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1/22

ceramic implants

international magazine of ceramic implant technology

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Janine Conzato

Managing editor

A new year, new faces and new long-term data

Today, patients have significant access to information and may come into the dental office with in-depth questions or recommendations regarding their treatment. Responding to these may require dentists to learn more about new procedures or technologies, looking at the scientific evidence with a critical eye. Regarding dental implantology, for example, there is market demand for a broader range of indications and greater prosthetic flexibility. Now new reliable long-term data on the clinical success of two-piece ceramic implants has made a fundamental contribution to evidence-based implantology, heralding a paradigm shift in the scientific discussion about ceramic implant systems. Many readers will be learning about this evidence for the first time in this issue of ceramic implants.

Among the new generation of ceramics in dentistry, zirconia presents outstanding aesthetic characteristics, a low propensity for plaque adhesion around the implant surface, excellent biocompatibility, and good osseointegration, muco-integration and biomechanics. In addition, zirconia implants have characteristics similar to those of titanium implants, and zirconia is frequently used in implant prostheses with pleasing results.

This issue of ceramic implants provides reports on the advantages of ceramic implants and a scientific update on the topic, including a worldwide survey by the European Society for Ceramic Implantology, conducted to gain a deeper insight into the daily use of ceramic implants. The survey findings provide valuable information for the further development of ceramic implants and make an important contribution to their reliable use—ultimately for the safety of patients. It is clear that the work being done in dental clinics and continuing education regarding the use of ceramic implants are contributing greatly to this development. This issue of ceramic implants is good testimony to that: numerous research articles, case reports, reviews and upcoming events testify to an extraordinarily active community.

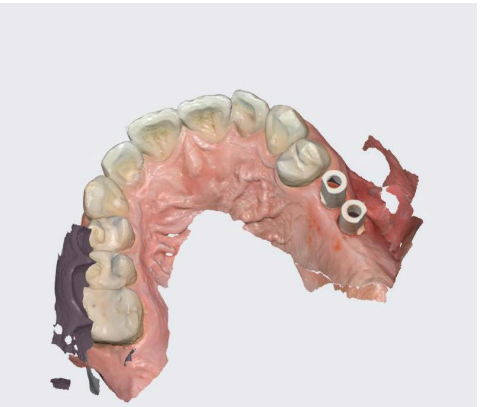
Over the past two years, continuing dental education in the form of in-person events has practically come to a standstill—not only in Europe but also beyond. Many of the great events in the dental world, like the International Society of Metal Free Implantology's annual conference, EuroPerio and the European Association for Osseointegration's annual scientific meeting, had to be called off. In-person events are slowly resuming, and the opportunity these offer for exchange among peers and socialising is more appreciated than ever.

Like the title of this editorial implies, we have something new to announce. There is a new dynamic duo in implant dentistry publishing: Timo Krause, OEMUS MEDIA AG product manager, and I are excited to have teamed up to write articles for our magazine. These are aimed at providing our readers with a comprehensive overview which reflects the diversity of ceramic implant initiatives, and we hope to live up to this objective in this new issue of ceramic implants.

Stay up to date with us by following us on LinkedIn.

Sincerely wishing you an enjoyable read,

Janine Conzato
Managing editor



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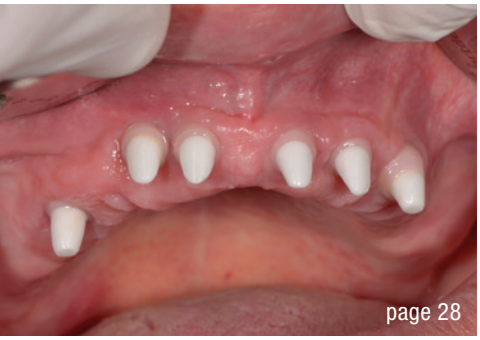

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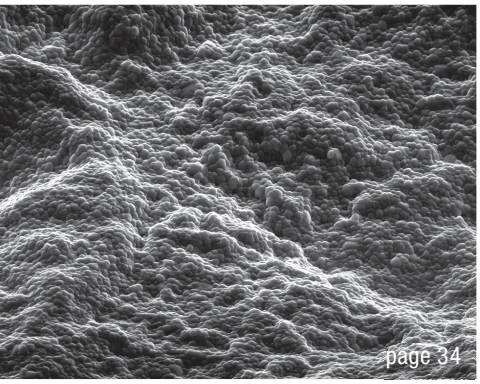

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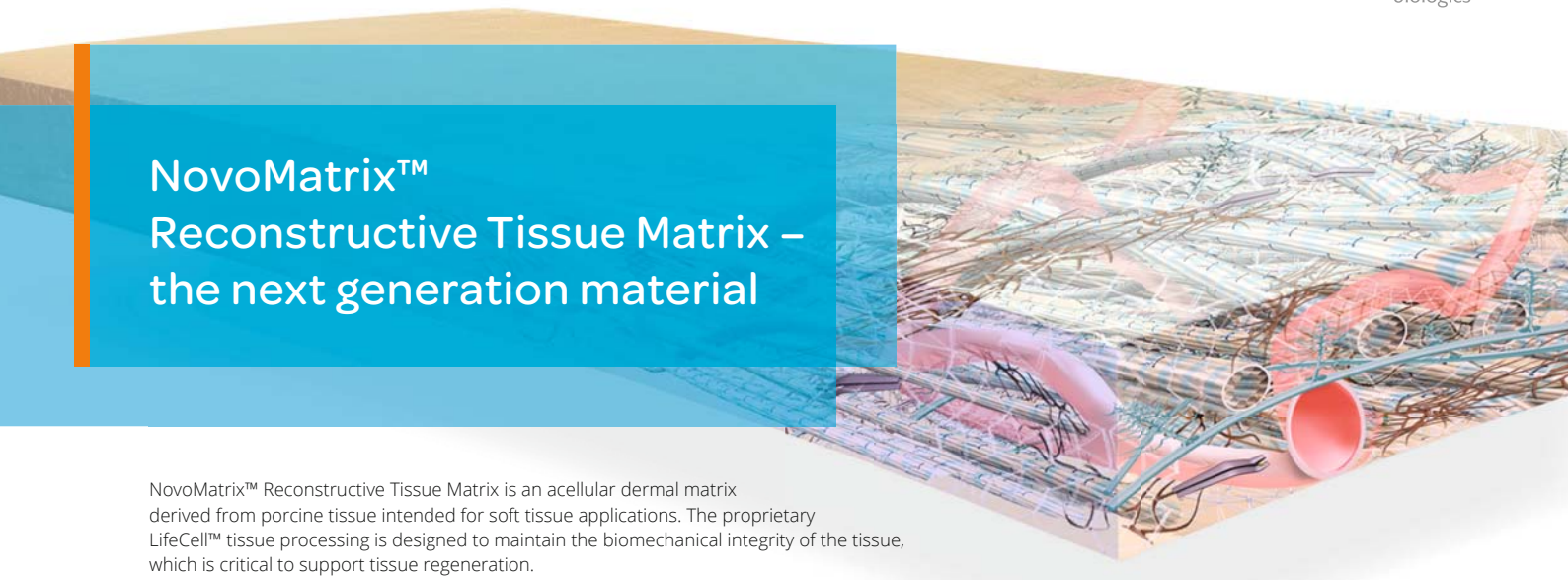

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[2] Schmitt et al. Clin Oral Implants Res. 2013, 24, 576.
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Dental implants and bone marrow defects

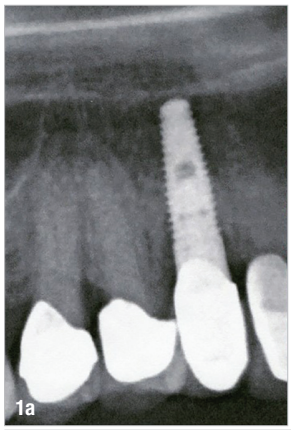
Evaluation of bone quality by intra-oral ultrasonography

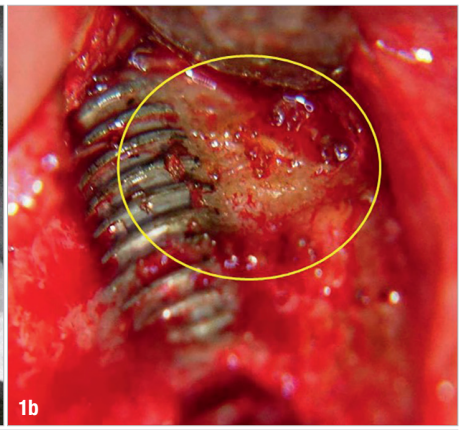
Dr Johann Lechner, Germany

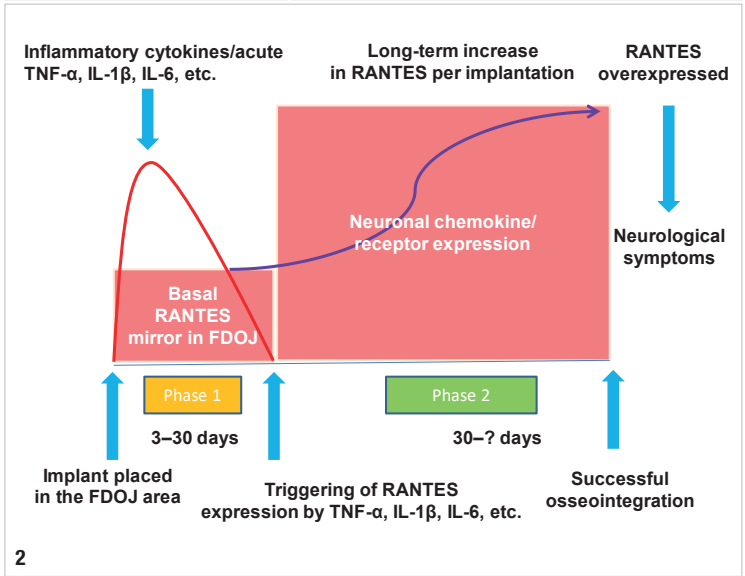
Introduction

In ceramic implants—**international magazine of** ceramic implant technology *issue 2/2021*, I discussed the objective validation of bone quality before implant placement in light of establishing whether the level of mineralisation in the jawbone is sufficient to osseointegrate an implant without any issues and to keep it secure in a stable bone bed for a long time or whether the implant is connected to a bone marrow defect.[1] In this current article, I would like to consider two questions relevant to the situation after implant insertion:

– Was the implant inserted into poorly healed bone?
– Is implant failure directly associated with incomplete wound healing of the implant site and a bone marrow defect around the implant?







Figs. 1a & b: Radiograph of an implant. No sign of inflammation in the jawbone **(a)**. Fatty degenerative osteolysis directly attached to the implant and thus not detectable by radiograph **(b)**. **Fig. 2:** This figure shows schematically the sequence of cytokine expression after wound setting by insertion of an implant into a bone area that is already preloaded with chronic inflammation of fatty degenerative bone marrow.

How to forecast the success of dental implants

The measurement of the quantitative ultrasonic transmission velocity (UTV) has been established as an innovative, objective, valid and reliable method for repeated, non-invasive measurements of bone quality before dental implantation.[5] The intra-individual correlation of the UTV values of the maxillary and mandibular lateral regions makes the data easy to interpret. The use of a small UTV device in this study enabled the recording of intra-oral UTV values in a large and heterogeneous patient population. Assessment of alveolar ridge UTV could provide a method for identifying critical bone quality before implant insertion or for monitoring bone healing (mineralisation) after augmentation procedures.[6]

The main advantages of ultrasonic measurement are that it is non-ionising, non-invasive, tolerable and available at relatively low costs. Furthermore, the examination is not a complicated process and can be easily performed by clinicians.[7,8] The new technology of transalveolar ultrasonic (TAU) measurement by CaviTAU can reliably identify regions of low mineralisation density in bone marrow cavities with signs of bone marrow defects and collateral chronic ischaemic inflammation.[9,10]

Implant insertion and bone marrow defects

There is no doubt that dental implantology has achieved a very high reliability and success rate in recent years. Despite this, there is increasing evidence that, in addition to the success of long-term stability, other medical assessment criteria should also be part of the discussion. Further questions on implant insertion arise, such as:

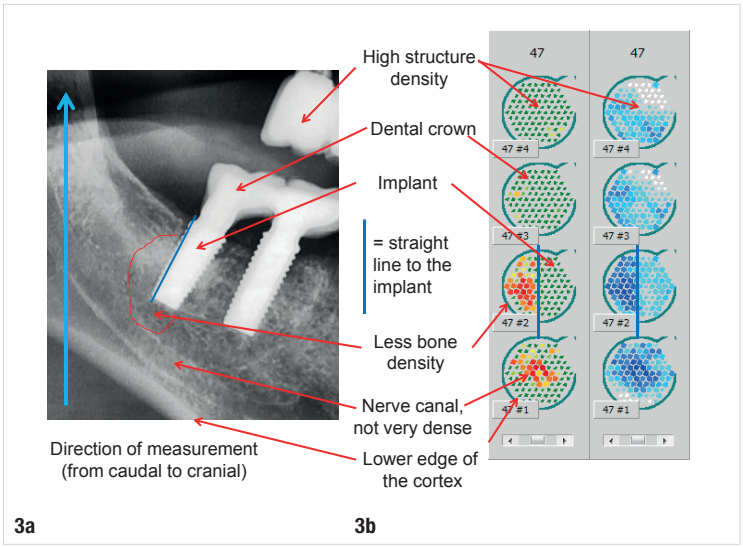
– Are good stability and loading capacity of an implant the only assessment criteria for implant success?
– Is there also undetected silent inflammation arising from fatty degenerative bone marrow defects (fatty degenerative osteonecrosis of the jawbone; FDOJ)?

A clinical case gives the answer to these questions: the panoramic radiograph showed that the implant had healed inconspicuously, hiding that it was directly attached to fatty degenerative morphology (Fig. 1). The overexpression of chemokine RANTES (CCL5) in regions of reduced bone density surrounding implants, as presented in the following case reports, has been described in detail. These FDOJ areas persist as silent or subclinical inflammation without the typical signs of acute inflammation.

In bone resorption in periodontitis and peri-implantitis, the acute cytokines tumour necrosis factor-α (TNF-α) and interleukin-6 (IL-6) are central to the destructive inflammatory process. A possible titanium intolerance provokes further expression of TNF-α and IL-1β via released titanium particles and increased bone resorption.[3]

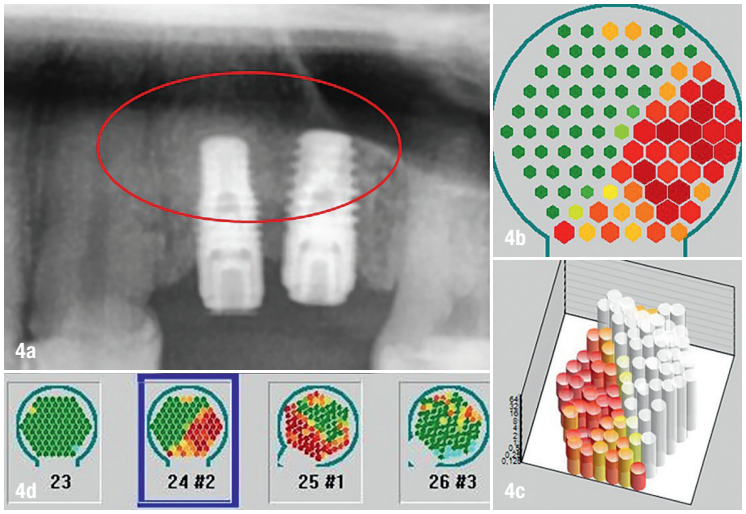
However, beyond this easily accessible therapeutic level, there are other bone resorption processes in the deeper layers of the bone marrow known as bone marrow defects or marrow oedema. This FDOJ morphologically shows bone softening, and TNF-α and IL-6 are far below the levels found in the healthy medullary cavity. In contrast, there is an up to 35-fold overexpression of RANTES.[11] With this chronic RANTES signal transduction, FDOJ appears to represent a unique pattern of inflammation with osteolysis in the body.

Local periodontal production of inflammatory cytokines such as TNF-α and IL-1β or IL-6 dysregulates regulatory and compensatory mechanisms that prevent the formation of implant-related FDOJ in the bone marrow. Arising from an intramedullary overexpression of RANTES, this phenomenon seems to be more widespread than originally thought. However, surgical removal of FDOJ areas can stop the induction of RANTES signalling pathways and thus inhibit the progression of associated symptoms.[11]

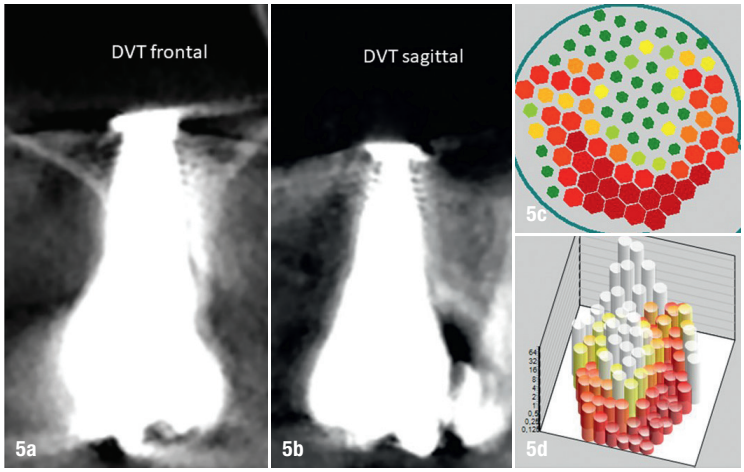


Figs. 3a & b: Two ceramic implants in areas #46 and 47 in an unremarkable radiograph **(a)**. CaviTAU measurement in four vertical comparison steps **(b)**.

An implant may be placed in an ischaemic area of subclinical FDOJ because of the radiographically inconspicuous FDOJ morphology and the lack of alternative methods for measuring bone density. Perala et al. demonstrated the induction of TNF-α *in vitro* after co-incubation of native implant material, which ensures that immunogenic particles are released from the materials.[12] With regard to cytokine expression in the context of an implant and the associated phases of healing, analysis during different stages of implantation reveals several new phases of cytokine-triggered signalling pathways. Acute wounding

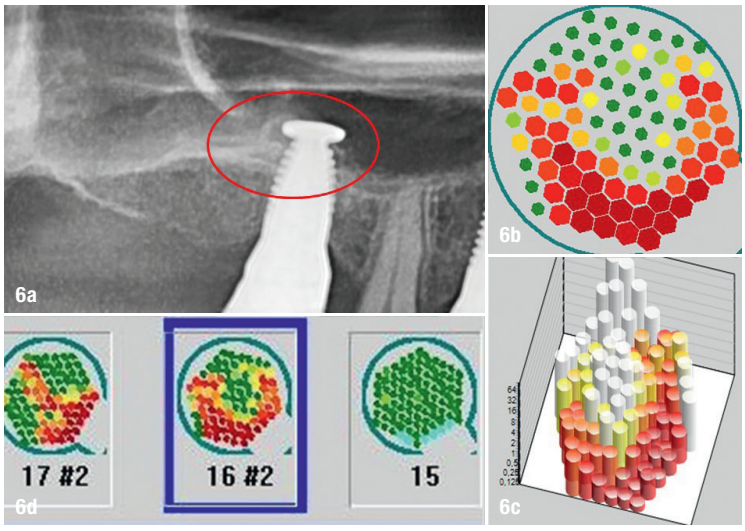


Figs. 4a–d: Radiograph showing implants in areas #24 and 25 and inconspicuous bone around the implants **(a)**. CaviTAU image clearly displaying the straight line where the implant (in green) comes into contact with the obviously osteolytic jawbone in red **(b)**. The white columns show the implant, and the red columns indicate the diminished bone density of the directly adjacent jawbone **(c)**. In contrast to the radiograph, the measurement by CaviTAU of the bone density adjacent to the implants displays diminished bone density in red **(d)**.



Figs. 5a–d: Frontal and sagittal CBCT images of implant #16. No conspicuous signs of inflammation **(a & b)**. CaviTAU image of the apical part of the implant in green (green = hard substance), surrounded by suspected osteolytic or osteonecrotic areas in red (red = low bone density; **c**). CaviTAU image of the hard substance of the implant in white, surrounded by suspected osteolytic or osteonecrotic areas in red **(d)**.

initiated by implant placement, which induces the release of acute cytokines through surgical trauma, provokes inflammatory cascades of TNF-α, IL-6 and IL-1β expression. TNF-α expression provokes increased secretion of RANTES in the bone surrounding the implant in the medium to long term (Fig. 2).[13–16] The apparent clinical stability of the implant and the radiographic inconspicuousness of the implant lead to the misdiagnosis of an apparently inflammation-free osseointegration.



Figs. 6a–d: Radiograph of the ceramic implant placed about nine months before. The radiograph did not give any indication of a possible cause of the atypical facial pain since insertion **(a)**. CaviTAU image indicating a relatively high degree of bone loss around the implant in red **(b)**. CaviTAU image of the implant in white and the surrounding diminished bone density in red **(c)**. According to the CaviTAU measurement, the conspicuous areas with possible osteolysis indicated in red are towards the apical area of implant #16 with clear osteolysis **(d)**.

CaviTAU detects focal inflammation areas around implants that cannot be identified by radiographs

CaviTAU solves the problem by providing reliable ultrasonic imaging of the circumscribed bone density. The measurement is divided into four vertical comparison steps, demonstrated here with reference to Figure 3:

- *Step 1:* The bottom right measurement shows caudal visualisation of the lower cortical margin of the lower jaw, as well as the less dense areas of the infra-alveolar nerve canal in red and dark blue.
- *Step 2:* The measurement shows the dense implant structure in green or light blue and white with a clearly straight delimitation of the distally located red or dark blue indicating reduced mineralisation density and suspected osteolysis.
- *Steps 3 & 4:* In a cranial and vertical direction, the scan shows dense structures in green or white and areas of suspected minor osteolysis or peri-implantitis in light blue.

Case reports on chronic inflammation around implants and their visualisation

In the following case reports, the reduced bone densities shown by CaviTAU—where the practice procedures allowed—were confirmed with the postoperative findings of RANTES/CCL5 expression measured by the multiplex procedure and light microscopy. Generally speaking, panoramic radiographs do not show findings of reduced bone density and are not sufficient for diagnosis of osteolysis.[17] The focus of these case reports is the metrological evaluation of bone density with CaviTAU used from a diagnostic and a preventive perspective.

Case 1

The 35-year-old female patient came to our practice with complaints of pressure in areas #24 and 25, into which two titanium implants had been placed. Previously, after several root canal therapies and unsuccessful apicectomies, the teeth had finally been extracted and replaced with titanium implants. On the CBCT scan, the implanting dentist could not see any abnormalities at implants #24 and 25 that could explain the pressure complaints and pulling pain in the implant area. As the patient did not wish to retain the two implants owing to this chronic feeling of pain, she came to our clinic with the request for a more detailed ultrasonic diagnosis of her bone situation in the region of implants #24 and 25.

We performed a measurement of the bone density in the region of implants #24 and 25 with CaviTAU. The

> "The use of a small UTV device in this study enabled the recording of intra-oral UTV values in a large and heterogeneous patient population."

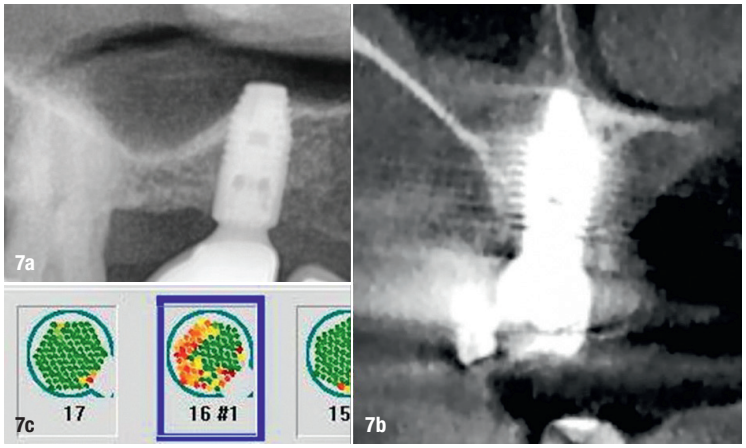
healthy neighbouring teeth, teeth #23 and 26, were also measured, as recommended for a lateral comparison measurement (Fig. 4). The measurement showed the teeth #23 and 26 in green, indicating dense structure. The extensive red area of osteolytic jawbone with clear demarcation of the hard implant proved the patient's complaint pattern. Both implants had been placed in a bone area that had not healed properly, and the remaining FDOJ had led to the patient's neuralgic complaint pattern after implantation.[18] These FDOJ areas remain as silent or subclinical inflammation without the typical signs of an acute inflammation.[19]

This case demonstrates the importance of the question of whether the implants have been inserted into healthy bone. With modern digital radiographic technology, we have a means of digital determination of the bone quantity, that is, whether the bone volume is sufficient for implantation, but no means of digital determination of bone quality, that is, whether the bone is healthy enough for implantation.

The implanting dentist had already tried antibiotics for several weeks without success. Therefore, the only way out was to remove the implants, debride the osteolytic areas and build up healthy bone to enable further implantation in the patient. The financial expenditure for the preceding implantation was thus just as high as the preceding root canal therapies and apicectomies. A quick assessment of the bone density in areas #24 and 25 employing a low-cost ultrasonic measurement with CaviTAU would have led to a considerable cost-saving and a medically safe procedure.

Case 2

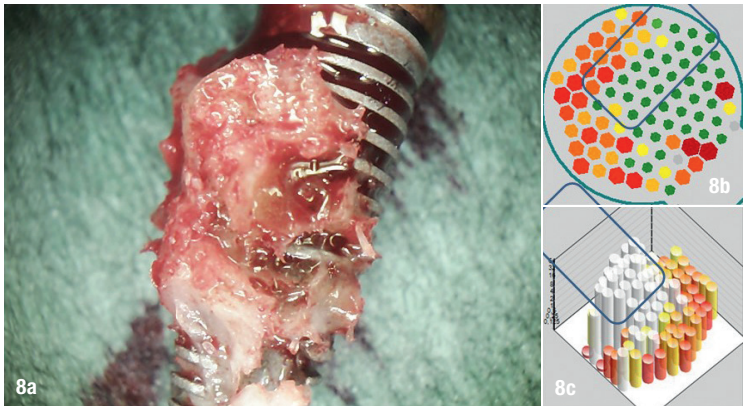
Nine months before, the 57-year-old female patient had received a ceramic implant simultaneously with a sinus lift immediately after extraction of her endodontically treated tooth #16. With the implant fixed, she was not sensitive to biting, but had suffered from chronic pain in the right upper jaw with no apparent cause for the last six months.



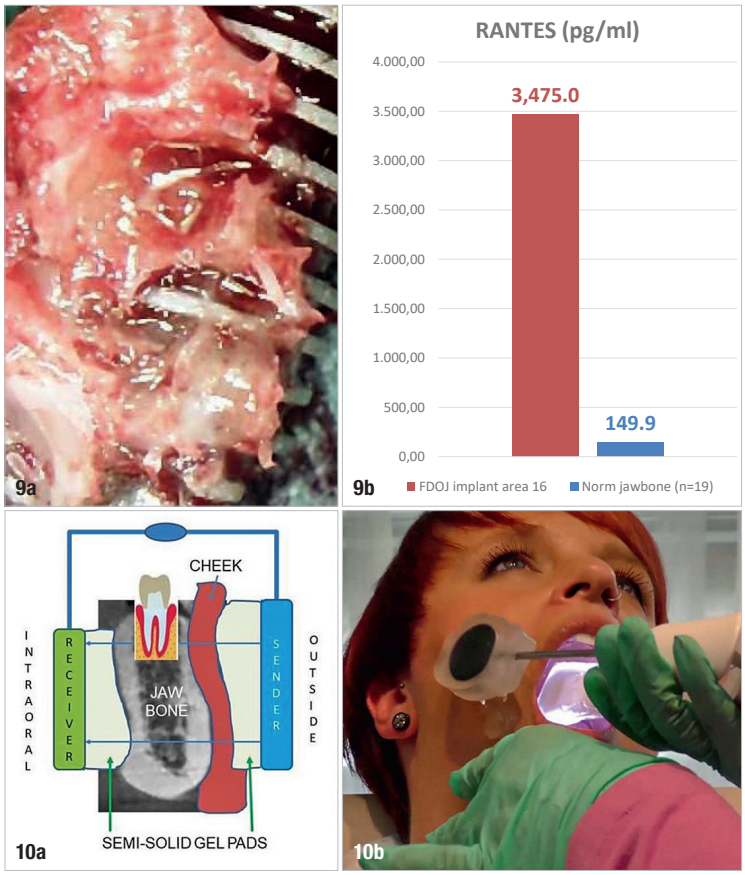
Figs. 7a–c: Radiograph showing inconspicuous bone tissue around implant #16 **(a)**. The CBCT scan should show the degree of mineralisation of the peri-implant bone environment; however, the hardening artefacts caused by the implant prevented this visualisation **(b)**. CaviTAU image clearly showing red around the implant, indicating an area of reduced mineralisation density **(c)**.

The main problem in practice related to radiographic imaging in implantology is that typical hardening artefacts occur in CBCT scans, caused by ceramic implants in particular but also by titanium implants. The regions between the implants and the implant–bone interface cannot be visually reconstructed correctly for technical reasons (Figs. 5 & 6).[4]

Histology was performed of a 0.5 cm sample material of the apical tissue around implant #16 with an older scarring apical granuloma with foreign-body granulomas around partially birefringent foreign material. The sample material consisted predominantly of fibrous connective tissue with foreign-body giant cells partly around birefringent foreign material. Only minimal chronic inflammatory cell infiltration was found.



Figs. 8a–c: Post-op photograph of the bone situation around the implant clearly showing the FDOJ tissue attached to the implant **(a)**. Corresponding to this is the 2D view of the hard implant shown in green in CaviTAU with a rectangular outline of the implant and a visualisation of the osteolytic dissolved tissue around the implant bed in red **(b)**. 3D representation of the osteolytic dissolved tissue around the implant bed in red with clear borderlines to the implant, shown in white **(c)**.



Figs. 9a & b: Large areas of dissolved bone directly around the implant, as well as fatty parts **(a)**. Local overexpression of RANTES by around 30-fold compared with the standard value of the multiplex analysis **(b)**. **Figs. 10a & b:** The sender and receiver are in a fixed coplanar position (a bar connects the sender and receiver). There are semi-solid gel pads between the sender and the cheek on the outside of the mouth and between the receiver and the alveolar ridge in the intra-oral position. A trans-alveolar ultrasonic impulse is sent from the sender to the receiver (blue arrows; **a**). Positioning of the sender (outside) and receiver (intra-oral) in the lower jaw **(b)**.

The peri-implant tissue showed not only the typical FDOJ softening but also the overexpression of RANTES. This further validated the pathological imaging by CaviTAU. It appeared that further inflammatory signalling cascades—primarily based on RANTES messenger substances—had been provoked by the insertion of the implant and the directly associated wound healing (Fig. 6).

Case 3

The 57-year-old female patient had suffered from migraines, but only on the right side, and atypical facial pain, in her upper right jaw only, since the implant placement (Fig. 7).

Histology of a medullary tissue sample from region #16 found exclusively fatty marrow and necrobiotic changes and areas of mucinous degeneration as well as small oil cysts. It also found small areas of fibrosis. The findings were altogether consistent with changes related to FDOJ (Figs. 8 & 9).

Conclusion

Our case studies demonstrate the immunological relationship between implants and FDOJ. The extent to which increased expression of RANTES derived from FDOJ areas contributes to immune-mediated disease is difficult to determine. Our cases provide evidence for the possible interaction between implants, RANTES signalling and general health. A comprehensive understanding of the complex networks described in our cases requires further research. Removal of implants and surgical removal of surrounding FDOJ areas can reduce RANTES overexpressed signalling pathways, potentially reducing inflammatory input and associated symptoms.

Owing to the insufficient imaging of the mineralisation levels in the bony implant environment in panoramic radiographs and the unavoidable hardening artefacts in CBCT scans, a considerable part of the bone marrow in the jaw cannot be correctly immunologically assessed. These assessment criteria in implantology can be measured by CaviTAU ultrasonography (Fig. 10).

After extraction of implants and removal of surrounding FDOJ areas, the silent inflammation may remain in the jawbone in case of incomplete debridement and poor bone healing might occur. This situation is then also often responsible for failure of the subsequent implantation or even for immediate ceramic implantation. For future successful implant surgery, prior measurement of the bone density and thus a determination of the metabolic situation in the jawbone is therefore essential for overall immunological safety for the patient and the treatment success for the dentist. For unexplained pain as in our described case reports, the easy-to-use and radiation-free CaviTAU is available to detect radiographically undetectable silent inflammation.

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Literature

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Ceramic dental implants in clinical use

Evaluation of the ESCI scientific survey

Dr Jens Tartsch, Switzerland

Introduction

In modern dental implantology, ceramic implants offer a supplement to the treatment spectrum with titanium implants. Increasing interest in ceramic implants owing to their biological advantages can be observed not only on the part of health-conscious patients but also in the dental profession. Promising short- and medium-term data on the successful use of ceramic implants is available. Nevertheless, the topic of ceramic implants is still controversial in part because of the lack of long-term data.

Even systematic reviews do not provide this, referring mainly to specific experiences with individual systems. Comprehensive findings on the general practical use of ceramic implants and experience from daily dental practice are still lacking.

To this end, the European Society for Ceramic Implantology (ESCI) conducted a global survey aiming to gain deeper insight into the general daily handling of ceramic implants and to answer questions concerning ceramic implantology. This survey provides valuable information for the further development of ceramic implants and makes an important contribution to their reliable use—ultimately for the safety of our patients.

Method

The survey questionnaire was designed by the ESCI scientific advisory board in German and English and was addressed to users of ceramic implants, users of titanium implants and dental technicians. The results of the survey were evaluated by the ESCI. The survey was not conducted for commercial purposes, and no financial resources were provided by partners or other third parties. The questionnaire was implemented in an online survey tool and sent as an online link via e-mail to the members of the ESCI, among others, published on the ESCI's website, published via print media of the dental press and distributed via various other channels of the survey partners from April to November 2021. This included social media channels of and newsletters from collaborating professional societies and the ESCI's company partners. The ESCI would like to thank all supporters for their efforts. These are the Austrian Society of Implantology (ÖGI), European Association of Dental Implantologists (BDIZ EDI), PEERS, the German Society for Environmental Dentistry (DEGUZ), the "Zahngipfel", as well as the companies Institut Straumann AG, CAMLOG Biotechnologies GmbH, Nobel Biocare Services AG, Dentalpoint AG, Z-Systems GmbH, COHO Biomedical Technology Co., LTD., CeramTec GmbH, Zircon Medical Management AG and the Dental Campus Association, as well as numerous media partners.

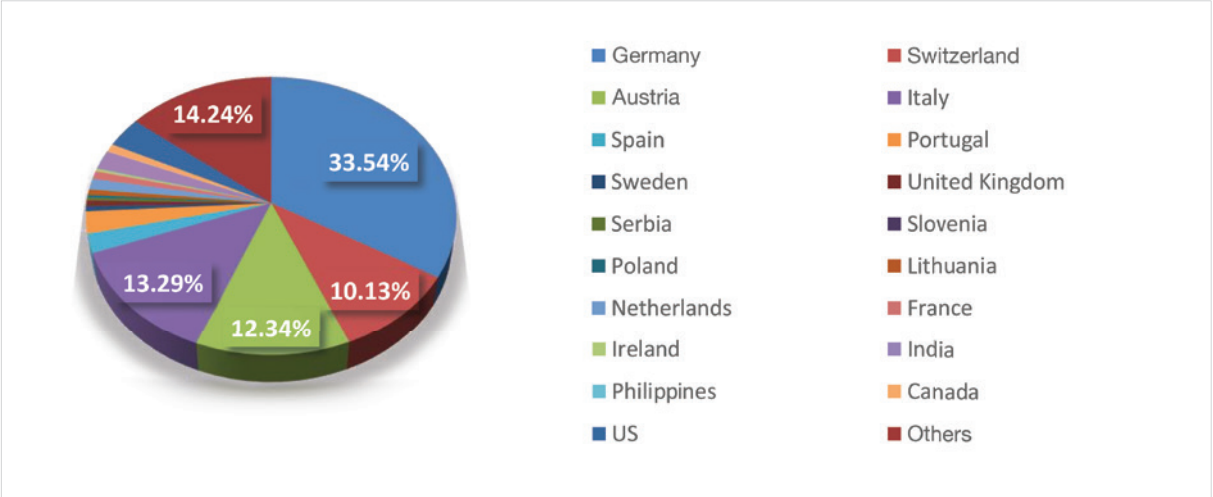

Fig. 1: Distribution of responses from participants in 45 countries.

The survey was completed by 316 respondents from all over the world (Fig. 1), demonstrating the importance of the topic of ceramic implants. The size of this sample allowed the ESCI to draw meaningful conclusions.
The questionnaire consisted of 42 questions in total, first covering questions on general demographic information and then posing questions in three separate sections for each of the target groups: (1) general dentists, oral surgeons and maxillofacial surgeons with experience in ceramic implantology; (2) general dentists, oral surgeons and maxillofacial surgeons without experience in ceramic implantology; and (3) dental technicians. It also posed questions on the further development and establishment of ceramic implants to all three groups.

Discussion

The comparison of the responses given by participants with practical experience in ceramic implantology to those with only theoretical knowledge of the subject is quite interesting. The assessments coincide in some areas but diverge in others.

The possible advantages of zirconia in terms of biocompatibility and a low tendency to inflammation were confirmed and are in line with the ESCI's view. In particular, a significantly lower tendency to peri-implantitis seems to be observed in private practice. This should be confirmed by corresponding clinical studies. The fear of the past regarding stability could at least be relativised for the newer systems, since fractures were not in the foreground in the survey findings on the reasons for loss.

The potential for osseointegration was rated equally for both zirconia and titanium. Loss during the healing phase was reported proportionally more often for zirconia, giving cause for further evaluation. Since various factors, such as overloading, incorrect loading, surface design and bone degeneration caused by overheating, can play a role in early loss, the causes of loss need to be differentiated in order to address these causes and reduce failures.

All responses indicated a clear tendency towards two-part systems, which allow a broader range of indications and offer more flexibility. There is a need for solutions which simplify the application compared with titanium implants. The full official statement on two-piece ceramic implants can be read on the ESCI website.

The clearest requirement, however, runs like a thread through the survey: users of ceramic implants should record their experiences and make them accessible to all interested parties. There should be broad, scientifically sound and objective information on the subject. The data on ceramic implants must be improved and long-term evidence-based studies initiated. Then ceramic implants will increasingly establish themselves for a broad user group in the interest of our patients. Implementing this requirement is a clear call from the survey to all manufacturers and research institutes—and a core topic of the ESCI.

For a detailed overview of all questions and results, please visit www.esci-online.com or request the full data summary from the ESCI.

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Ceramic implant placement in a medically compromised patient

Dr Alexandr Bortsov, Russia

Introduction

While dental implants are becoming a standard treatment for tooth loss, there is emerging but steadily growing patient demand for reliable, metal-free, natural-looking ceramic implants. This demand is particularly pronounced not only in patients with metal sensitivity but also in those who would like to have highly aesthetic restorations. I personally have experienced that the latter group are patients who have had restorations before, done extensive research about the topic online and come to my practice specifically asking for ceramic implants. The challenge I face is that those patients would like to have a reliable ceramic implant and expect successful treatment outcomes irrespective of their age, lifestyle or medical history.

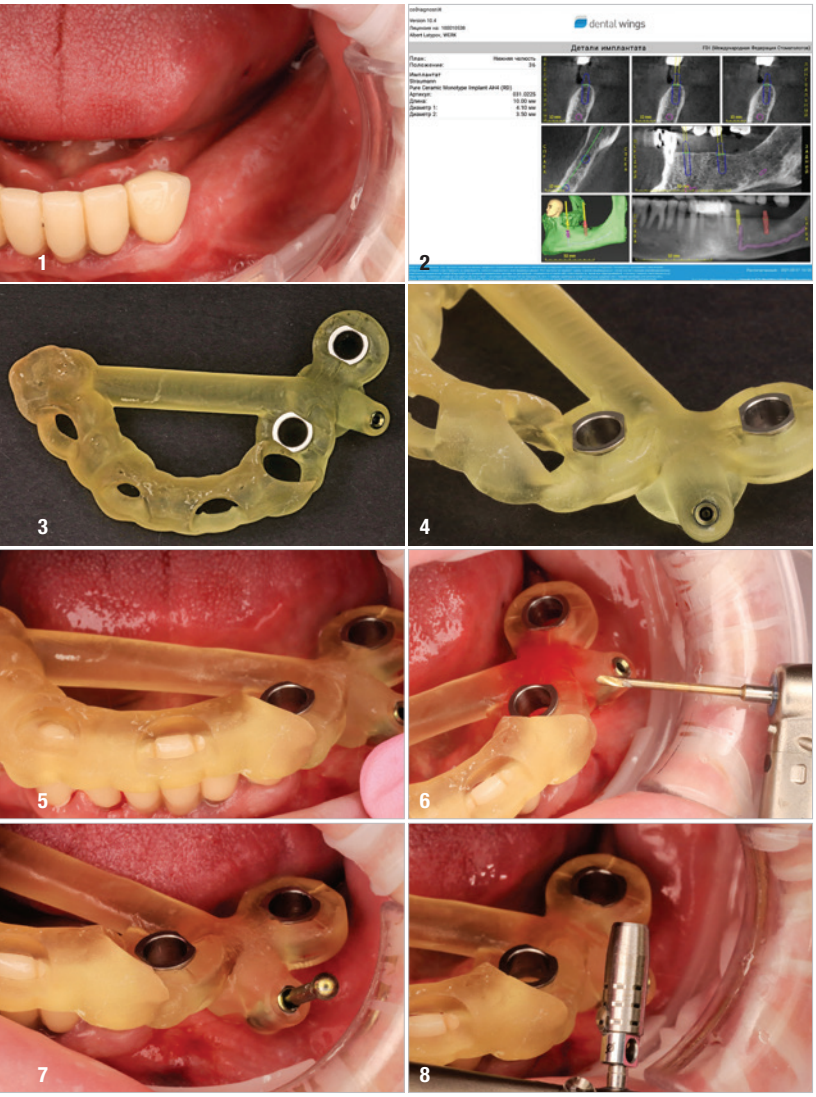


Fig. 1: Initial situation. **Fig. 2:** coDiagnostiX planning in the molar region. **Fig. 3:** Guided surgery template. **Fig. 4:** Guided surgery template close up. **Fig. 5:** Checking precision fit of the guided surgery template. **Fig. 6:** Drill for the fixation pin preparation. **Fig. 7:** Fixation pin in place. The template was securely fixed. **Fig. 8:** Tissue punch, the pilot instrument.

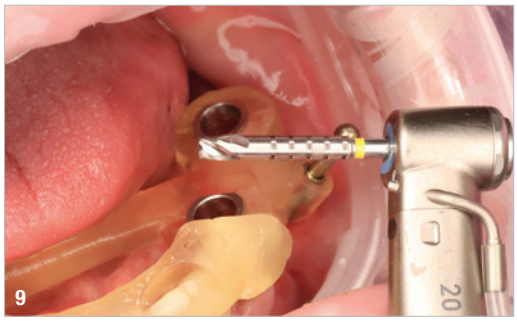
The following clinical case report describes a three-unit bridge restoration on ceramic implants in a medically compromised patient who came to my practice seeking a natural-looking, metal-free restoration.

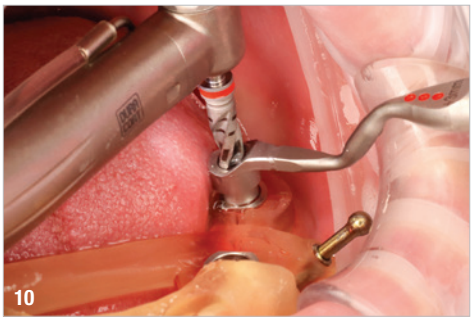
Initial situation

A 53-year-old diabetic patient who was a smoker and had good hygiene and no parafunctional habits presented to the clinic for the replacement of the missing premolars and molars in the left mandible (Fig. 1). The patient had received metal–ceramic restorations in the past and was dissatisfied with the experience, complaining about a grey metal margin that became visible with time and had a non-aesthetic appearance. The patient was well informed about the subject and wanted to have a natural-looking, metal-free restoration which would nevertheless be strong and reliable. He also was concerned about the surgery itself and had a strong preference for a minimally invasive surgical procedure. Further anamnesis and routine testing revealed elevated haemoglobin A1C at 9%.

Treatment planning

It was discussed with the patient and his endocrinologist that Straumann PURE monotype ceramic implants (zirconia implants with the ZLA surface) restored with a full-ceramic three-unit bridge would provide a metal-free, aesthetic and mechanically strong restorative solution in this clinical case. It was also agreed to use a fully guided surgery approach to avoid incisions and minimise surgical trauma.





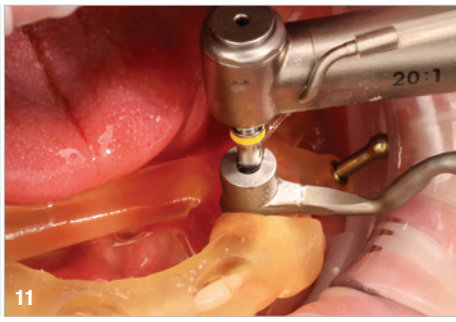


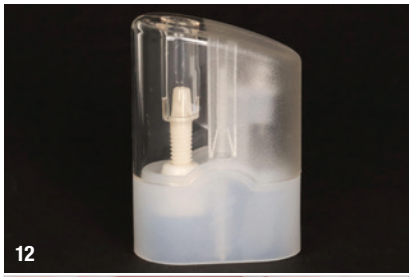
Fig. 9: Milling cutter, to flatten the bone ridge. **Fig. 10:** Guided drilling with the use of a guided handle. **Fig. 11:** Guided tapping. **Fig. 12:** Vial containing the PURE monotype implant. **Fig. 13:** Monotype implant with PURE transfer piece. **Fig. 14:** Fully guided implant insertion in the molar region. **Fig. 15:** Monotype implants right after insertion. **Fig. 16:** Monotype implants in place after the template was removed. **Fig. 17:** Closed-tray impression copings. **Fig. 18:** Analogues inserted into the impression. **Fig. 19:** Protective caps fixed. **Fig. 20:** Laboratory model with analogues. **Fig. 21:** Finished three-unit bridge restoration on the laboratory model.

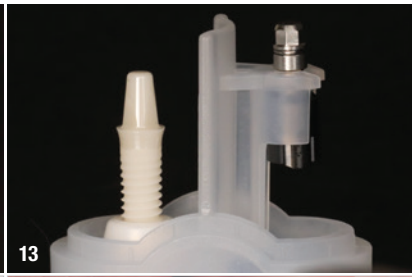
The patient was referred for a CBCT scan of the area, and we performed a digital scan using an intra-oral scanner (TRIOS 3, 3Shape). Upon receipt, the DICOM data was imported into the implant planning software (coDiagnostiX, Dental Wings), and the scan files were imported into the laboratory software (Straumann CARES Visual). Since the ceramic implants used are mono-bodies in design and it is not recommended to modify the abutment, our task was to plan the most parallel placement of the implants relative to each other, considering all anatomical formations (Fig. 2). Once the planning had been completed, the guided surgery template was 3D-printed (Figs. 3 & 4).

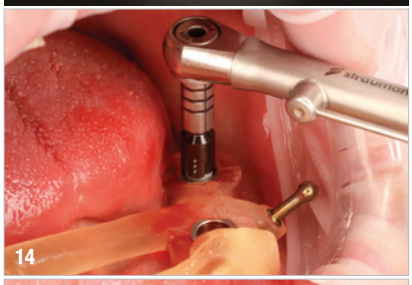
> “Patients would like to have a reliable ceramic implant and expect successful treatment outcomes irrespective of their age, lifestyle or medical history.”

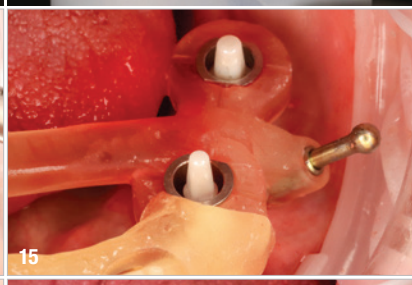
Surgical procedure

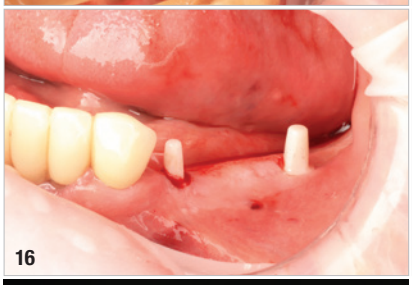
At the first stage, the surgical template was applied, and the precision of its fit was checked (Fig. 5). The fixation pin drilling and insertion were then done after the top-up of the infiltration anaesthesia (Figs. 6 & 7). The first instrument used was a tissue punch to facilitate an optimal soft-tissue cuff and reduce trauma (Fig. 8). The design of the PURE ceramic implant is a combination of tissue-level and bone-level implant—the implant neck mirrors the Straumann tissue-level implant, and the implant body mimics the Straumann bone-level implant

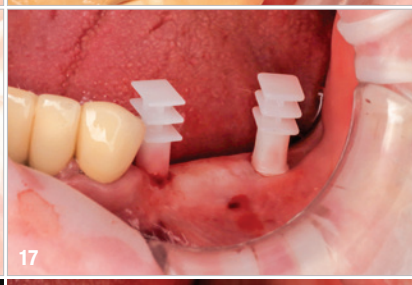


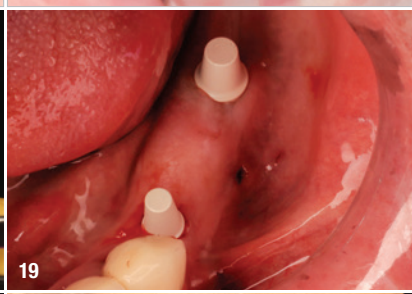


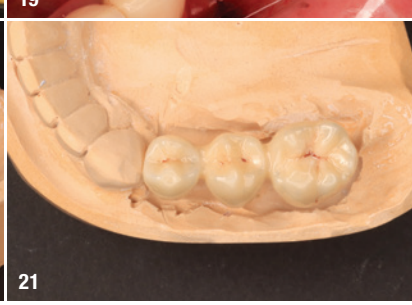












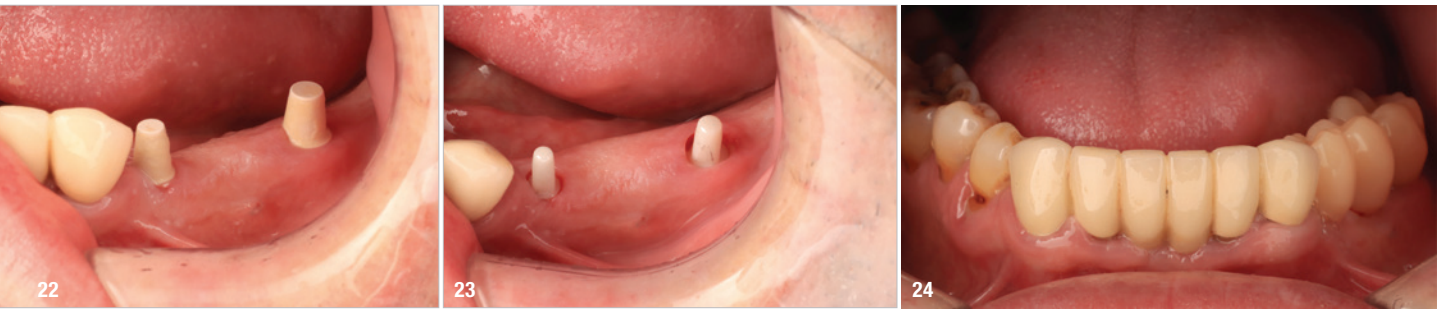


Fig. 22: Healed sites five days post-op. **Fig. 23:** Healed sites before cementation and after removal of the protective caps. **Fig. 24:** Final restoration.

design. Thus, the surgical protocol for osteotomy preparation for PURE is the same as for the corresponding bone-level implant. For this case, the osteotomy preparation guide was used according to the protocol established for bone-level implants provided by coDiagnostiX (Figs. 9–11).

The basic implant bed preparation was done using pilot drills followed by twist drills: for the 3.3 mm diameter implant, the final drill was 2.8 mm in diameter; for the 4.1 mm diameter implant, the final drill was 3.5 mm in diameter. The fine implant bed preparation was done using the respective profile drilling and tapping for the 3.3 mm and 4.1 mm diameter implants. The PURE implant comes with a separate transfer piece that locks securely into place (Figs. 12 & 13).

Three points on the driver line up with the flat surface of the implant abutment and indicate the distance to the shoulder (1, 2 & 3 mm; Fig. 14). This design greatly facilitates implant placement and makes it very straightforward. The implants were placed in the positions of the first premolar (diameter: 3.3 mm; narrow diameter; length: 12.0 mm; abutment height: 5.5 mm) and second molar (diameter: 4.1 mm; regular diameter: 12.0 mm; abutment height: 5.5 mm), respectively. The implants were placed precisely in the planned positions regarding the insertion depth and relative to the centre of the sleeve (Figs. 15 & 16).

Prosthetic procedure

Since good primary stability was achieved (about 45 Ncm), and there were no teeth in the maxilla, it was decided to take a closed-tray impression right after the surgery and fix the implant analogues in the clinic (Figs. 17 & 18). Appropriate protective caps were placed on the abutment portions of the implants (Fig. 19). The impressions were transferred to the laboratory, and within four working days, a one-piece anatomical bridge of zirconia was made (Figs. 20 & 21).

After five days, the patient came to the clinic for fixation of the final restoration. At this appointment, plaque was seen on the protective caps (Fig. 22), but the healed mucosa appeared a healthy pink (Fig. 23). The abutment parts of the ceramic implants were cleaned and prepared for cementation. Excess cement was removed. A follow-up visit seven days after cementation was arranged. No further crown adjustments were required, and the patient was very comfortable with the final restoration (Fig. 24).

Treatment outcomes

At the one-year follow-up, there were no biological or technical complications. The treatment option of ceramic implants and a zirconia restoration appears to be a valid alternative to titanium implants in patients requiring metal-free restoration, even in a diabetic patient. The soft tissue around the implant remained stable over time, indicating the excellent biocompatibility of the ceramic. The tissue-level design of the implant places the cementation line at or above the gingival margin to facilitate hygiene maintenance. The tooth-like colour of the body enables the achievement of high aesthetics. The patient was satisfied with the functional and aesthetic outcomes.

about the author

Dr Alexandr Bortsov graduated with a DDS from South Ural State University in Chelyabinsk in Russia. As a surgeon, his focus areas are implantology and guided surgery, aesthetic dentistry and digital dentistry. Dr Bortsov is the director of the Dental Art clinic in Chelyabinsk and of the International Team for Implantology study club in Chelyabinsk.

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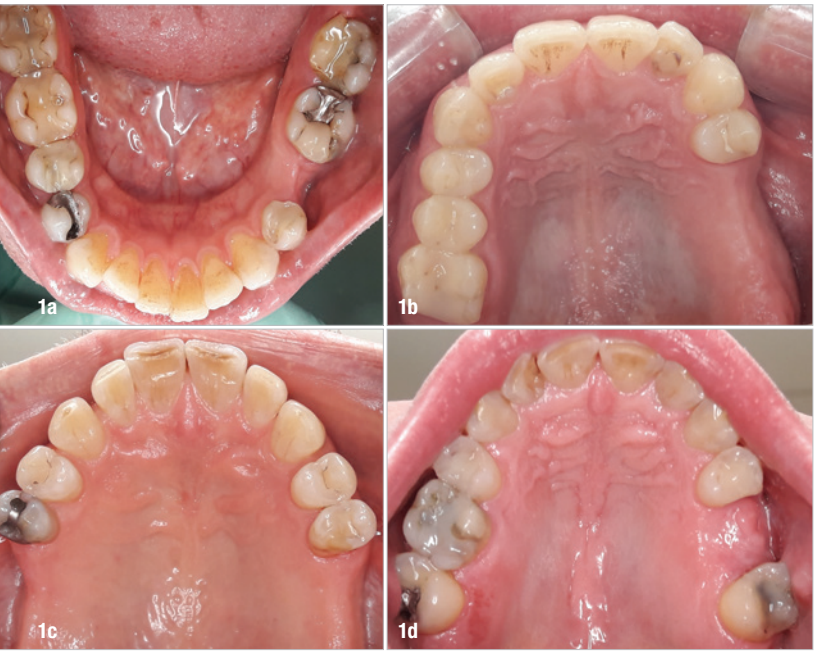


Figs. 1a–d: Pre-op situation in all four patients. Case 1 **(a)**. Case 2 **(b)**. Case 3 **(c)**. Case 4 **(d)**.

Introduction

Dental implants have helped to improve quality of life for our patients. The material of choice for implants remains Type IV titanium, whose mechanical and biological properties have been proved.[1] Yet, this material is not exempt from complications. Firstly, these metallic implants show aesthetic limitations when used in the anterior region, especially in patients with a thin gingival biotype. Examples are the possible appearance of a metallic margin in case of gingival recession and a greyish discoloration due to translucency of the peri-implant mucosa.[2,3] Secondly, studies have reported immunological reactions to titanium particles, leading to biological complications.[4] Others have demonstrated allergic reactions to titanium, reporting a prevalence of 0.6%.[5] Thirdly, it must be taken into account that the number of patients demanding metal-free implants has been increasing during recent years. For these reasons, non-metallic alternatives to titanium have emerged. The first ceramic implants arrived on the market more than 40 years ago.[6] They were made of alumina, a material prone to fracture when loaded unfavourably, and so they are no longer available on the market.[7] More recently, yttrium tetragonal zirconia polycrystal (Y-TZP) became the material of choice for the manufacture of ceramic implants. It is characterised by a high resistance to fracture, a low modulus of elasticity, a low affinity to plaque and high biocompatibility.[8,9] In this series of four cases, the CERALOG system (BioHorizons Camlog) was used. CERALOG implants are manufactured from Y-TZP.[10] The CERALOG system provides all the necessary elements to permit retention of any type of prosthesis upon these implants, ranging from single crowns to a full-arch restoration. In this case series, the treatment indication was single-tooth implants.

Table 1: Patients' data.

	Sex	Age (years)	Health status	Smoking status	Periodontal health	Diastema location
Case 1	Male	52	ASA I	No	Healthy	#35
Case 2	Male	43	ASA I	No	Healthy	#25 & 26
Case 3	Male	57	ASA I	No	Healthy	#16 & 26
Case 4	Male	61	ASA I	No	Healthy	#26

Table 2: Implant specifications.

	Position	Implant diameter	Implant length	L-PRF	Insertion torque
Case 1	#35	4 mm	12 mm	No	35 Ncm
Case 2	#25	4 mm	12 mm	No	30 Ncm
	#26	4 mm	8 mm	No	25 Ncm
Case 3	#16	4 mm	8 mm	Yes	25 Ncm
	#26	4 mm	10 mm	Yes	30 Ncm
Case 4	#26	4 mm	10 mm	Yes	30 Ncm

Case series report

Four patients were selected for this case series (Table 1). All of them wanted or needed replacement of one or two teeth with ceramic dental implants. All the patients were in good general health.

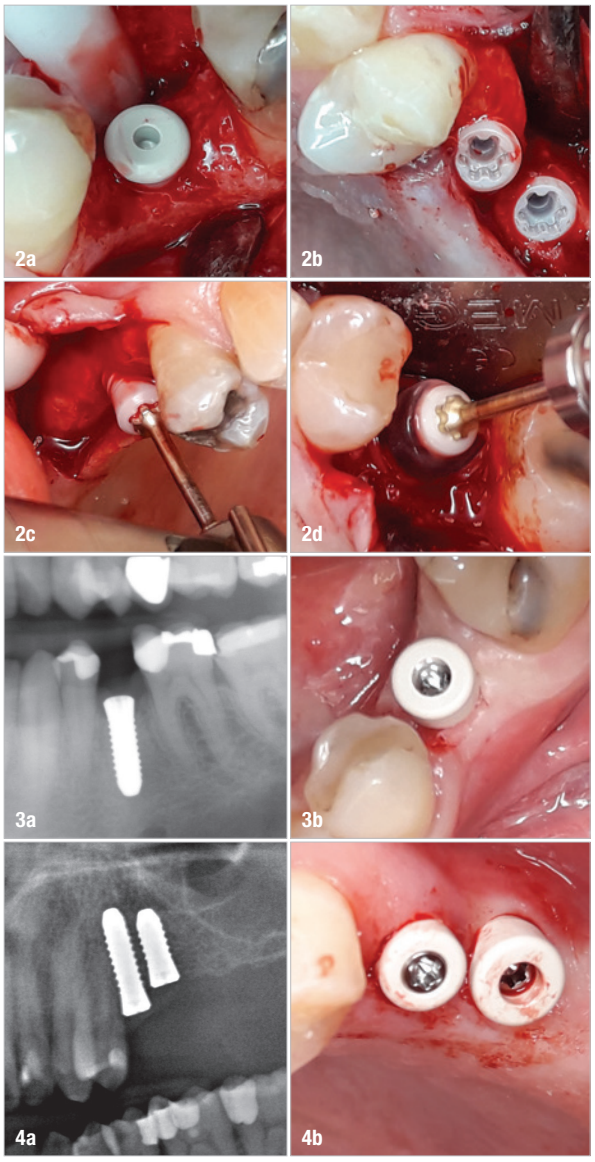
Examination

In all cases, the tooth or teeth to be replaced had been extracted at least one year before the dental implant surgery. In none of these cases was socket preservation or ridge preservation performed at the time of extraction. Moreover, all the patients had good oral hygiene. In all but one patient, radiographic analysis was performed by CBCT, supplemented with subsequent digital implant positioning (SICAT and Sidexis, both Dentsply Sirona; Fig. 1).

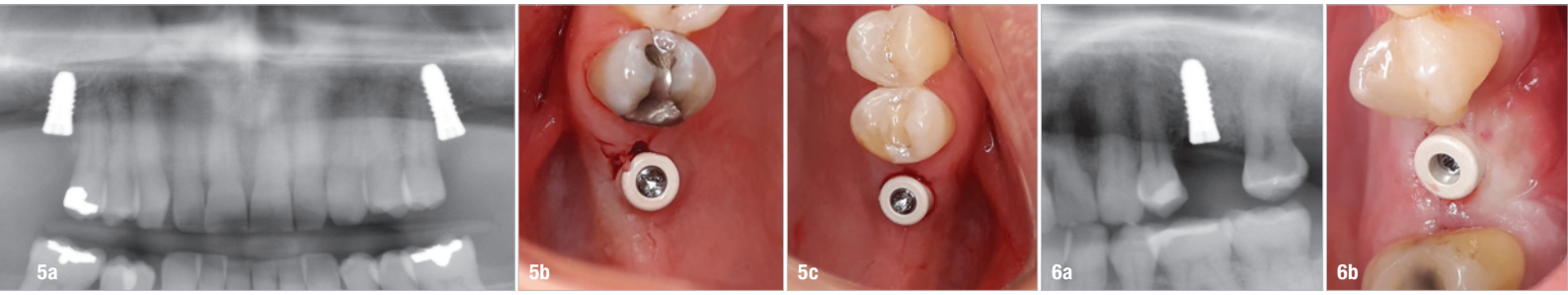
Surgery

Two-stage surgery was performed for all six implants. All surgeries were performed without sedation or preoperative systemic antibiotics. In two of the four cases, leucocyte- and platelet-rich fibrin (L-PRF) was used during the intervention (IntraSpin, BioHorizons; Table 2). In all cases, the exact CERALOG pre-tapping (maximum: 15 rpm) and drilling protocols (maximum drilling speed: 550–800 rpm) were used. All the implants were placed manually to a maximum torque of 35 Ncm. After the insertion of the implant, a PEEK cover screw was inserted into the implant (Fig. 2). The soft tissue was sutured tightly with an atraumatic resorbable suture material. No postoperative complications were reported. The patients were asked to rinse with chlorhexidine twice a day for one week postoperatively (PERIO-AID, 0.05%, DENTAID). A healing time of three months in the lower jaw and five months in the upper jaw was respected.

After three months (Case 1) and five months (Cases 2, 3 & 4), the second-stage surgery was performed under local anaesthesia. Healing abutments (PEEK material with titanium screw) were placed to a maximum force of 15 Ncm (Figs. 3–6). All the implants showed excellent stability (measured using the Periotest, Medizintechnik Gulden) and were completely osseointegrated. Radiographic examination confirmed the latter findings.



Figs. 2a–d: PEEK cover screws inserted into the implants. Case 1 **(a)**. Case 2 **(b)**. Case 3 **(c)**. Case 4 **(d)**. **Figs. 3a & b:** Radiograph after three months **(a)** and healing abutment in place (**b**; Case 1). **Figs. 4a & b:** Radiograph after five months **(a)** and healing abutments in place (**b**; Case 2).



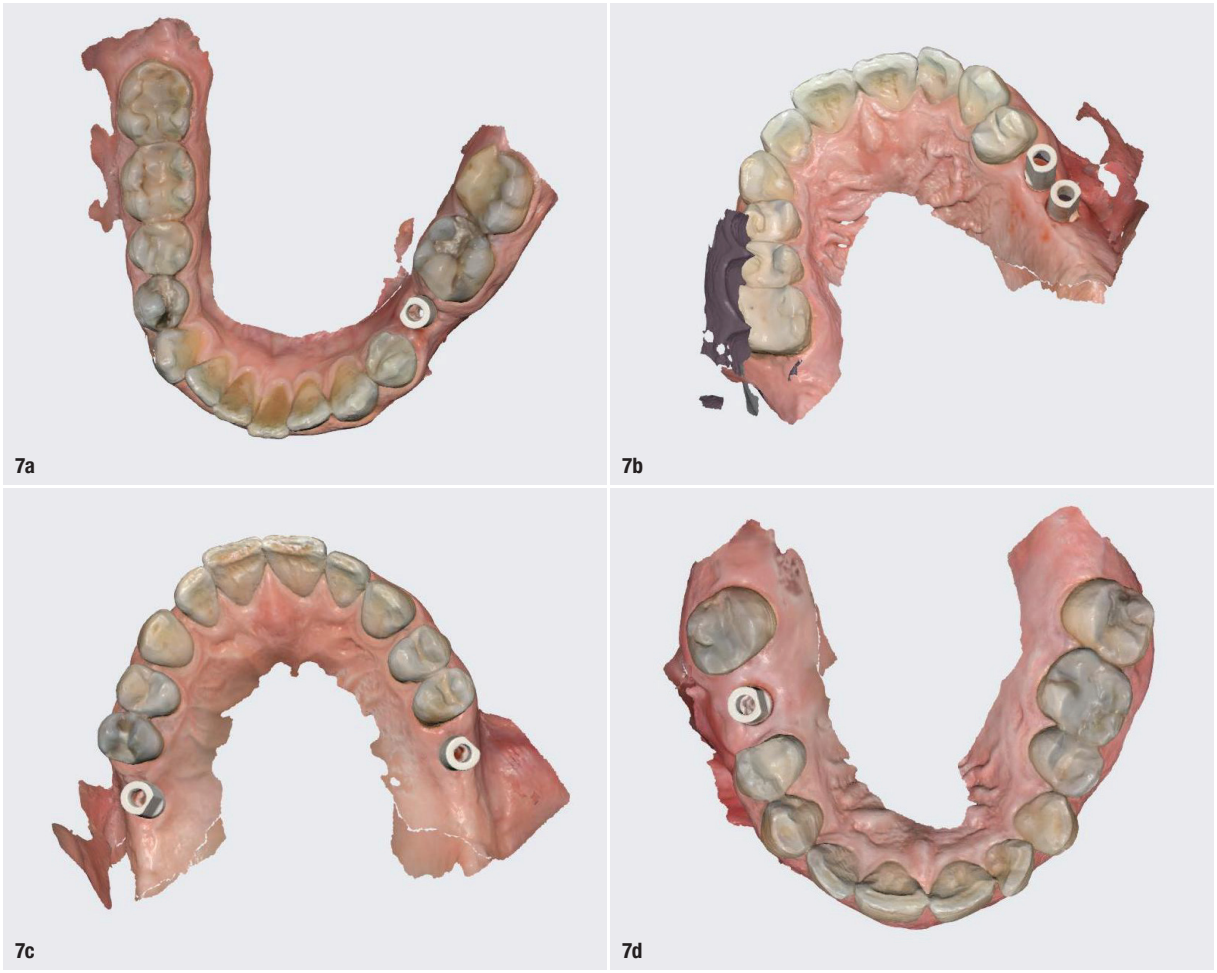
Figs. 5a–c: Radiograph after five months **(a)** and healing abutments in place (**b & c**; Case 3). **Figs. 6a & b:** Radiograph after five months **(a)** and healing abutment in place (**b**; Case 4).

Digital intra-oral scanning

One week after the second-stage surgery, the intra-oral scanning was performed using a Medit i500 scanner (Medit) following the scanning protocol prescribed by the company (Fig. 7). After the removal of the healing abutments, CERALOG scan bodies (PEEK–titanium alloy screw) were inserted into the implants. After the scanning procedure, the original healing abutments were reinserted. Shade determination was digitally carried out with a Rayplicker (Borea). For the planning of the prosthetic restoration, polyphenylsulphone selection abutments were used. All the crowns were ordered digitally from the same dental laboratory. For all the crowns, a ceramic material was selected.

Crown installation

On average, two weeks after the scanning procedure, the crowns were available for placement. PEKK abutments were used. All the crowns were prepared as screw-retained superstructures. Since the four patients strictly



Figs. 7a–d: Digital intra-oral scans after the second-stage surgery. Case 1 **(a)**. Case 2 **(b)**. Case 3 **(c)**. Case 4 **(d)**.

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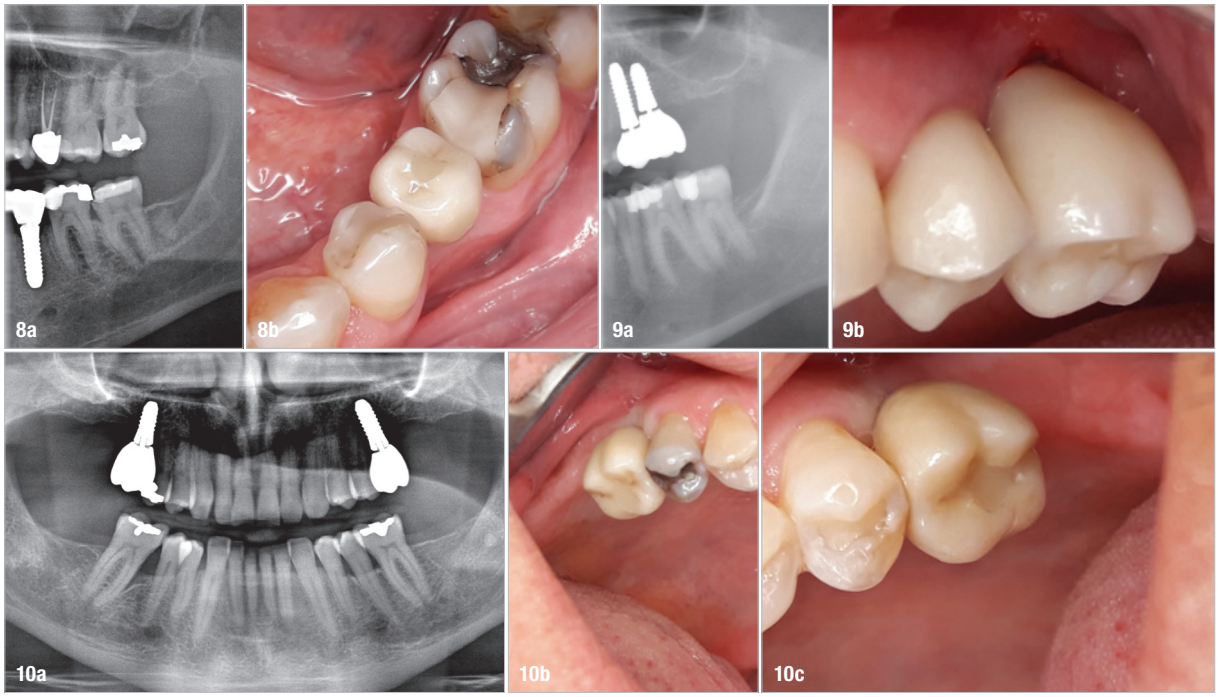
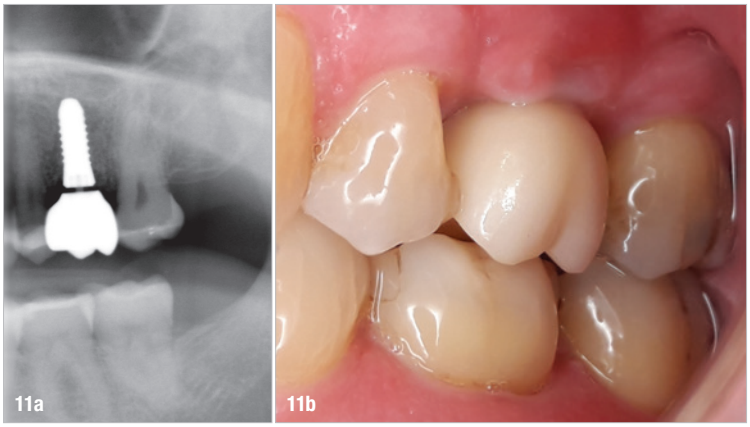


Figs. 8a & b: Final control radiograph of the implant position **(a)** and final intra-oral situation for Case 1 **(b)**. **Figs. 9a & b:** Final control radiograph of the implant position **(a)** and final intra-oral situation for Case 2 **(b)**. **Figs. 10a–c:** Final control radiograph of the implant position **(a)** and final intra-oral situation for Case 3 **(b & c)**.

wished for a bio-holistic approach, the six titanium abutment screws were replaced with six gold abutment screws (Holisticor screws). These gold screws were tightened to a maximum torque of 15 Ncm. When titanium abutment screws are used, a maximum toque of 25 Ncm should be applied. As recommended by the company,



Figs. 11a & b: Final control radiograph of the implant position **(a)** and final intra-oral situation for Case 4 **(b)**.

all the screws were retightened to the corresponding torque (15 Ncm) after at least 5 minutes. The screws were protected with PTFE tape, and the remaining screw openings were filled with a composite material of the same colour as the zirconia crown. The occlusion was checked and adjusted where necessary (occlusal concepts included no guidance on the implant-retained restorations and very light intercuspal contact as verified with occluding paper). Oral hygiene instructions were given, focused on interdental cleaning with interdental brushes. A final control radiograph was taken. The PEKK abutment is not radiopaque, and therefore the distance between the implant and crown can easily be determined in the radiograph: the abutment is correctly positioned in the implant when the gap between the implant shoulder surface and the lower edge of the crown measures 0.55 mm in the radiograph (Figs. 8–11).

Conclusion

All the patients were happy with the results of the therapy: the functional and aesthetic outcome was satisfying. The only remark was the long duration of the complete therapy for the upper jaw cases. Owing to the extended osseointegration period of five months, the complete therapy took more than six months. From the practitioner's point of view, there was no major difference in comparison with the use of titanium implants, besides the following of the strict guidelines from the manufacturer. CERALOG implants seem to be an adequate and stable alternative to titanium implants in the replacement of lateral teeth in the upper and lower jaws.

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Literature

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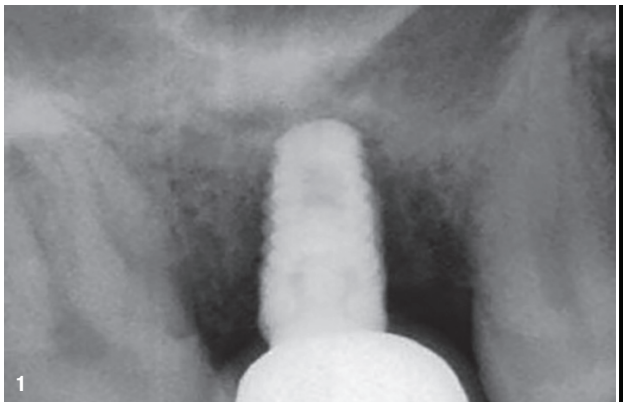
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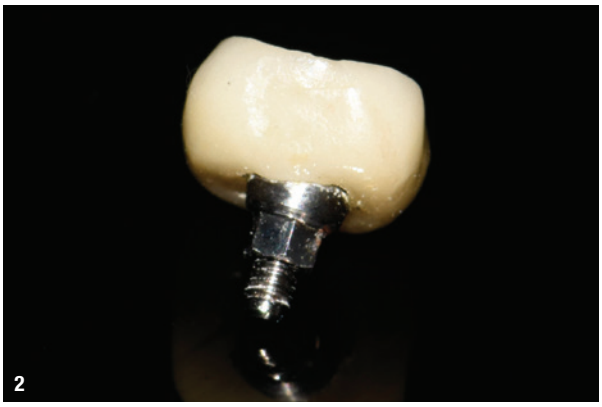
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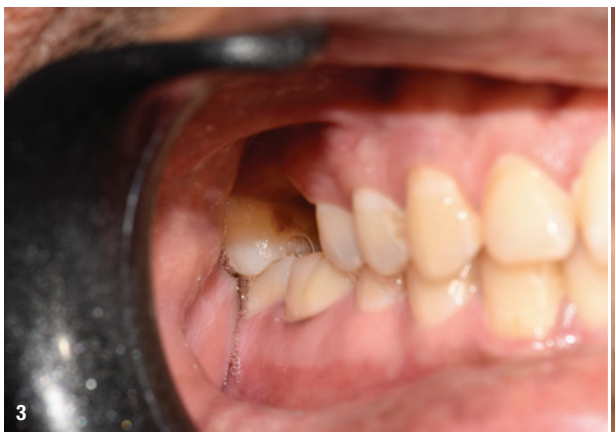
Introduction

Extraction of tooth is carried out for numerous reasons, including caries, fractures, periodontal problems, prosthetic purposes, orthodontic, and widespread external or internal root resorption. Root resorption (pathological) has a multifactorial etiology, although many aspects remain unclear, and can lead to loss of tooth structure. The use of dental implants is a reliable treatment option for replacing missing or hopeless teeth, and the satisfactory and predictable outcomes reported by several implant research studies have supported the huge development and standardisation of oral implantology.

According to the available data, the current success rate of dental implants is around 94–95% in the maxillary area and 97–98% in the mandibular area after a ten-year follow up period.[1] However, the rising demand for usage of dental implants is associated with a growing need for long term and predictable results, and despite having excellent success rates, complications/failures may occur because of biomechanical and biological complications. Peri-implantitis is a biological complication and is still a topic of concern.

Peri-implantitis is a pathological condition that occurs in the tissues around dental implants and is characterised by inflammation of the peri-implant connective tissue and progressive loss of the supporting bone. In clinical situation, peri-implantitis sites exhibit signs of inflammation and, in particular, increased probing depths and/or recession of the mucosal margin, bleeding on probing and/or suppuration, and radiographic bone loss. According to Jan Derks, the prevalence of peri-implant mucositis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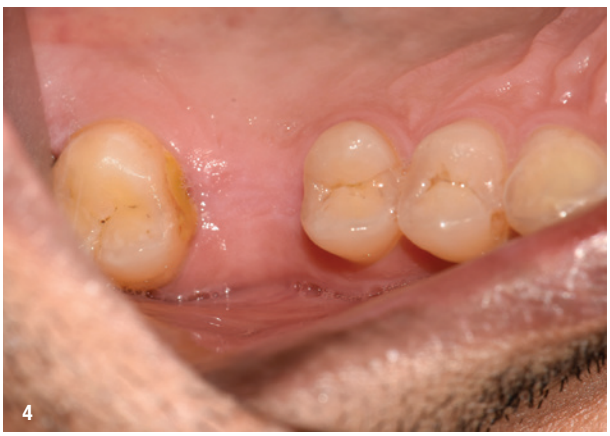
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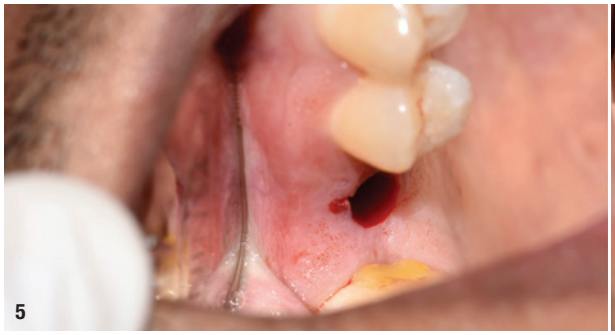
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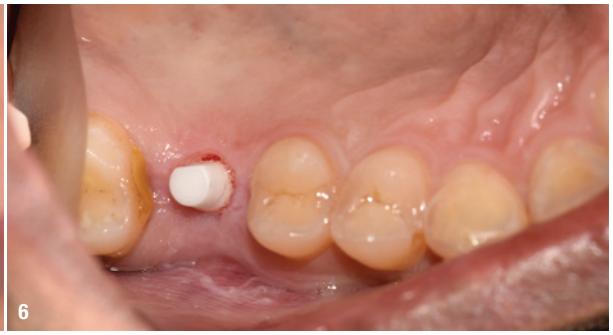
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and peri-implantitis ranged from 19 to 65% and from 1 to 47%, respectively. Meta analyses estimated weighted mean prevalence of peri-implant mucositis and peri-implantitis of 43% and 22%, respectively.[2] The problem with this pathology remains the lack of information on etiological factors and standardisation of the utilised diagnostic criteria.

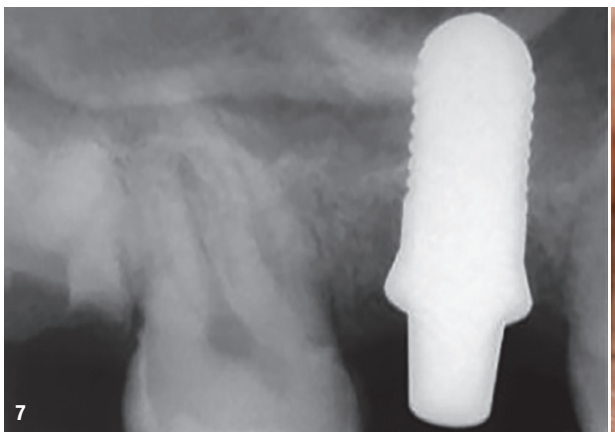
Titanium implants after interacting with intra-oral conditions, undergo tribocorrosion and release titanium particles into the surrounding gingivae. This release of ions can contribute to the subsequent inflammation around titanium dental implants. The degradation products in the form of microparticles or ions may infiltrate the peri-implant tissue and peri-implant bacterial plaque and trigger an inflammatory response, resulting in bone resorption, suggesting a possible pathogenesis of peri-implantitis.[3–7] Furthermore, the studies have shown that allergic responses and hypersensitivity to metal are not uncommon findings; in fact, delayed onset T cell mediated metal hypersensitivity is reported in 12–17% of the general population.[8–10]

The increasing incidence of peri-implant mucositis and peri-implantitis affects both the short- and long-term survival rates of titanium implants and their success. Therefore, using an alternative material, zirconium dioxide, has been increasingly popular and successful. Among the new generation of ceramics in the dentistry field, zirconia ceramics presents outstanding aesthetic characteristics, a low propensity of plaque adhesion around the implant surface, excellent biocompatibility, and good osseointegration, muco-integration and biomechanics. In addition, zirconia ceramics have characteristics similar to those of titanium implants and are frequently used in implant prosthetics.[11–14] This case report describes how a failed titanium implant in the maxillary posterior was successfully replaced with a zirconia implant that became biologically integrated.

Case presentation

A 40-year-old male patient presented to us after having received a titanium dental implant at another private practice ten months before presenting to our office. He presented with a loose titanium implant (position #16) in the maxilla.

The patient reported no history of tobacco smoking or alcoholism. The last dental check-up visit had taken place about six months before. No previous history of periodontitis was detected. At clinical evaluation, the peri-implant mucosa appeared swollen and red, and probing revealed bleeding and a probing depth of 4 mm buccally and 4 mm lingually. There was slight mobility. The radiographic image showed radiolucency around the cervical region around the implant with a diameter of 4.25 mm (Fig. 1). A diagnosis of peri-implantitis was supposed, and after discussion with the patient, the implant was removed (Figs. 2 & 3)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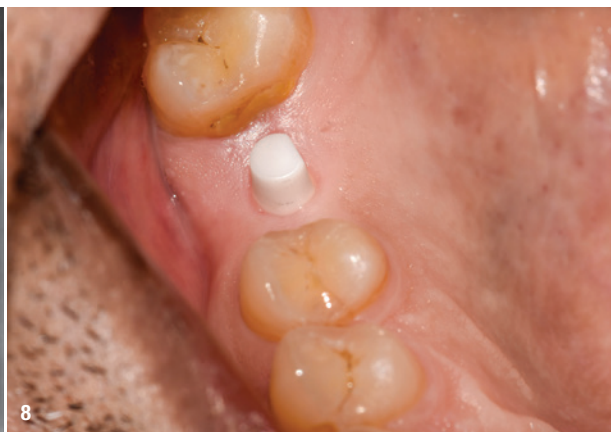
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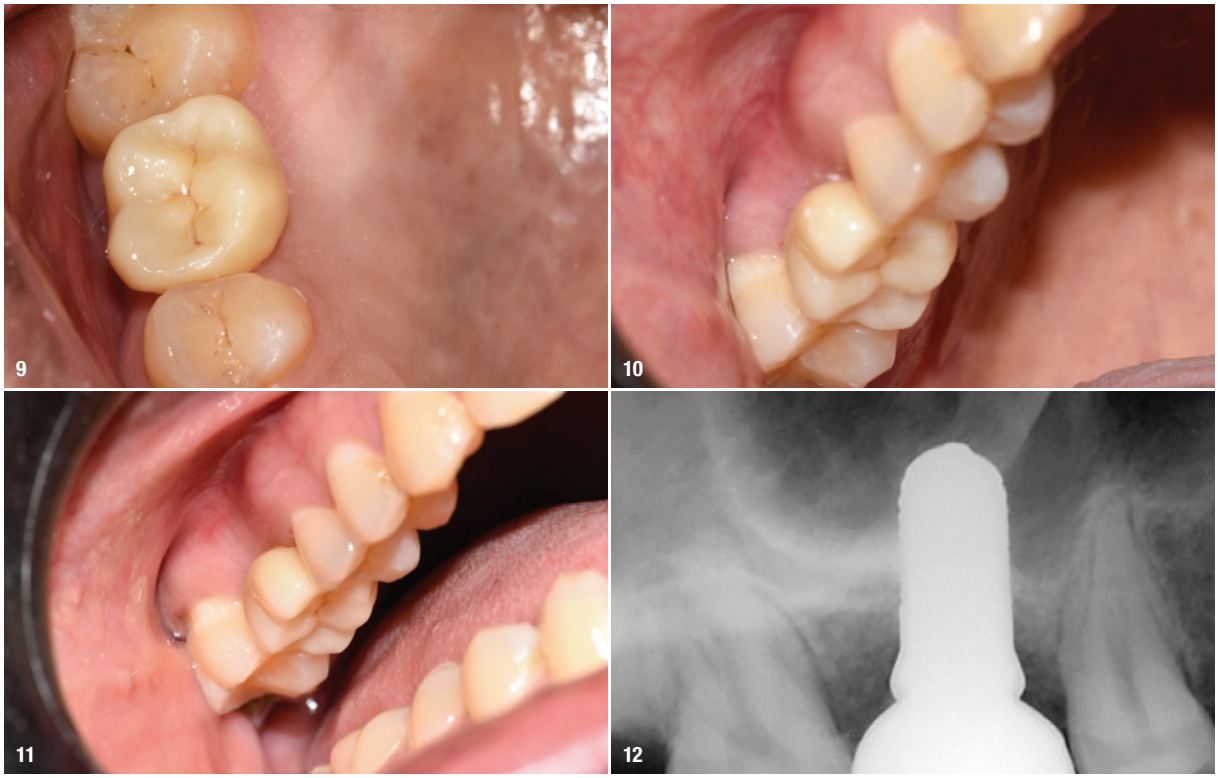

and the socket was debrided using diode laser therapy.

After 12 weeks, a one-piece zirconia implant (ZiBone, COHO Biomedical Technology) was inserted following the company's protocol (Figs. 4–7). A zirconia implant was chosen for better biological integration. Furthermore, the patient had requested a metal-free option, since there was a possibility of a metal allergy.

The fixture was loaded with a metal-free zirconia crown after 16 weeks (Figs. 8 & 9). During the follow-up period, the patient did not report any symptoms of peri-implantitis or other problems, and the clinical and radiographic examination showed the success of the metal-free implant prosthetic restoration. In particular, the peri-implant tissue appeared healthy (Figs. 10 & 11), and the radiograph confirmed the absence of marginal bone loss around the implant and no sign of bone resorption (Fig. 12).

Discussion

In the above case, the zirconia dental implant seemed to have integrated well without any signs of marginal bone loss and established excellent soft tissue healing. A ceramic dental implant has some benefits over titanium: although the survival and success rates of zirconia and titanium dental implants are quite comparable, some research studies have stated that a zirconia dental implant is more biocompatible compared with titanium, as the latter releases corrosion products around the implant site. The characteristics of their enhanced biocompatibility, along with good osseointegration and success rates, make zirconia implants clear candidates for use in clinical implant dentistry. However, further investigations on titanium release and its connections with peri-implantitis, hypersensitivity and bone resorption are recommended.

about the author

Dr Saurabh Gupta graduated from Manipal College of Dental Sciences in India with a BDS and holds a master's degree in oral and maxillofacial surgery from Rajiv Gandhi University of Health Sciences in Bangalore in India. He is an international and national lecturer and a board member and Education Director of the International Academy of Ceramic Implantology. He is a member of the Zirconia Implant Research Group, which aims to orient and lead research in the field of metal-free implantology. He founded and directs WhiteZ Dental in Bangalore.

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Rehabilitation of the maxilla with implant-supported zirconia bars

Dr Witalij Kolbe, Germany

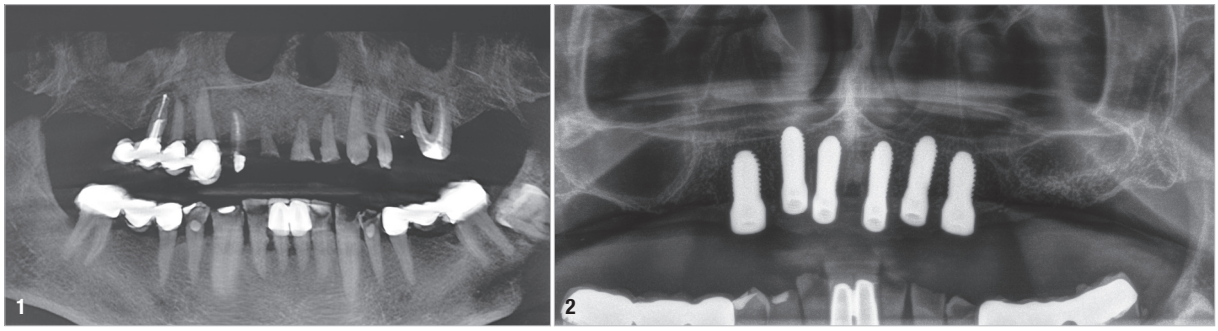


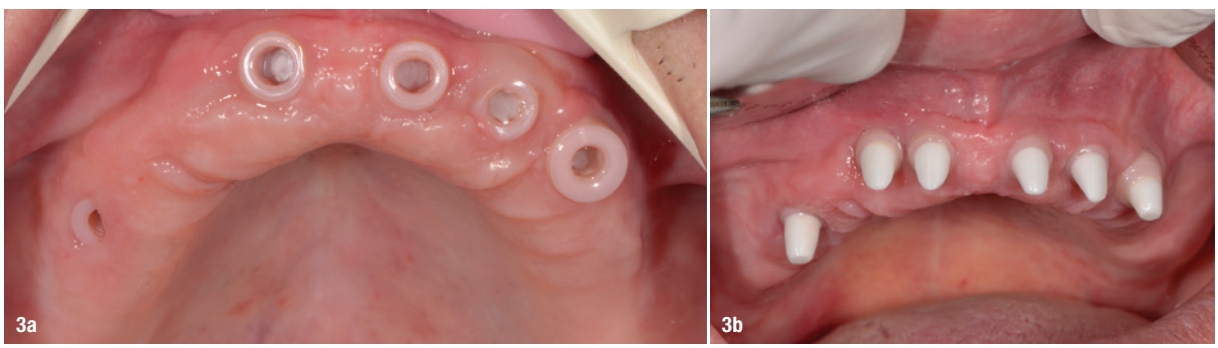
Fig. 1: Pre-op radiograph revealing severely pronounced atrophy in the maxilla. **Fig. 2:** Six zirconia implants were placed in the patient's maxilla.

The use of zirconia as a material for dental implants and prostheses, in conjunction with newly developed materials and CAD/CAM technology, undoubtedly represents a fascinating opportunity to restore the teeth of our patients. As with any new technology, increasingly precise manufacturing techniques are bringing about a change in indications. Today, it is possible to realise custom-fabricated CAD/CAM zirconia bars on zirconia implants. The use of the material zirconia for abutments, implants and bars is certainly recommended from a biological stance. Based on the vast number of past successful clinical restorations, one can be confident in choosing restoration with bar-supported hybrid prostheses. In the recent past, the employment of zirconia as a material for implants, abutments and bars in the context of surgery and hybrid prostheses has proved to be both a successful combination method and a successful stand-alone approach in clinical practice. In the following, a clinical case report is described which illustrates how even the smallest details matter when it comes to determining the optimal use of zirconia implants, abutments and bars in clinical practice.

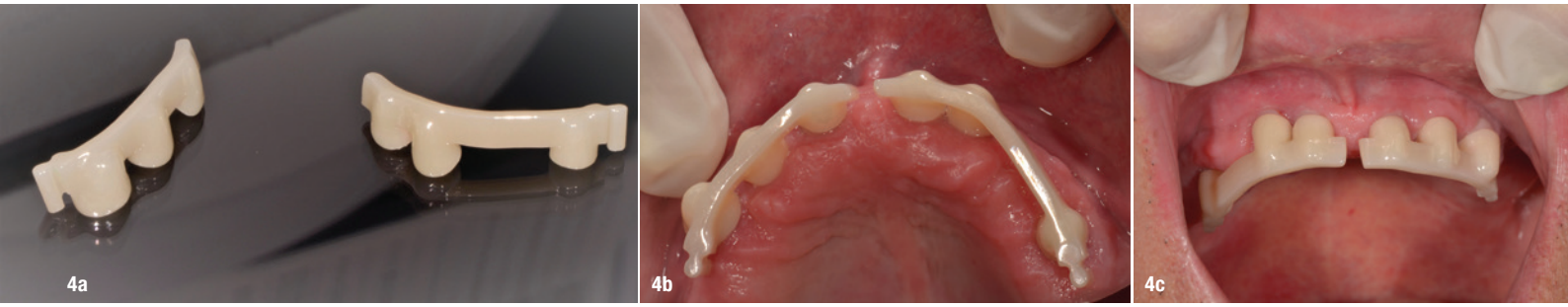
Clinical case

Owing to severely advanced atrophy in the maxilla, not only missing tooth structure but also missing jawbone and soft tissue had to be replaced in the patient (Fig. 1). Six zirconia implants (AWI, WITAR) were placed in the patient's maxilla (Fig. 2). A complete denture was fabricated for the healing phase and the base lined with a soft lining material. Six months later, after the surgical phase had been completed, the prosthetic restoration was carried out. The therapeutic decision was made in favour of a removable palate-free combination restoration.

In order to meet the aesthetic demands, it is imperative to perform an overall wax try-in before designing the bar so that the bar can be designed according to the tooth



Figs. 3a & b: The implant shoulders and zirconia abutments were positioned transgingivally.

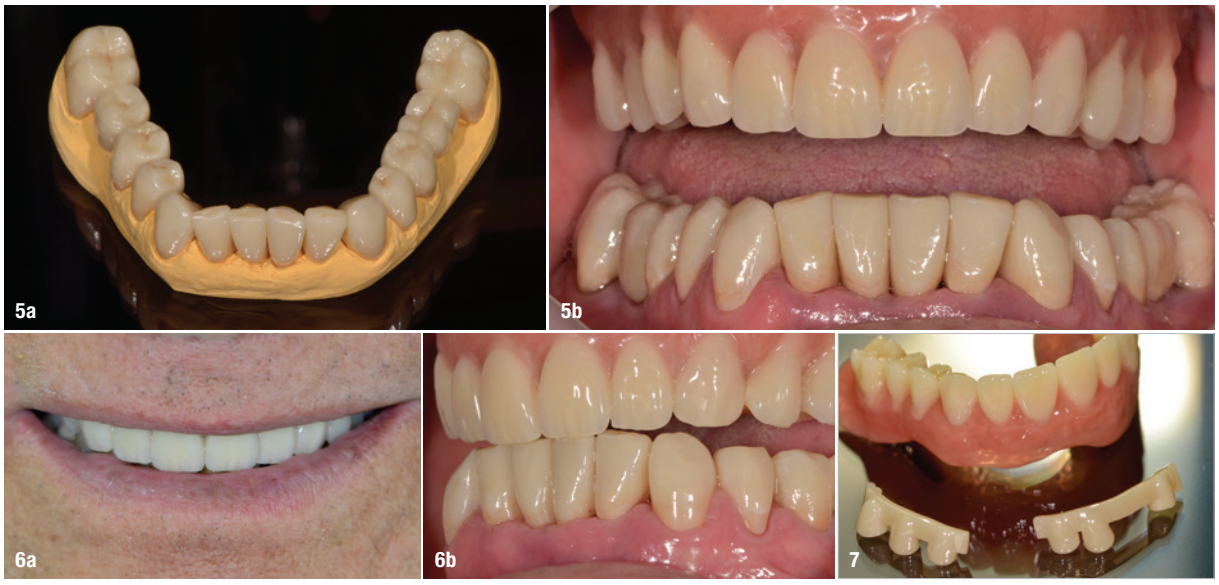


Figs. 4a–c: The definitive bars were placed on the abutments and cemented.

position and not vice versa. The varying thickness of the mucosa was compensated for by the transgingival preparation of the implant shoulders and the zirconia abutments (AWI, WITAR; Fig. 3). Thereafter, a primary impression was taken over the abutments, and the secondary impression was taken in a silicone-based impression material (A-silicone, DMG Dental). The bar constructions were then milled from zirconia in a CAD/CAM procedure and clinically checked for a tension-free fit.

Outcome

Eighteen months after placement, the treating clinician and the patient were still satisfied not only with the overall aesthetic result of the restoration (Figs. 6a & b) but also with a stable implant-supported superstructure, which was installed without complications and which offers significant advantages from both a biological and technical point of view (Fig. 7).



Figs. 5a & b: The prosthesis for the mandible was fabricated with IPS e.max pressed ceramics. **Figs. 6a & b:** Eighteen months after placement, the restoration was considered satisfactory. **Fig. 7:** The prosthesis produced in the WITAR laboratory.

The superstructure, a sliding construction over the bars, was fabricated from solid PEEK material. The finishing was done with autopolymerising PMMA denture acrylic (Palapress vario, Kulzer) and fabricated denture teeth (Genios, Dentsply Sirona). During the fabrication of the combination prosthesis, aesthetic, phonetic and functional aspects were taken into consideration with a particular view to the acrylic material used. The try-in of the completed bars went smoothly and without complications. The definitive bars were placed on the abutments and cemented with glass ionomer cement (CX-Plus, SHOFU Dental) in a tension-free way (Fig. 4). The prosthetic restoration in the mandible was fabricated in a second step with lithium disilicate pressed ceramics (IPS e.max Press, Ivoclar Vivadent; Fig. 5).

Acknowledgement
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Ceramic implants account for 50% of implants we use

An interview with Prof. Michael Gahlert & Dr Stefan Röhling, Germany

Dr Stefan Röhling (left) and Prof. Michael Gahlert are experts in two-piece ceramic implants.

Experts in the field of two-piece ceramic implants, Prof. Michael Gahlert and Dr Stefan Röhling together run an oral surgery practice in Munich. In this interview with ceramic implants, they discuss the advantages of ceramic implants and provide a scientific update on the topic. In addition, the implantologists, being pioneers in the field of modern ceramic implants, share their experience of zirconia implants and consider the significance for clinicians of the statement by the European Society for Ceramic Implantology on the clinical application of two-piece zirconia implants and what the future holds for ceramic implantology.

Dr Röhling, together with Prof. Gahlert and other colleagues, you received the 2020 André Schroeder Prize for Preclinical Research for your study titled "Ligature-induced peri-implant bone loss around loaded zirconia and titanium implants". What exactly did you investigate in that research?

Dr Röhling: In this experimental study, we investigated for the very first time the occurrence and onset of ligature-induced peri-implantitis around ceramic implants in direct comparison with titanium implants. In the joint project with Prof. David Cochran of the University of Texas Health Science Center at San Antonio School of Dentistry in the US, we were able to show that during active and spontaneous progression of inflammation there was significantly less bone loss around ceramic implants than around titanium implants.

There is clinical evidence that ceramic implants offer superior biocompatibility. Does this have an impact on the lower tendency to develop peri-implantitis?

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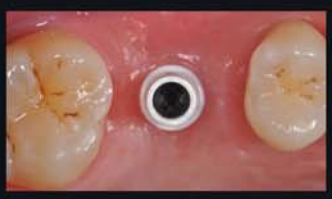


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Dr Röhling: The development of peri-implantitis depends on multiple factors. However, the accumulation of bacteria on the implant surface in the form of biofilm can clearly be observed to be one of the main causes of the development of peri-implant inflammation. This formation of biofilm depends not only on the physical (surface roughness) and chemical (surface energy and surface tension) properties of the surface but also on the type of biomaterial used (titanium versus ceramic). Scientific studies have shown that less biofilm accumulates on ceramic than on titanium for implants with similar surface topography. The results of our experimental study are even more concrete. Based on the currently available data, it can certainly be assumed that the biocompatibility has an impact on the development of peri-implantitis. However, whether ceramic implants truly have a lower tendency to develop peri-implant infections over the long term is very difficult to say based on the current data. The research data obtained to date is very promising nonetheless.

> "There is now sufficient scientific data to support reliable clinical use of ceramic implants of zirconia."

Prof. Gahlert, you are currently working on a retrospective follow-up study of Zeramex two-piece ceramic implants. Do you already have initial results to share?
Prof. Gahlert: We conducted a retrospective follow-up examination of 21 patients with one of our doctoral students and the University of Basel. This involved re-examination of 36 two-piece ceramic implants of the type Zeramex XT. In addition to measuring clinical parameters, the study considered abutment–implant connection by means of a carbon screw, which did not lead to complaints in any of the cases we re-examined. The average loading phase of the ceramic implants was 2.1 years, and the survival and success rates were the same as for comparable and established titanium implants.

Of the implants placed in your practice, what percentage are ceramic implants?
Prof. Gahlert: Looking back at the last ten years, the proportion of ceramic implants placed at our practice has risen continuously alongside the use of titanium implants. Today, especially at our practice, I would put the share of ordinary ceramic implants at 50%.

There are hardly any one-piece titanium implants. What role do one-piece ceramic implants play in clinical practice?
Dr Röhling: One-piece ceramic implants are definitely a niche product that is only routinely used by a few practitioners. Many clinicians are sceptical about the surgical and prosthetic handling as well as the fact that the superstructures can only be cemented. The two-piece ceramic implant designs are closer to what the majority of dental surgeons would like to use, since the clinical handling is comparable with that of titanium implants. At our practice, however, one-piece ceramic implants are an important factor in everyday clinical work because excellent results can be achieved with regard to the red–white aesthetics, especially in the aesthetically critical area of the anterior teeth.

In which cases do you prefer two-piece, screw-retained ceramic implants?
Prof. Gahlert: For larger prosthetic restorations, the two-piece implants offer greater prosthetic flexibility. Plus, as implantologists, we prefer it when the implants heal subgingivally or epigingivally because this poses a lower risk of early or improper loading caused by projecting implant stumps. This problem remains with one-piece implants, especially if patients wear removable temporary dentures during the healing phase.

The current trend in titanium implants is bone-level design. Does this also apply to ceramic implants?
Dr Röhling: Looking at the international market for titanium implants, we see more bone-level designs in use than tissue-level designs. This development can definitely be attributed to increased prosthetic flexibility. To further establish ceramic implants on the market and make them of interest to more clinicians, it is absolutely essential for reversible, screw-retained, two-piece bone-level ceramic implant designs to be available to permit the creation of individual abutments. The discussion surrounding bone-level versus tissue-level designs, however, should not be limited to the factor of prosthetic flexibility. The underlying biological principles should be considered as well. This makes it clear that there certainly still are justifications for a tissue-level design in regular clinical practice today.

Is the interest in ceramic implants reflected in your patients?
Prof. Gahlert: We are repeatedly amazed at the range of information which new patients looking for implant restoration have when they arrive at our practice. The Internet has a wealth of information to offer on this topic. Many patients also come because ceramic implants have now opened up new options for them that would not be achievable with titanium from the patient's perspective.

Not all dentists use ceramic implants yet. What do you think keeps them from doing so?
Dr Röhling: Unfortunately, many practitioners still don't trust the products that are available. This can be attributed to a lack of knowledge and marketing communication deficits with regard to the material properties and reliability. Another factor is prejudice against ceramic implants. Negative reports from the past involving ceramic implants of alumina often play a role here. However, it must be considered that modern ceramic implants are made of zirconia and have significantly better biomechanical properties than ceramic implants of alumina, which have not been available on the market since the mid-1990s. This makes such prejudices outdated: there is now sufficient scientific data to support reliable clinical use of ceramic implants of zirconia.

What would you advise your peers working in private practice with regard to the advantages of ceramic implants?
Dr Röhling: Ceramic implants expand the treatment spectrum of a practice and offer patients a dependable alternative to titanium. This fact is all the more important given that the demand for ceramic implants by patients has continued to increase. In a study conducted by our research group, we showed that tooth-coloured ceramic implants are more attractive to patients than are grey implants of titanium. In addition, ceramic implants offer advantages for challenging aesthetic indications and compromised soft-tissue conditions. In many clinical cases over the last decade, we have observed a rapid and stable adaptation of the peri-implant mucosa without irritation.

Are there any specific cases in which you prefer ceramic implants, such as for anterior teeth?
Prof. Gahlert: In addition to the highly aesthetic restoration options of ceramic implants in the maxillary anterior area, as a periodontist I am particularly drawn to using ceramic implants in patients with past periodontal disease resulting from genetic causes. Because ceramic implants have lower bacterial affinity than do titanium implants, they are my first choice for tooth replacement in these special cases.

How do you see the future of ceramic implants compared with titanium implants?
Prof. Gahlert: One of the most important aspects will be greater recognition of ceramic implants than is currently the case. Although a robust movement in favour of ceramic implants is taking shape around the world, there are still too many gaps in the data. My prediction is that in five years, after scientific confirmation of ten years of serious long-term data from a variety of study groups and continued positive clinical performance, ceramic implants will have found a permanent place alongside titanium ones.

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Dr Stefan Röhling

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Fig. 1: At the 2022 Academy of Osseointegration annual meeting in February, the first ever nine-year prospective study on two-piece ceramic implants was presented.

In response to the desire for a broader range of indications and greater prosthetic flexibility, two-piece ceramic implant systems are increasingly finding their way on to the market. In the past, however, numerous two-piece ceramic implant systems have come to the market that presented major drawbacks regarding failing osseointegration or high fracture rates. With the Patent™ Dental Implant System, Zircon Medical Management has adopted a revolutionary, 20-year-old technology that promises to eliminate these drawbacks of conventional ceramic implant systems. Making good on this ambitious claim, a team of researchers at Heinrich Heine University Düsseldorf in Germany has now presented the first reliable long-term data of its kind on the clinical success of two-piece ceramic implants at the recent 2022 Academy of Osseointegration (AO) annual meeting in San Diego in the US, heralding a paradigm shift in the scientific debate surrounding dental implants. The fact that long-term successful treatments can be realised with the two-piece Patent™ Dental Implant System has now been scientifically proved.

The first ever nine-year study on ceramic implants

The prospective nine-year study presented at the recent AO annual meeting investigated patients with average health profiles who had received two-piece Patent™ Implants in single-tooth posterior restorations at Heinrich Heine University Düsseldorf between 2011 and 2012.[1] Extremely high survival rates for the implants (95.8%) were documented after nine years of wear—rates comparable to those of titanium implants. Also, stable bone and soft-tissue levels with mucosal recession of less than 1 mm were documented in all the implants after the nine-year period. Furthermore, the researchers observed no bleeding on probing in more than half of the implants after this period. In light of the convincing results, lead researcher Prof. Jürgen Becker emphasised that predictable, safe and long-term reliable restorations can be achieved in average implant patients with the two-piece Patent™ Implants.

Revolutionary prosthetic concept

The excellent long-term performance of the two-piece Patent™ Dental Implant System documented in the prospective study can be attributed to a number of special design factors implemented with the aim of eliminating the drawbacks of conventional ceramic implants once and for all. Unlike some other ceramic implants, the Patent™ implant design was not merely copied from titanium implants, but was purposefully engineered with the specific material properties of zirconia in mind. While other systems rely on metal screws for the internal connection or employ an unfavourable ceramic–ceramic screw connection, the Patent™ Dental Implant System has developed a revolutionary prosthetic concept: the prosthetic connection is realised via a high-tech glass fibre post, which has dentine-like properties and, being flexible, dampens the masticatory forces transferred from the definitive restoration to the implant. The result is a metal-free and extremely stable construction without a bacteria-prone micro-gap at the subgingival level.

Fast and predictable osseointegration

The proven high survival rates of Patent™ Implants can also be attributed to the special implant surface created in a proprietary manufacturing process. The endosteal implant surface is hydrophilic, osteoconductive and significantly rougher than the surfaces of conventional ceramic implants, having a roughness value of 6 µm. Within minutes after insertion, a fibrin network forms on it, promoting extremely successful bone healing through contact osteogenesis and optimising the early phase of healing. The superior bone healing of Patent™ Implants was impressively demonstrated in an animal model study by Drs Roland Glauser and Peter Schüpbach (in publication), in which the researchers found that Patent™ Implants achieve bone–implant contact of over 70% after only four weeks of healing. Such results demonstrate that the Patent™ Dental Implant System outperforms all other implants examined in comparable studies to date. Moreover, thanks to the biomimetic implant design, which was modelled after a natural tooth, the Patent™ Dental Implant System permits a particularly high degree of soft-tissue adaptation. This soft-tissue seal prevents pathogenic bacteria from infiltrating the underlying tissue and causing marginal bone loss, peri-implant inflammation and systemic complications.

Patent™ users and experts share their experiences

Dr Sammy Noumbissi, president of the US expert society International Academy of Ceramic Implantology, stressed: "I've had the opportunity to look at the Patent™ Dental Implant System very closely many times, and I have colleagues and friends who are using them extensively now. The Patent™ Dental Implant System is the first ceramic implant with a decade of research behind it. This is unique, especially in the ceramic implant world. In the past, many ceramic implant systems with comparatively little scientific evidence have come to the market. The Patent™ Dental Implant System has been used, tested and evaluated since 2006. In ceramic implantology, I have never seen a product that has been so extensively researched before being commercially marketed."

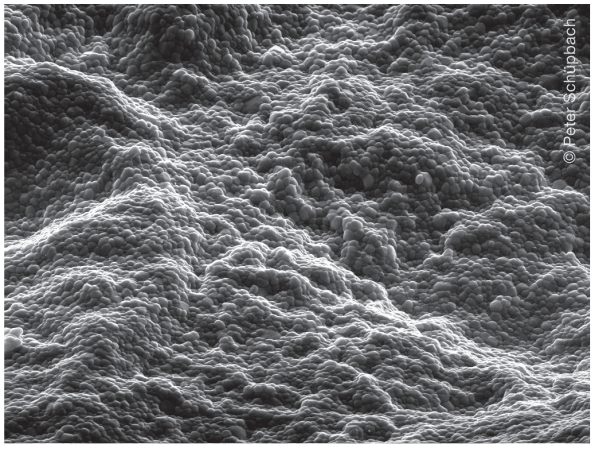

Fig. 3: With a roughness value of 6 µm, the surface of the Patent™ Dental Implant System is significantly rougher than the surfaces of conventional ceramic implants, ensuring fast and predictable osseointegration (scanning electron microscopy 10,000× magnification).

Fig. 2: The two-piece Patent™ Dental Implant System is metal-free. The prosthetic connection is realised via a high-tech glass fibre post, which is inserted into the patented 3C connection of the implant and cemented. It is then ground and restored just like a natural tooth. The glass fibre post has dentine-like properties and offers great flexibility, immense strength and a wide variety of prosthetic possibilities.

Commenting on the unique nine-year study at Heinrich Heine University Düsseldorf, Dr Paul Lee, founder of the Luxembourg-based INTEGRA biohealth clinic, said: "This long-term study confirms what I have been observing for ten years now in clinical practice with the Patent™ Implants I have placed." Dr Glauser, who is a Swiss implantologist, confirmed: "Thanks to the special, highly rough surface, even better results in terms of bone healing can be achieved with Patent™ Implants than with all other ceramic implants on the market." Among the many Patent™ users is also Dr Marcel Wainwright, who said of the healing success of the Patent™ Dental Implant System: "The rougher the surface, the easier it is for the cells to attach to it and form a fibrin network. I don't know of any other implant system that has a higher roughness." In addition, Dr Wainwright values the easy handling of the Patent™ Implant: "The switch to Patent™ is by no means dramatic—the few things that need to be learned can be explained in one afternoon."

Reference

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Successional whiteSKY zirconia implant from bredent medical

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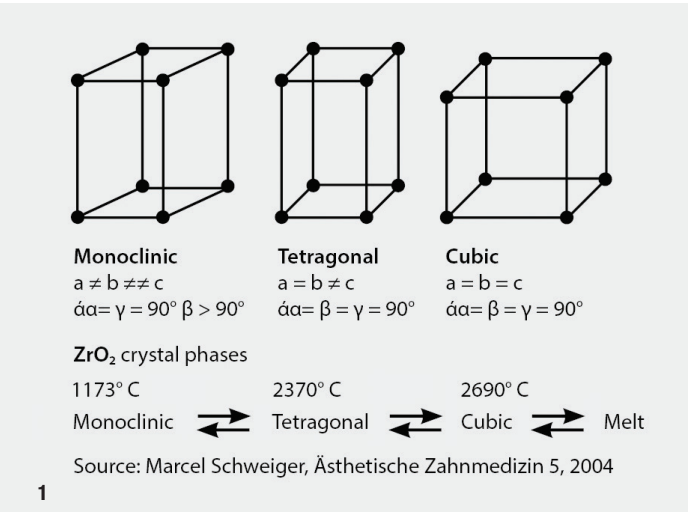

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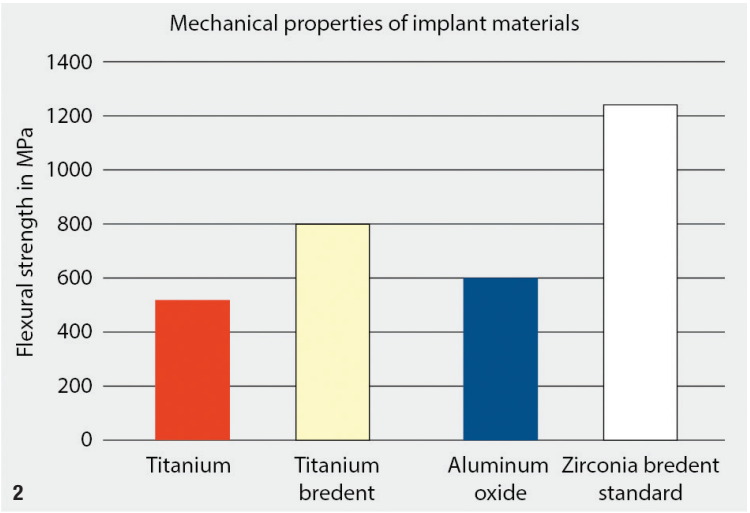

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Fig. 1: The zirconia used for whiteSKY implants has a tetragonal structure. This structure only occurs in nature at temperatures between 1,173 °C and 2,370 °C. Yttria is added to stabilise the structure at room temperature.[7] **Fig. 2:** Unground zirconia has a strength triple that of titanium and double that of alumina. Industrial grinding increases its strength even further, meaning that a strength of approximately 2,000 N can be achieved in implants.

The contemporary zirconia implant is truly comparable to titanium and has no treatment limitations. This makes it a reliable alternative for patients with metal allergies, those wishing to lead a metal-free lifestyle and those needing implants in the aesthetic zone to ensure that dark shading does not affect the aesthetic outcome of the restoration. Zirconia is perfectly suited for implants, since its strength is three times higher than that of titanium and it exhibits ideal elasticity and long-term resistance to fracture. Scientific studies have shown that zirconia features the same characteristics as comparable titanium surfaces regarding osseointegration.[1,2]

> "Zirconia is perfectly suited for implants, since its strength is three times higher than that of titanium and it exhibits ideal elasticity and long-term resistance to fracture."

The whiteSKY zirconia implant system developed by bredent medical has been proved to be safe and durable, demonstrating excellent long-term results since its introduction in 2006.[1,2] The company has now built on this success with the launch of a second generation of the system. The new whiteSKY Tissue Line and Alveo Line ceramic implants incorporate all the features of the classic whiteSKY implant in an improved, contemporary design and new shape which has been scientifically and clinically proved.

For the first generation of whiteSKY implants, clinical and scientific evaluations have been carried out from the very beginning, and histological investigations have confirmed the implant's excellent osseointegration and verified its long-term clinical outcomes. Research shows that its survival rate is on par with that of titanium implants and that bone levels remain stable in the long term, and the red–white aesthetics have been shown

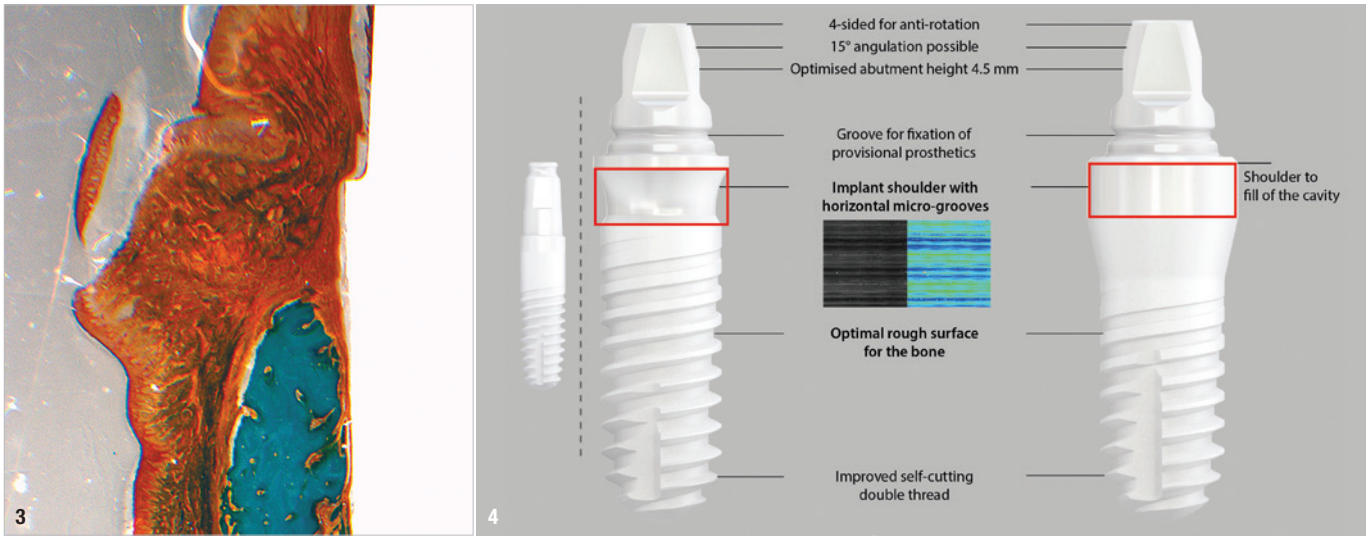

Fig. 3: Histology demonstrates excellent muco-integration of the whiteSKY zirconia implants, which is the basis of the long-term success.[1] **Fig. 4:** Retaining proven properties and developing these successes further was the goal of the development of the second generation of whiteSKY. The same highly stable material has been used in the same production process and improvements have been made to the neck design, which is now available in two forms. The improvements in the superstructure design ease the integration of both temporary and definitive prosthetic restoration and optimise the digital workflow.

to be outstanding.[1,2] Furthermore, studies have demonstrated that ceramic dental implants exhibit good biocompatibility, good epithelial attachment and low plaque accumulation.[3–6]

For the newly launched second generation, several additional, customer-requested improvements have been introduced and the following proven success factors have been retained: the complex manufacturing

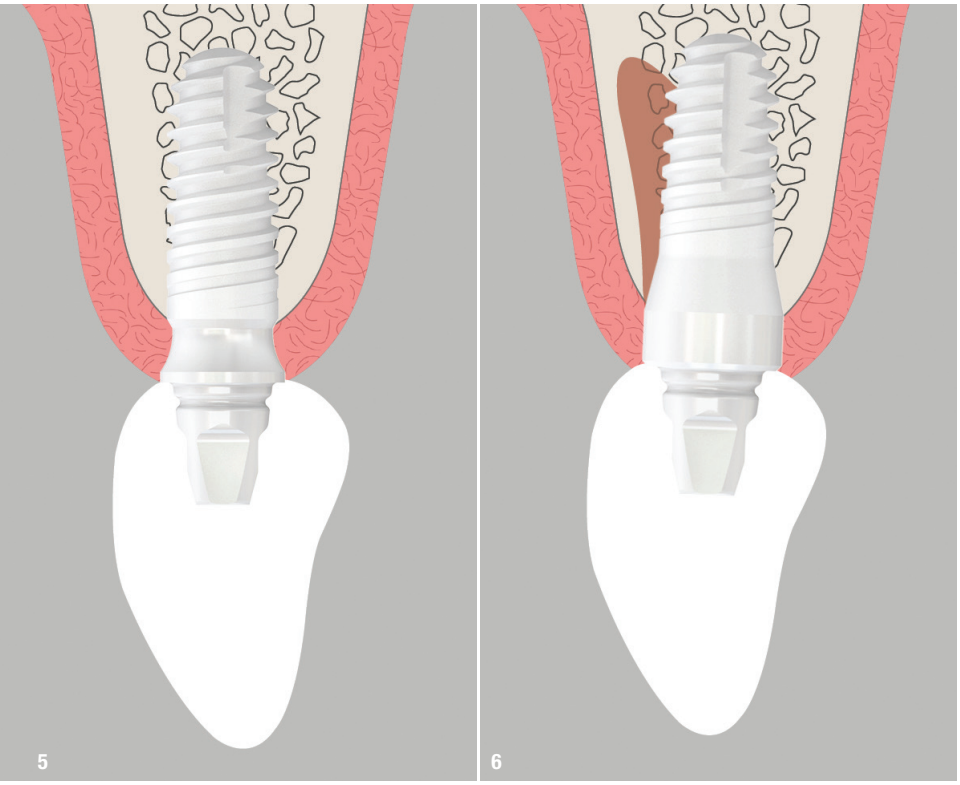

Fig. 5: Placed whiteSKY Tissue Line implant. **Fig. 6:** Placed whiteSKY Alveo Line. Ideal for immediate implantation.

process involving hot isostatic pressed zirconia; the surface treatment; the one-piece design, which ensures micro-gaps do not occur and therefore guarantees the long-term survival of the implant; and the optimised design and bone-oriented surgical protocol, which have been shown to achieve excellent primary stability. This is a prerequisite for immediate restoration, which is highly recommended, as clinical research indicates that it can increase bone–implant contact by 50%.[3] The tooth-coloured whiteSKY zirconia implant meets patients' high aesthetic demands—no dark shades will affect the beauty of the restoration.

The implant can be used in cases of low gingival height. Its one-piece design makes it ideal for immediate loading. It has the same requirements as for an immediately loaded titanium implant, such as sufficient bone volume, adequate primary stability and connection to adjacent teeth or to other whiteSKY implants.

Two designs one goal—aesthetics

The second generation of whiteSKY is available in two designs for the different user philosophies. whiteSKY Tissue Line with the slim and scalloped sulcus design offers the maximum space for the soft tissue and limits the need for customisation—therefore, it is ideal for the standardised analogue and digital workflows.

whiteSKY Alveo Line with its wide platform for the closure of the alveolus is ideal for customisation according to the anatomical situation of the patient to achieve maximum in aesthetics in any case—then it is used in the analogue and digital workflow like a natural tooth.

whiteSKY Alveo Line and Tissue Line have the reduced abutment height with a 15° bevel at the tip which facilitates the restoration of tilted implants in the maxillary anterior region. The horizontal groove ensures easy insertion of temporary restorations and facilitate temporary and permanent cementation.

The one-piece whiteSKY Tissue Line and Alveo Line are versatile and suitable for a wide range of indications, from single restorations in the aesthetic zone as well as the posterior zone to short-span bridges in the premolar–molar region and even in free-end situations. Depending on the competence of the dental team, the new generation whiteSKY can be used also for very challenging cases of full arch restorations. There is also no limitation in terms of implant placement timing—all options are possible from immediate implant placement to late implant placement for both systems.

In all cases, the manufacturer recommends the immediate restoration of the whiteSKY implants because of the proven improved osseointegration and patients' wish for speedy but safe restoration.

This year, bredent medical celebrates 15 years of the whiteSKY implant system in various European cities. At various international events you can find out more about the new whiteSKY implant system.

Literature

bredent

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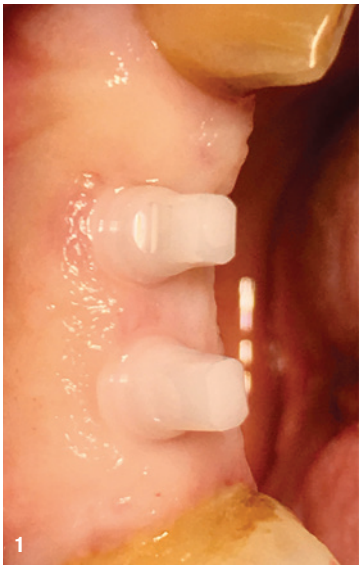
bredent medical

Zirconia implant as alternative to titanium



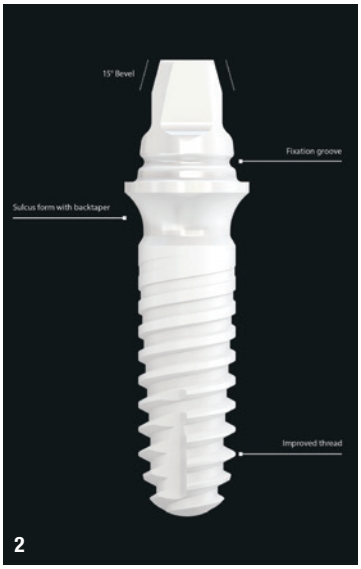


Fig. 1: Clinical case with the whiteSKY Tissue Line by Dr Gallizia, France.
Fig. 2: The new whiteSKY Tissue Line zirconia implant-reshaping scientific success.

The whiteSKY Tissue Line and Alveo Line ceramic implants incorporate all the features of the "classic" whiteSKY implant in an improved, contemporary design and new shape which has been scientifically and clinically proven. The zirconia implant is truly comparable to titanium and has no treatment limitations. This makes it a reliable alternative for patients with metal allergies, those who want to lead a metal-free lifestyle and those needing implants in the aesthetic-zone to ensure that dark shading does not affect the aesthetic outcome of the restoration. Zirconia is also perfectly suited for implants since its strength is comparable to that of titanium and exhibits ideal elasticity and long-term resistance to fracture.
Dr Claude Gallizia from France stated titanium equates to bio tolerance whilst zirconia offers total bio compatibility. "In practical terms, I am pleased to say that with whiteSKY, we get minimal post-operative pain, achieve beautiful osseointegration and get a phenomenal reaction from bone and gingival tissues."

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Dr Pascal Marquardt, a specialist in prosthodontics and oral implantology and a dedicated member of the Schilli Implantology Circle explains: "In 2016 I discovered this new option of the VICARBO® screw. The combination of high-strength PEEK thermoplastic polymer and specially aligned carbon fibres in the abutment screw and the most stable ceramic material on the market in the implant itself—finally successfully rivalled the common components of titanium implants in terms of strength and long-term clinical success." Compared to titanium implants, so the experienced implantologist, the low plaque adhesion and the lower peri-implantitis rates that have emerged in recent reports make ceramic implants a particularly interesting option in patients with periodontal disease or who have issues with proper oral hygiene. The favourable soft-tissue reaction makes for uncomplicated handling in the aesthetic zone. Dr Marquardt also emphasises the complex manufacturing process of the SICwhite, in which both the implant and the abutment are milled from particularly strong, fully sintered ATZ ceramics providing maximum safety in terms of the fracture strength of these ceramic implants. It is true that not all cases are suitable for ceramic implants today. But given the developments over the last few years, we have good reason to expect that a growing range of indications and an increasing variety of implant types will eliminate many of today's restrictions in the future.

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Zircon Medical Management

Master of zirconia: The Patent™ Dental Implant System

While other ceramic implant manufacturers struggle with early osseointegration failure and high fracture rates, Zircon Medical Management, the manufacturer of the Patent™ Dental Implant System, together with leading scientists and a team of highly experienced material experts, has succeeded in mastering the complex process of manufacturing zirconia implants in a unique way—employing a process that has been protected by 14 patents. All surface-machining steps are carried out prior to sintering. Through the proprietary manufacturing process, a surface roughness is achieved (6 µm) that is up to five times rougher than conventional zirconia implant surfaces. In the subsequent sintering stage, potential process-related microcracks are eliminated. Moreover, the design of the Patent™ Dental Implant System does not merely mimic the design of titanium implants. Rather, its design was purposefully engineered to perfectly complement the material characteristics of zirconia. The result is a true tissue-level zirconia implant that is unparalleled in terms of fracture resistance, osseointegration and long-term stability. In addition, the entire manufacturing process—from raw material assembly to milling and final packaging—takes place exclusively at two proprietary production sites in Germany. Therefore, Zircon Medical Management is able to guarantee Patent™ users absolute quality control. Choose long-term stability. Choose reliable osseointegration. Choose Patent™ Implants from Zircon Medical Management, the master of zirconia.

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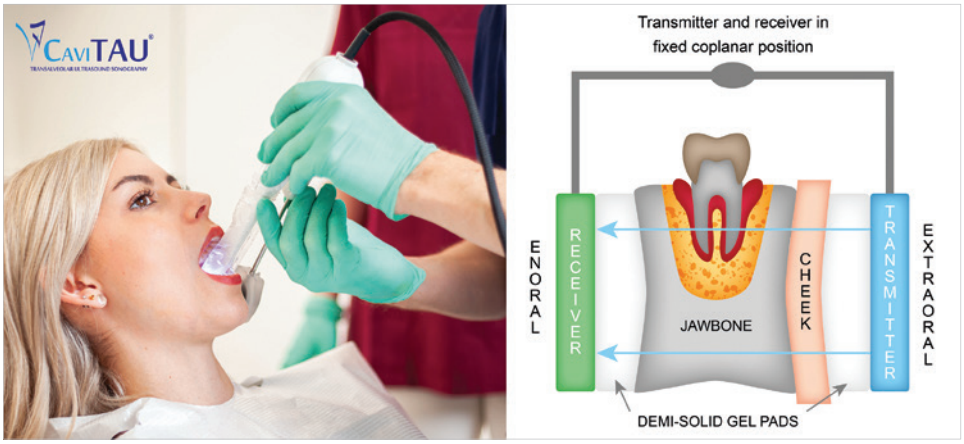

CaviTAU® application with LED gel pad and schematic representation of transalveolar sonography.

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Changing lives by giving smiles back: SmileAward 2022

Every day, around the globe, we know dental professionals rely on Straumann to give patients the confidence to smile again, to laugh, to show off their smiles, to eat the foods they love. Thousands of dental professionals use our products and solutions to rebuild the quality of life for patients and to unlock the potential of people's lives. While Immediacy Protocols stood in the focus in 2021, the SmileAward 2022, welcomed dental professionals to show us how they are changing the lives of their patients through full-arch rehabilitation or clear aligner therapy. They are invited to submit their best patient stories and share with the world the many ways that dentistry can restore confidence and improve our well-being. The 2022 SmileAward aspires to be the most inspiring, most uplifting clinical case competition.

Submission requirements
The required documentation includes all relevant diagnostics and step-by-step illustrations. It is also required to submit a 4-minute video that combines high-definition clinical images with the testimonial of the patient. All cases fulfilling the criteria will go through to a public vote. A jury composed of key opinion leaders in dentistry will select the final winners, who will be announced at EuroPerio10.

Timeline
– Submission of cases: by 20 July
– Public voting: 1 Aug–29 Aug
– Selection of winners by jury: 1 Sept–14 Sept
– Announcement of winners: EAO Congress, Geneva (29 Sept–1 Oct)

Great prizes
All finalists in both categories will be awarded a prize so that they can continue changing lives together with Straumann. The top three winners in both contest categories will be #GivingSmilesBack with the materials needed to complete one or more pro bono cases, and our top winner in each category will also get their patient video story edited professionally, and it will be seen with worldwide visibility across Straumann channels and platforms. Our winners can also opt for a #ChangingLives prize, a donation to a philanthropic organisation in their honour—or for a #BoostingYourPractice prize in which the top winner in each category will take home a TRIOS intra-oral scanner.

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Zeramex

Dr Rouven Wagner on his experience with 2ingis guided surgery for Zeramex implants

Nowadays, digital workflows are an integral part of the daily routine of an implantology dental practice. In addition, optical impressions and CAD/CAM workflows are already covered during studies at almost every university in order to learn about different digital tools and their advantages. "I studied in Leipzig, where Prof. Ludwig Graf and Dr Wolfram Knöfler dealt with titanium implant alternatives very early on", explains Dr Rouven Wagner. "That's how I got into the world of ceramic implants. I also looked into the subject during my oral surgery training and my master's degree at the IMC under the supervision of Prof. Ulrich Joos. Finally, I wrote my master's thesis on ceramic implants." Dr Rouven Wagner started working with Zeramex because he was convinced by the metal-free implant with the carbon fibre-reinforced VICARBO® screw and its prosthetic flexibility. With the Zeramex implant, the usual workflow can be maintained.

"I tested several surgical guides. Unfortunately, some of them were partly inflexible and not open. That's why I chose 2ingis, an open-source system that gives me a lot of flexibility. I have the full field of vision and can decide whether a punch is enough or whether I should open up. The water cooling is also excellently solved," says the implantologist.

Especially in the anterior region, it is safe to work with a 3.5 mm Zeramex implant in narrow gaps in the lower jaw. With an analogue impression, one could damage the orthodontic appliance or change it much too much. Great results could also be achieved with treatments in combination with orthodontic restorations. Surgical guides make it possible to place an implant in a pre-planned location and determine the exact position of it. This has the advantage that the implantation is easier and the treatment time is shorter. The surgical procedure can be performed in a way that is gentler on the tissue and more comfortable and safer for the patient, as few or no soft tissue incisions are required.


Dr Rouven Wagner

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CAMLOG Biotechnologies

Digital workflow with the CERALOG® Implant System

The demand for highly aesthetic, natural-looking restorations is continually increasing—so is the demand for efficient workflows. The well-established CERALOG® Implant System will shortly be complemented with a bonding base, allowing to efficiently plan and manufacture the restorations for CERALOG® two-piece implants.

The CERALOG® bonding base CAD/CAM PS as well as all other new components will be platform switched—opening the pathway for more efficient workflows and improved aesthetic outcomes. With these new prosthetic components CAMLOG confirms its commitment for a ceramic system which is easy to use, with lean instrumentation, and clearly structured surgical procedures.

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Fig. 1: CERALOG® bonding base CAD/CAM PS. Combining the benefits of platform switching with efficient digital workflows. **Fig. 2:** Hexalobe—abutment connection for ceramic implants. The torque is transmitted tangentially to the implant, which allows a much higher torque compared to hexagonal connections, and more rotational stability.

EuroPerio10

Congress programme with over 130 top speakers

David Herrera and Phoebus Madianos are looking forward to the EuroPerio10 taking place in June.

The tenth edition of EuroPerio returns in 2022 after having been postponed from last year because of the Covid-19 pandemic. Organised by the European Federation of Periodontology (EFP), EuroPerio10 will take place on 15–18 June in Copenhagen, Denmark. It features a top-level scientific programme packed with sessions covering all the latest trends and topics for oral-healthcare professionals, with 135 well-known speakers from over 30 countries in the main programme. The scientific programme features a wide variety of innovative formats, including live muco-gingival and bone-regeneration surgeries, interactive sessions, so-called nightmare sessions (worst-case scenarios), video sessions, debates, interviews, symposia, and more. Considerable attention will be also given to the EFP's S3-level clinical guidelines on the treatment of periodontitis—the newest guideline, on stage IV periodontitis, will be presented at the congress.

"The scientific programme addresses the interests of every member of the dental community and provides them with an updated snapshot of what perio is today," explains David Herrera, scientific chair of EuroPerio10. "We have a great faculty, complete and diverse, addressing the main challenges of our profession with the most engaging session formats. So, we are proud to have prepared an exciting congress up to the task of bringing dental professionals up to date in terms of knowledge, skills, trends and solutions, but also in terms of personal interaction and networking with colleagues," says Phoebus Madianos, chair of EuroPerio10. Registration for EuroPerio10 is possible at the EFP website and has been open to all professionals since August last year.

EuroPerio10 · www.efp.org/europerio · europerio@mondial-congress.com

EAO Congress 2022 in Geneva

Uniting nations through innovations

The European Association for Osseointegration is pleased to announce details of its 29th congress, which will take place in Geneva from 29 September to 1 October with a digital programme for those who cannot attend in person. Geneva is home to many international organisations including the United Nations, the World Health Organisation and the Red Cross. Reflecting their goals of global collaboration, the theme of the EAO congress will be uniting nations through innovations. It will focus on the role of new technology in disrupting the way we communicate, work and learn. The programme will feature renowned speakers who will share their knowledge on the application of digital technologies across all aspects of implant dentistry. Sessions will compare current digital techniques with conventional techniques and will provide clinically relevant take-home recommendations. As well as the daily live programme, the digital evening event will feature additional content, available to a global online audience. Anyone attending in person will be able to participate in both parts of the programme, experiencing two educational events at the same time. The congress is being held in partnership with the Swiss Society of Oral Implantology (SGI), the Swiss Society of Periodontology (SSP), the Swiss Society for Oral Surgery and Stomatology (SSOS) and the Swiss Society of Reconstructive Dentistry (SSRD). Geneva 2022 will be a unique opportunity to learn from the best. We hope that you can join us—either in person or virtually—for what will be a ground-breaking programme focused on the evolving role of technology in implant dentistry.

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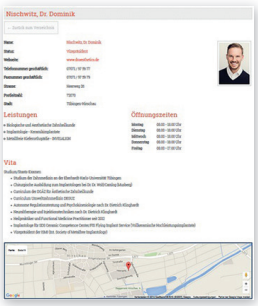

Discount on congress fees

Come and join us! Attend the Annual Meeting of ISMI in Berlin on 24 and 25 June 2022 and benefit from first-rate continuing education. ISMI members receive a special discount on the participation fee.

Online archive for specialists

Get exclusive access to ISMI's extensive online archive. Discuss all relevant questions regarding metal-free implantology with experts and colleagues from around the world and enjoy free access to the online archive where you will find informative training videos and clinical case reports.

Newsletter

The ISMI newsletter keeps you up to date with the latest scientific trends, products, and events on a regular basis. It also features user reports as well as a wide range of information and tips on the subject of metal-free implantology.

Specialist magazine

As a member of ISMI, your membership fee includes a subscription of the independently published English language magazine *ceramic implants—international magazine of ceramic implant technology.* Published twice a year, the magazine offers specialist articles and event reports as well as industry- and science-related news from the international world of metal-free implantology. In addition, *ceramic implants* provides information about manufacturers and their latest products.

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GC Brazil, represented by José Geraldo Lopes Neves on the right, joined a hybrid ceremony held in honour of Prof. Maria Fidela de Lima Navarro, among other academics, during which she was awarded the title of professor emeritus by the University of São Paulo. *(Image: © GC South America)*

GC International participates in awards ceremony

Prof. Maria Fidela de Lima Navarro honoured at University of São Paulo

The faculty of dentistry on the University of São Paulo's Bauru campus bestowed the honour of professor emeritus including Prof. Maria Fidela de Lima Navarro. The honour is awarded to retired professors who have distinguished themselves through teaching, research and other contributions to the university.

The hybrid two-day awards ceremony took place on 7 and 8 March and was broadcast live on YouTube. GC Brazil, represented by José Geraldo Lopes Neves, attended the ceremony in recognition of the contributions that Prof. Navarro has made to dentistry research in Brazil.

"Many actions have led us to share knowledge and continue to learn. We are here in this solemn moment, and it gives me immense joy and a feeling of accomplishment with the professional and personal goals that were achieved, as a group," Prof. Navarro said in her acceptance speech. "We reaffirm our confidence in being able to always share a new path, towards the highest peaks that certainly still need to be climbed. This is because, despite the paths we have taken so far, many other fields still need to be explored, and a journey of new discoveries is just beginning," she continued.

Prof. Navarro has contributed and continues to contribute to research related to glass ionomers and glass hybrids as well as their properties and applications in several clinical cases.

Source: GC International AG

Eklund Foundation

Applications for odontological research and education are welcome

Researchers within dentistry will soon be able to apply for grants of up to €250,000, which is the total sum allocated by the Eklund Foundation in 2022. The application portal will be open during May for the seventh year running, welcoming applicants from all parts of the world in all fields of dentistry. Both experimental and clinical studies within all fields of dentistry are accepted, but the foundation will prioritise projects that can be related to perio-odontology, implantology, or cariology. Researchers may apply for funding for a project in its entirety or for part of a project. The Board will announce the successful projects in September.

Eklund Foundation is established to support research within odontology.

Information in short

– Allocated sum: €250,000
– Application period: 1–31 May 2022
– Announcement of grants: September 2022
– Applications from any location or university are accepted
– Read more and apply at www.eklundfoundation.org

Background

The Eklund family, owners of TePe Oral Hygiene Products, created the Eklund Foundation in celebration of their long-standing relationship with the professional dental community. Since 2016, the foundation has distributed €140,000–240,000 annually, supporting odontological research worldwide. More information about the grants, published studies, and interviews with previous recipients are available on the website. The Eklund Foundation was established in 2015 to support research and education in the odontological field.

Source: TePe Oral Hygiene Products AB

Significant milestone in implant production quality management

Komet Custom Made receives the prestigious CleanImplant Certified Production Quality award

Klaus Rübesamen (right), CEO Gebr. Brasseler, and Carsten Cieslik (left), General Manager Komet Custom Made with Dr. Dirk Duddeck, Managing Director and Head of Research at the CleanImplant Foundation.

Globally recognised as a testing authority for uncompromising implant quality, the CleanImplant Foundation has awarded its seal of excellence to German contract manufacturer of ceramic implants Komet Custom Made. The CleanImplant Foundation has long been an established authority among implantologists for independent evaluations, ratings and information on the quality and cleanliness of implant surfaces. In March, the non-profit foundation granted the Certified Production Quality seal to Komet Custom Made, a division of Gebr. Brasseler, for its excellent production quality of ceramic implants. Scanning electron microscopy (SEM) analyses of more than 100 different commercially available implant systems show that this deserves recognition. "More than half of all analysed implants show significant impurities under SEM," said Dr Dirk U. Duddeck, managing director and head of research at CleanImplant. "These contaminants on new, sterile-packaged implants, which are entirely preventable on the manufacturer's side, unfortunately, have clinical consequences and harm both practitioners and patients. It is our responsibility to inform dentists accordingly and provide a stage for quality manufacturers," he added.

Quality assurance by accredited testing laboratories

After an extensive testing process, carried out in an accredited testing laboratory, the CleanImplant Foundation awards the Certified Production Quality seal to contract manufacturers producing implants for various trade labels according to regulations based on the CleanImplant consensus guideline on the cleanliness of dental implants, which has been established for many years.

"The certification by the CleanImplant Foundation for ceramic implants confirms the process reliability of the quality assurance measures in place at the company, including validated final cleaning and subsequent packaging in the cleanroom, and represents a further milestone in ensuring overall ceramic competence of Komet Custom Made," said Carsten Cieslik, general manager of Komet Custom Made.

Source: CleanImplant Foundation

European Federation of Periodontology

Prof. Andreas Stavropoulos is new president and launches campaign for Ukraine

On 26 March, the European Federation of Periodontology (EFP) was able to hold an in-person meeting for the first time since 2019. The EFP's annual general assembly took place in the Austrian capital of Vienna, where a new president, Prof. Andreas Stavropoulos, was welcomed and a campaign launched to provide financial aid for Ukraine. The "Help Ukraine" campaign is planning to assist the Ukrainian people and refugees who have fled the country by calling on the EFP's 37 affiliated national societies of periodontics to raise at least €30,000 in donations. The campaign was organised in collaboration with the World Health Organization-affiliated WHO Foundation.

Prof. Stavropoulos took over as president of the EFP from Prof. Lior Shapira. In his first message since assuming the role, Prof. Stavropoulos called for the society's members to work together despite any differences, writing, "What we have in common is much greater than what separates us."

Prof. Andreas Stavropoulos, the new president of the EFP.

The general consensus among attendees of the EFP's general assembly was that an in-person meeting was much needed after the predominantly online nature of meetings over the past two years. "I am so pleased that this year we returned to a face-to-face general assembly meeting and could greet everyone in person," said EFP Secretary General Prof. Nicola West. She continued: "While online meetings have their place in our sustainability strategy, face-to-face meetings are essential for our business to operate, creating energy, warmth and friendship, which cannot be underestimated."

Source: Dental Tribune International

Congresses, courses and symposia

IAOCI

11th IAOCI World Congress

19–22 May 2022
Washington DC, USA
https://www.iaoci.com

6th Annual Meeting of ISMI

24–25 June 2022
Berlin, Germany
ismi-meeting.com

Bioceramics 32
32nd Symposium and Annual Meeting of ISCM

20–23 September 2022
Venice, Italy
bioceramics32.org

2nd European Congress of Ceramic Implant Dentistry

20–22 October 2022
Zurich, Switzerland
www.esci-online.com

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