

# ceramic implants

**international magazine of** ceramic implant technology



## **research**

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Georg Isbaner

Editorial Manager



# Ceramic implants— current state of discussion

Dear Readers,

When the idea for this magazine was first presented at the IDS 2017, it was not yet foreseeable that in the months leading up to the first publication in fall 2017 the developments of the ceramic implant market would yet be speeding up. Numerous dental businesses were introducing new or newly acquired ceramic implant systems. The first publication of *ceramic implants—international magazine of ceramic implant technology* thus occurred in a highly sensitive environment and consequently received much attention.

If one is closely following the discussions regarding ceramic implants of the past months and years—may it be by reading, among others, this magazine or by participating in the specialist congresses e.g. in San Diego, USA (IAOCI), Constance, Germany (ISMI) or at the diverse ITI sessions—certain topics have become especially prominent:

On one hand material and processing characteristics are concerned—taking into account the monoclinic and tetragonal phases of zirconium dioxide ( $\text{ZrO}_2$ )—defining the mechanical and prosthetic capacities of the implant body. As implant material  $\text{ZrO}_2$  can resist extreme loading forces in the tetragonal phase (compared to the monoclinic phase) and its high biocompatibility makes it an ideal dental material. However, owing to its tremendous stiffness in comparison to titanium it is also prone to fractures at the load limit—as has been noticed in the past. This consequently has an influence on the design (production), application and the characteristics of

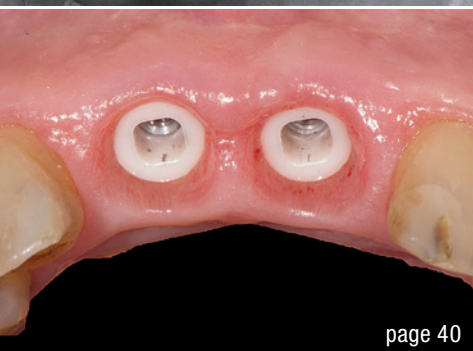
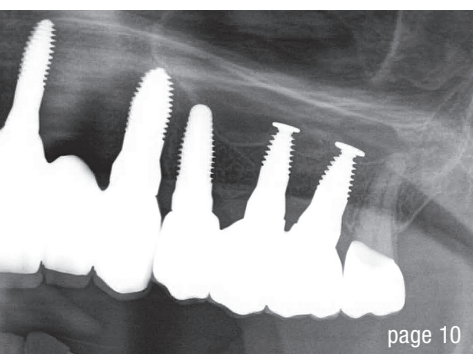
one-piece and two-piece (screw-retained or cemented) implant systems. Thus we are reaching the second discussion topic: One-pieced or two-pieced?

The advantage of one-piece  $\text{ZrO}_2$  implants is the absence of a micro-gap. The experts however recommend—and here the opinions and methods still widely differ—to forego a possible prosthetic follow-up processing by grinding the implant head as it can impair the surface characteristics (tetragonal > monoclinic). Thus, naturally also the indication area is restricted, as the surgically best position does not necessarily lead to the most reasonable prosthetic solution.

According to the experts, also with two-pieced, screw-retained systems, owing to the material solidity of  $\text{ZrO}_2$  and in case of faulty design, there is a risk of fractures or loosening at the implant–abutment connection. Manufacturers of the newest two-piece systems are, however, stating that these risks have been overcome as the design was adjusted accordingly and no significant disadvantages in comparison to two-piece titanium implants have to be feared. Further the prosthetic diversity of two-piece  $\text{ZrO}_2$  systems, especially when combined with thorough digital planning, makes it possible to join the necessary prosthetic solution with the surgically reasonable position of the implant. Overloading and faulty functionality including the presumed fracture risk can be avoided in advance. The newest generation of bone-level  $\text{ZrO}_2$  systems is closing important indication gaps in comparison to titanium systems.

Yours, Georg Isbaner





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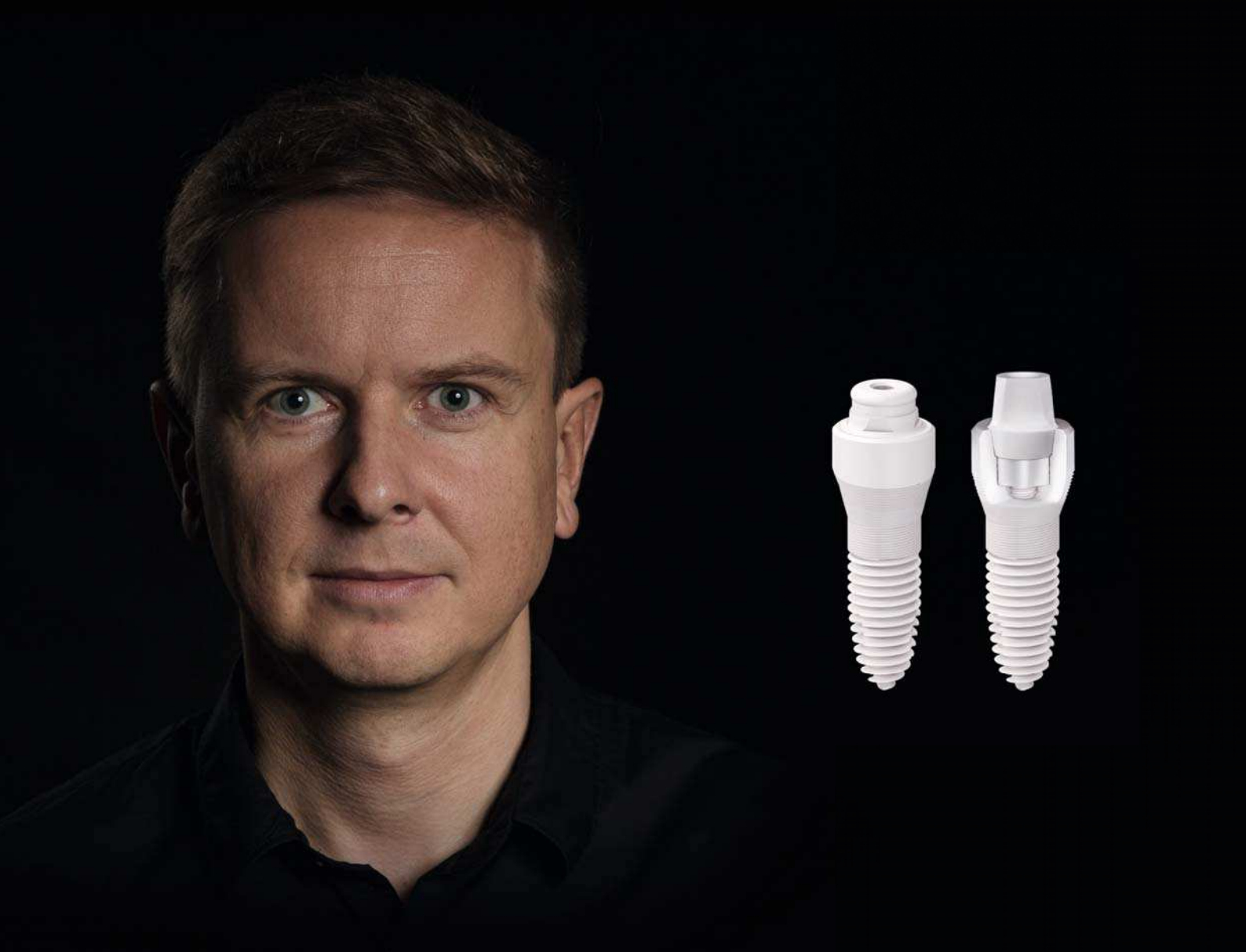
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“For me, biological dentistry and the use of ceramic implants are important milestones in dentistry.”

Dr. Alexander Neubauer, Tittling

“The opportunities for a dentist to make a positive contribution to patient health in this field, are truly enormous. In addition to the courses themselves, work shadowing Dr. Volz and his live procedures was always a great experience and proved really impressive. The idea of the concept being implemented in their own dental practices was very popular with patients right from the start. Courses in the areas of stress management, practice management and nutrition also contributed to holistic training and personal development that I wouldn't want to miss out on”.

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# From peri-implantitis to implant disease

## Will terminology and definitions change?

Dr Franz-Jochen Mellinghoff, M.Sc., PhD, Germany

**Current demographic prognoses show** that the proportion of elderly (population of 60 and above) will increase strongly in all developed and underdeveloped countries worldwide by 2050 (Fig. 1). This naturally results in an increasing stress on the global health system. One of the stressors that dentists can focus on is dental health, specifically regarding implants (Table 1).

Millions of dental implants made from titanium are inserted annually worldwide. They are especially used for the elderly, in order to rebuild the functional and aesthetic purposes of teeth after partial or total loss. Implant therapy has therefore developed into a procedure which allows very demanding dentures in faster and cheaper ways.

### Implantological developments

With the development of titanium implants from 1965 to 1990 there was a wave of excitement and hope among

both dental practitioners and patients in need. This technology was new, fascinating, and incredibly profitable. Unfortunately, in the excitement to apply this new technology the much needed research on the still unknown side effects began to diminish and the focus quickly turned to treatment diversification and profit.

Fast forward 52 years to present day and we now see that implants can lead to some form of bodily reaction presented as infection. These infections are described as mucositis and peri-implantitis. It can be observed that the implant disease starts with mucositis and progresses towards a status of peri-implantitis and can even progress as far as to result in complete implant loss.

Recently it has been shown, that these problems of inflammation increase especially with titanium implants that have been inserted over a longer period of time.<sup>1</sup> The majority of respondent US implantologists reported that

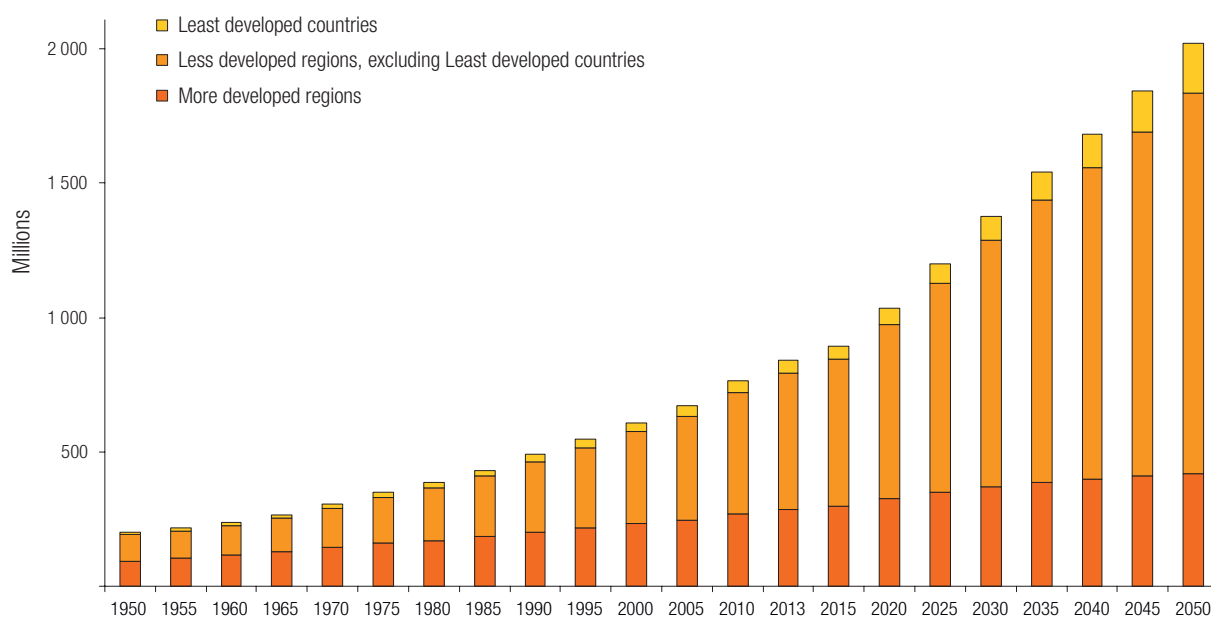


Fig. 1: Population aged 60 or above by development region. (Source: United Nations: World Population Aging 2013)



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| 2013            | Inserted implants | Inhabitants   | Inserted implants/<br>population (%) |
|-----------------|-------------------|---------------|--------------------------------------|
| Brazil          | 2,552,822         | 201,009,622   | 1.27                                 |
| USA             | 1,805,011         | 316,668,567   | 0.57                                 |
| Italy           | 959,124           | 61,482,297    | 1.56                                 |
| Germany         | 795,243           | 81,147,265    | 0.98                                 |
| South Korea     | 773,492           | 48,955,203    | 1.58                                 |
| Spain           | 630,028           | 47,370,542    | 1.33                                 |
| Japan           | 496,287           | 127,253,075   | 0.39                                 |
| France          | 389,115           | 65,951,611    | 0.59                                 |
| Russia          | 285,001           | 142,500,482   | 0.20                                 |
| China           | 269,917           | 1,349,585,838 | 0.02                                 |
| Switzerland     | 231,311           | 22,457,336    | 1.03                                 |
| Canada          | 203,952           | 34,568,211    | 0.59                                 |
| the Netherlands | 142,843           | 16,805,037    | 0.85                                 |
| UK              | 133,131           | 63,395,574    | 0.21                                 |
| Australia       | 89,050            | 22,262,501    | 0.40                                 |
| Austria         | 86,327            | 8,221,646     | 1.05                                 |
| Portugal        | 77,755            | 10,799,270    | 0.72                                 |
| Sweden          | 67,484            | 9,119,423     | 0.74                                 |
| <b>Total:</b>   | <b>9,987,893</b>  |               |                                      |

**Table 1:** Overview of inserted implants by nation. (Source: Süddeutsche Zeitung [Uhlmann 2016], Press office DGI, KZBV, dental industry)

the prevalence of peri-implant mucositis and peri-implantitis in their practices is as high as 25 per cent. They estimated that there is an even higher proportion within the general US population.

Regarding this study and the fact that there is no proven therapy for this detrimental process, when consulting the published success rates it becomes obvious that more often than would be expected it results in implant loss. According to relevant literature, we can take 10 per cent as a minimum value for implant losses over the years.<sup>2-7</sup>

Even though aetiology is multifactorial and could not be clarified acceptably, there is a lot of evidence point-

ing towards titanium intolerance playing a decisive role in patient condition.<sup>8</sup> As studies were able to show, zirconium dioxide reduces that risk because ceramic, unlike titanium particles, do not provoke significant secretion of messenger substances for osteolytic processes.<sup>9</sup>

## Could ceramic implants be the (new) “next best thing”?

After a rough beginning, with frequent material breakages and very limited numbers of suppliers, ceramic implants are becoming increasingly more present in the field of dental solutions. More and more, informed consumers are demanding treatment options which are holistic and thus considering the body as a whole. To date, there is very little data of known implant disease regarding ceramic implants—not a bad start but will this data change? And if so, when, how, and by how much?

The now realised success with two-piece and specifically the new bone-level ceramic implants will lead to much greater use of ceramic implants, as a wide range of indications can be covered, that were until now reserved to titanium implants.

## Conclusion

In summary there could be a change of focus turning from peri-implant disease to implant disease. Bringing more focus to the implant disease in general medicine will give us a chance to investigate this phenomenon more seriously. This is a task for all participants in the field of implantology because knowledge about implant disease could lead to widespread uncertainty in our patients

and we need to be well informed in order to properly advise them.

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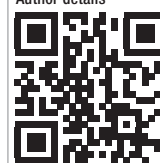
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Literature



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