-supported restorations.



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**03**  
More than 50 delegates from 18 scientific medical and dental associations take part in the DGI's guideline conferences—as here in 2021.



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**04**  
After discussing a guideline, the delegates vote.

able two-piece ceramic implants based on zirconium dioxide appear to be a therapy option for replacing missing teeth. However, a final assessment is not possible due to the low level of evidence from clinical studies.”

Special clarification required. Therefore, the experts emphasise that a special clarification is necessary when discussing with patients, where the therapy with two-piece ceramic implants—compared to that with titanium implants—is explained and highlighting the issue of the lack of long-term data so far.

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