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CI ceramic implants

2/24

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international magazine of **ceramic implant technology**

case report
Single unit implant rehabilitation in the aesthetic area

research
Impact of periodontitis on systemic health and on implants

events
ESCI satellite symposium 2024

oemus

February 8, 2025

SOPIO & EACim MEETING

Lisbon University
Portugal

Ceramic Implant as an alternative to Titanium

•

Immediacy in Implant Dentistry

INTERNATIONALLY RENOWNED LECTURERS WITH LONG EXPERIENCE IN IMPLANTOLOGY

João Caramês / André Moreira / Helena Francisco / Paulo Carvalho / Luca Stavola
Juan Blanco / Giancarlo Bianca / Oliver Cheron / Amandine Para / Fabrice Baudot

Lectures in **English**

9h15 - 9h30 • Opening and presentation of the seminar

9h30 - 10h10 • Paulo Carvalho
10h10 - 10h50 • João Caramês
10h50 - 11h20 • Coffee Break
11h20 - 12h00 • Luca Stavola
12h00 - 12h40 • Juan Blanco
12h40 - 13h10 • Morning round table
13h10 - 14h20 • Lunch

14h20 - 15h00 • Giancarlo Bianca
15h00 - 15h40 • Oliver Cheron
15h40 - 16h00 • Coffee Break
16h00 - 16h40 • Fabrice Baudot
16h40 - 17h20 • Amandine Para
17h20 - 17h50 • Evening round table
17h50 - 18h00 • Closing

INFORMATION & REGISTRATION

eacim-ceramic-implantology.com

Timo Krause
Germany
Editorial Manager

Timo Krause

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Don Quixote—quitting is no option

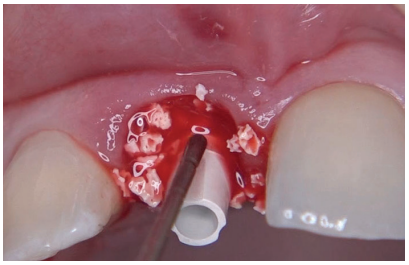
Let's begin with a brief history lesson: the earliest attempts at dental prosthetics date back to the 5th millennium BCE. Archaeological illustrations show how shell fragments were used to replace extracted teeth. Remarkably, this material came directly from nature—composed of calcium carbonate, magnesium carbonate, silicates, clay minerals, and organic components.

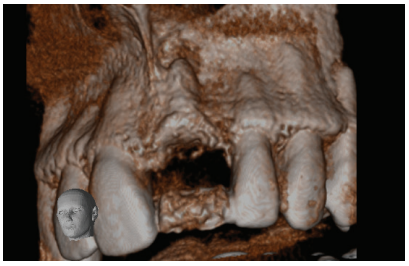
Even in ancient times, dentures made of ivory or walrus tusks were common. These "teeth" were secured with gold bands and threads around neighbouring teeth.

Then, in 1806, Giuseppangelo Fonzi may have invented the first artificial ceramic tooth, designed to meet both functional and aesthetic standards. This innovation was a milestone, paving the way for further development in dental solutions.

Starting in the 1960s, the focused development of dental implants began. Early attempts were made with aluminium oxide to create a system that could be mass-

CONTENT





▼

produced. Although there were setbacks, the idea of a metal-free alternative to popular titanium implants stuck with many pioneers. In the 1990s, they developed new solutions using zirconia, a type of ceramic that was stronger and more resilient than aluminium oxide. The benefits of this new material were quickly recognised in the dental field.

Where are we today? Zirconia implants have now shed their niche status and established themselves in modern dentistry. From a small group of enthusiasts, a global network of experts has emerged. They regularly exchange ideas, bringing fresh perspectives to the industry, which in turn continuously refines these materials.

And where will this lead? We don't know for sure. But we do know that ceramic implantology remains a niche for many and is sometimes underestimated due to the material's specific properties. However, zirconia implants, as stated by numerous studies and committees, now offer a competitive alternative to metal. Although ceramic implantology is sometimes viewed with skepticism, many advanced concepts have developed around the implanting process itself, contributing significantly to successful treatments.

Ceramic implantology is neither magic nor a game; it is serious business, and those specialising in this field deserve to be taken seriously. With *ceramic implants*, we aim to provide all ceramic implantology specialists with a platform and a voice.

So, let's not give up—let's break down the barriers standing in our way together and let us continue to fight against the windmills of scepsis, harsh critic and laughter. Don Quixote 2.0.

Sincerely

Timo Krause

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CONTENT

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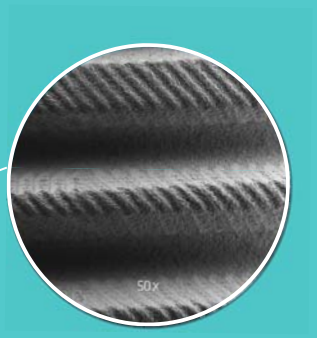

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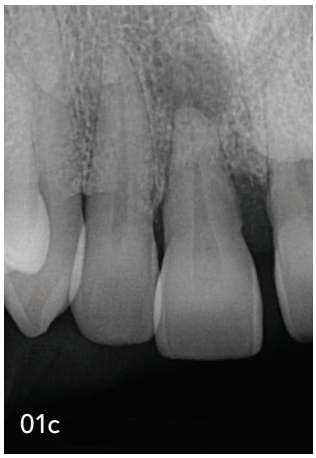
Single unit implant rehabilitation in the aesthetic area

Zi Ceramic Implant System in use with immediate loading associated with Socket Shield technique

Dr Geninho Thomé, Carolina Accorsi Cartelli, Dr Sérgio Rocha Bernardes, Dr Jean Uhlendorf, Brazil



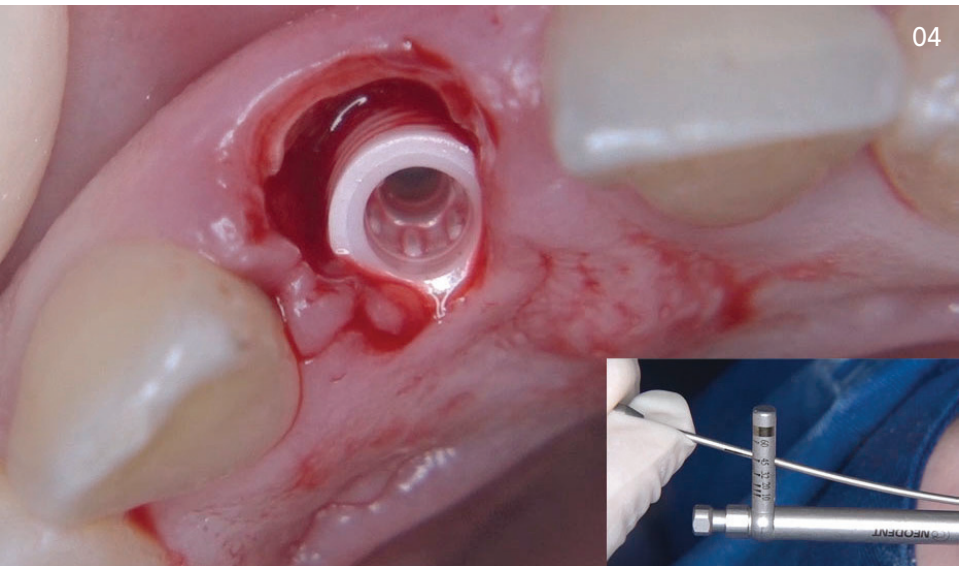
01a–c
Patient's initial situation: patient's smile, occlusal view and periapical X-ray (tooth 11).

"The Socket Shield prevents bone loss and gingival recession while enhancing implant stability and producing a more natural-looking outcome."

Introduction

To restore teeth to their natural appearance and function, aesthetic rehabilitation in dentistry requires accuracy. The selection of methods and materials is essential. Due to their exceptional biocompatibility and attractive features, two-piece injection-molded zirconia implants have gained enormous attention.[1,2]

High biocompatibility of zirconia implants lowers the risk of rejection and inflammation, among other benefits.[3] Compared to standard titanium implants, their white hue closely matches natural teeth, offering greater aesthetics.[4] The injection molding technology in their production ensures perfect adaptation and long-term durability due to its high accuracy and strength.[5] Because of these qualities, zirconia implants combine practical and aesthetic advantages, making them a promising alternative for dental restorations.[6]



02–04
Steps of the surgery: occlusal view after dental section and maintenance of the buccal fragment. Evidence of thread formation in the dental socket. Neodent® Zi 4.3 x 13 mm implant installed (45 Ncm).

The Socket Shield method preserves a portion of the native tooth root after implant insertion, the alveolar bone and surrounding soft tissues are kept intact. This prevents bone loss and gingival recession while enhancing implant stability and producing a more natural-looking outcome.[7] Inject-molded zirconia implants combined with the Socket Shield method are a significant break-through in cosmetic dentistry that provides excellent aesthetic and functional outcomes.[7,8]

In addition to their visibility and aesthetic requirements, dental operations in the maxillary aesthetic areas can be extremely difficult. To guarantee immediate loading, long-term functionality, and harmonious soft tissue aesthetics, these procedures require meticulous and customised planning.[9]
Considering the functional and aesthetic requirements of the clinical case, this study uses a two-piece ceramic implant with the Socket Shield technique to treat the right central incisor region.

General aspects and health conditions

Female, 37 years old, with aesthetic complaints due to the presence of diastema between the upper central incisors with a progressive increase in the space between the teeth over time. (Figs. 1a & b). After the clinical evaluation and periodontal probing, periodontal involvement of the right incisor was ob-

“Ceramic implants have been indicated more frequently over the years, especially in cases of rehabilitation in anterior regions (upper jaw) in patients who have high aesthetic expectations.”

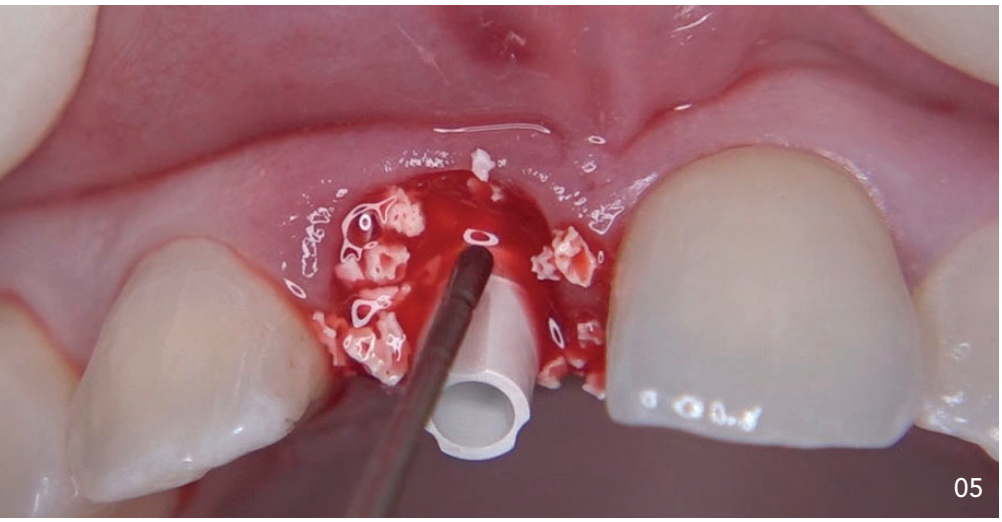
served: deep probing (more than 6 mm in 03 sites) and grade I mobility. After carrying out imaging exams: panoramic, periapical radiographs and CBCT, crestal bone resorption and periapical lesion were observed (Fig. 1c). Considering this diagnostic, the installation of a ceramic implant in the region of tooth 11 was proposed for the patient, using the Socket Shield technique followed by upper lip frenectomy and immediate loading.

Surgical technique

Initially, an anaesthetic infiltration block was performed in the anterior portion of the right superior alveolar nerve and complemented by palatal with subperiosteal infiltration. To preserve the buccal bone wall and maintain the thickness of connective tissue on the same face, it was decided to perform the Socket Shield surgical technique, preserving the buccal fragment of the root (infraosseous). Started with a dental section (Zeckria drill), removation of the palatal portion of the root and curettage of the periapical lesion, followed by grinding and finishing (conical diamond drill with rounded end) of the buccal root fragment (Fig. 2). Then the drilling protocol was made according to the manufacturer’s instructions: Spear drill, conical drill Ø 2.0, Ø 3.5, Ø 4.3 and drill for threading (tapping) with Ø 4.3 respectively (Fig. 3). The Neodent® Zi 4.3 x 13 mm implant was installed in the region reaching 45 Ncm of torque, allowing immediate load. The space (gap) between the implant surface and the root portion was filled with particulate bone (Cerabone Straumann®; Fig. 4).

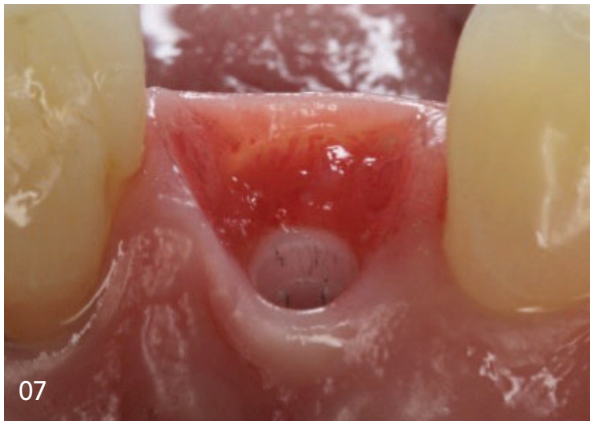
Prosthetic rehabilitation

After implant installation, the narrow PEEK CR abutment (4.0 x 1.5 mm) was selected (Fig. 5). A temporary cylinder was installed to capture the acrylic resin crown, using resin cement, for subsequent installation of the screw-retained crown (torque of 32 Ncm,

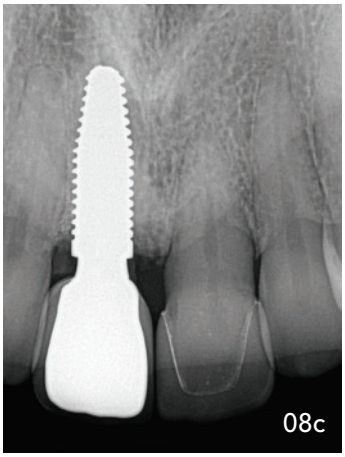


05 + 06
Surgical step: CR abutment installed and insertion of the bone graft (Cerabone Straumann) into the gap. Patient’s smile after implant installation and immediate temporary prosthesis.

07
Follow-up (five months) showing the healthy appearance of gingival tissue after removing the prothesis for the scanning of the final crown.



08a–c
Follow-up (two years of the installation of the implant): buccal and occlusal views, and X-ray.



“Two-piece zirconia implants also avoid wound healing problems and undesirable loading during the healing period, which are disadvantages of one-piece zirconia implants.”

Fig. 6). In the fifth month of postoperative follow-up, the provisional prosthesis was unscrewed (Fig. 7), and the scanning was done to create the definitive prosthesis. The scan body was installed, and through intra-oral scanning, the definitive prosthesis was manufactured (Zirconia). Thus, using the printed model, the crown was cemented onto the ZiBase (3.75 x 4.0 x 1.5) with resin cement and then installed with 32 Ncm of torque.

Discussion and final considerations

Ceramic implants have been indicated more frequently over the years, especially in cases of rehabilitation in anterior regions (upper jaw) in patients who have high aesthetic expectations. Clinical performance of two-piece zirconia dental implants after five and up to 12 years.[10] The literature about ceramic implants shows satisfactory results about the biological, mechanical, and aesthetic properties.[1,2,11]

In this case, it was decided to use the surgical technique called Socket Shield and the use of a Zi System implant (Neodent) to achieve a completely satisfactory result. Maintenance of the buccal root fragment provides anatomical preservation of periodontal structures and prevents long-term recession of the bone

and gingival tissue. During the drilling (sequence of drills) and the installation of the implant, it is necessary to take much care to avoid an excess of pressure at the remaining tooth and consequent displacement of them.[11]

Most of the clinical investigations describe the use of one-piece zirconia implants instead of the employ of two-piece zirconia implants to treat partial or total edentulous patients.[12] In this case report, the use of two-piece zirconia implants presents several advantages, including the increase of prosthetic versatility due to the variability of abutments options. Two-piece zirconia implants also avoid wound healing problems and undesirable loading during the healing period, which are disadvantages of one-piece zirconia implants.[13]

This case shows survival and success during two years of follow-up. Four systematic literature reviews[14–17] cited a few clinical cases about the use and survival of two-piece zirconia implants. Haro Andanez et al.[14] and Hashim et al.[18] described the clinical studies performed by Cionca et al. and Payer et al., which were previously described. Haro Andanez et al. also described the clinical studies from Becker et al.[19] and Brüll et al.[20] and performed a meta-analysis. Considering only the two-piece zirconia implants the implant survival rate was 94% between one and three years of follow-up.

"Periodic clinical and radiographic monitoring is essential for the control of peri-implant tissues and the success of the rehabilitation."

Periodic clinical and radiographic monitoring is essential for the control of peri-implant tissues and the success of the rehabilitation. The present case has 24 months of follow-up with great results. It was possible to observe clinical (Figs. 8a & b) and radiographic (Fig. 8c) images of the implant and prosthesis about the following factors: complete osseointegration, maintenance of the marginal bone level (no signs of peri-implantitis), excellent aesthetics and soft-tissue function, reflecting the success of this treatment. Further research is required to evaluate the long-term outcomes.

Geninho Thomé

Dr Thomé holds a degree in Dentistry from the Federal University of Santa Catarina, a specialisation in Periodontics and Implantology, and a Master's and Doctorate in Implantology. Dr Thomé is currently the Scientific President of Neodent, Chairman of the Board of Directors of Neodent, and General Director of ILAPEO College.

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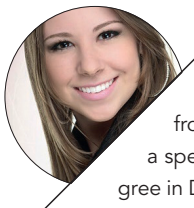

Carolina Accorsi Cartelli

Carolina Cartelli is currently technical specialist at Neodent. She graduated in Dentistry from the Federal University of Paraná (2012) and is a specialist in Implantology. She holds a master's degree in Dentistry with an area of concentration in Implantology from the Latin American Institute of Dental Research and Education.

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Sérgio Rocha Bernardes

Dr Bernardes holds a degree in Dentistry from the Federal University of Rio de Janeiro (1995–1999), a specialisation in dental prosthetics from APCD/Bauru (2000–2002), a specialisation in Implantology recognised by the CFO (2007), a master's degree in Dentistry (Oral Rehabilitation) from the Federal University of Uberlândia (2003–2005) and a PhD in Dentistry (Oral Rehabilitation) from the School of Dentistry of Ribeirão Preto, University of São Paulo, with research in collaboration with the Eastman Dental Institute, London (2005–2008). Dr Bernardes holds a postgraduate degree and an MBA in Business Management from the Getulio Vargas Foundation (2009–2011). Dr Bernardes is certified by the Portuguese Dental Association for passing the equivalence exam (2007). He is a member of the review board of the *International Journal of Oral and Maxillofacial Implants* and Editor-in-Chief of *Prosthesis Laboratory in Science*. He is currently a professor at the Latin American Institute of Dental Research and Education (ILAPEO) and Head of Global Research & Education at Neodent.

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Literature

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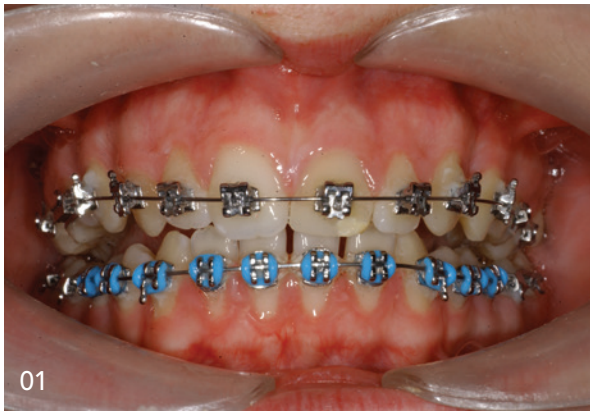
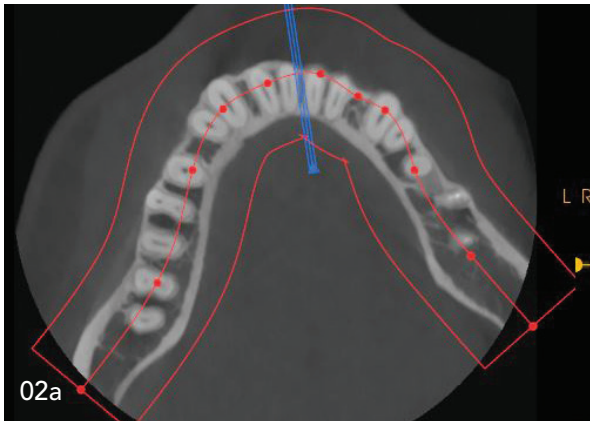
Single-tooth restoration in the anterior maxilla

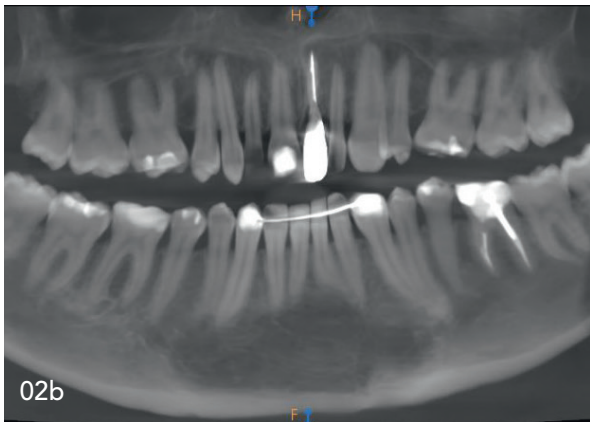
Dr João Pedro Almeida & António Korrodi Ritto, Portugal

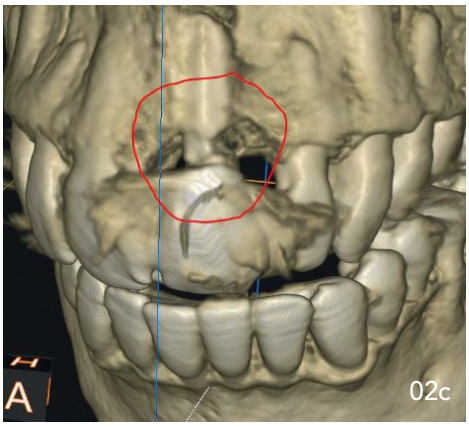


01
Clinical situation at the start of orthodontic treatment in 2011.

02a–d
CBCT images showing marginal bone loss around tooth #21.







Introduction

Replacing an unsalvageable tooth in the anterior maxilla with a dental implant poses certain challenges clinicians must navigate. Due to the high visibility of this area, using an implant system that can facilitate optimum aesthetics by predictably preserving the hard and soft tissue is crucial. In the clinical case described below, an implant system was used to restore a central incisor that has been proven in independent long-term studies to precisely achieve that.[1, 2]

This two-piece tissue-level implant has a parallel-walled design with a shallow thread and is inserted using moderate torques not exceeding 30 Ncm to avoid compression of the surrounding tissue and thus to allow fast and predictable healing, which is a prerequisite for long-term stability and vitality of bone levels and overall tissue health.

The implant treatment described in this case required a multidisciplinary approach and coordination with the orthodontist, as orthodontic treatment had not been completed at the time of implant placement, as the patient was still wearing retainers.

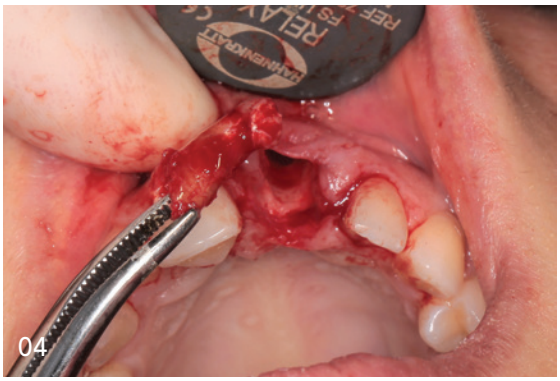
Initial situation

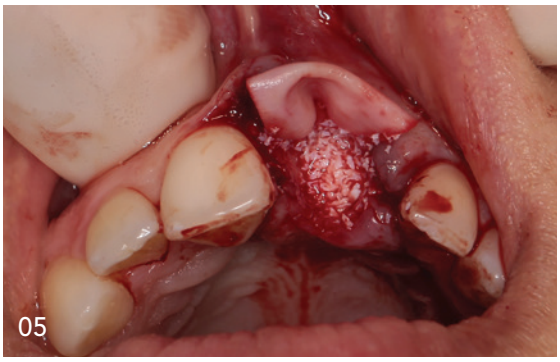
The female patient, aged 30, was referred by her orthodontist owing to the fractured root of tooth #21. She had started orthodontic treatment in 2011 (Fig. 1). After discoloration of the tooth developed, a CBCT scan was taken (in 2021), and it showed marginal bone resorption and bone loss around the root of the endodontically treated tooth #21 (Figs. 2a–d).

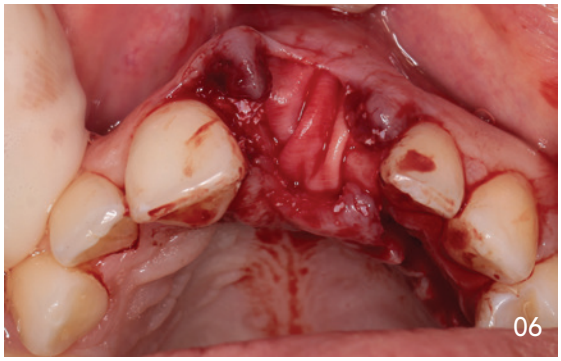
03
Removal of the crown and failing post-and-core restoration.

04
Extraction of the remaining root.

05
Extraction socket filled with particulate xenograft material.



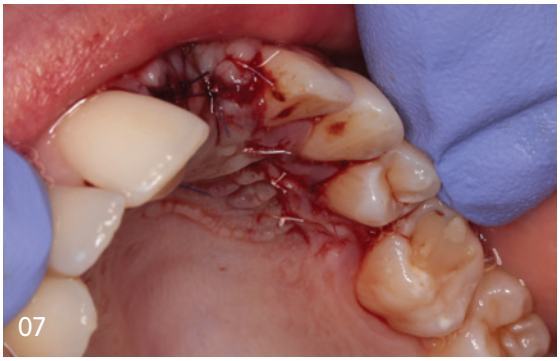




06
Grafted site covered with the collagen membrane.

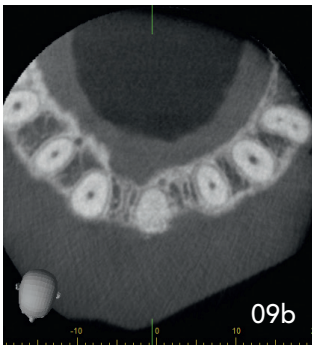
07
Sutured site.

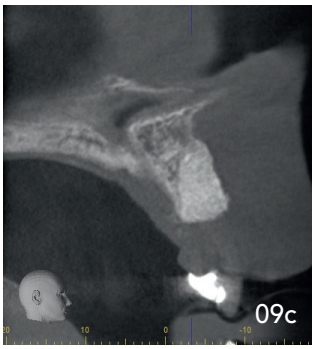
08
Clinical situation after placement of the provisional restoration.



"A minimally invasive implant placement with a moderate insertion torque of a maximum of 30 Ncm is imperative to ensure minimal bone compression to retain the vitality of the bone after implant insertion, allowing healing to progress undisturbed."


09a


09b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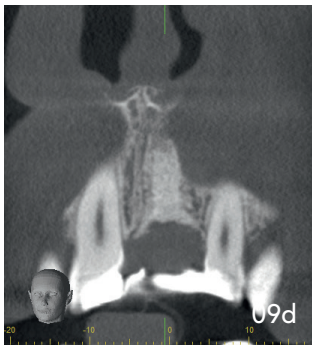
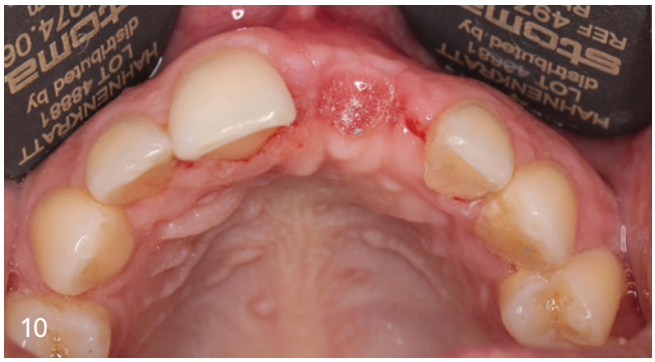

09d


10

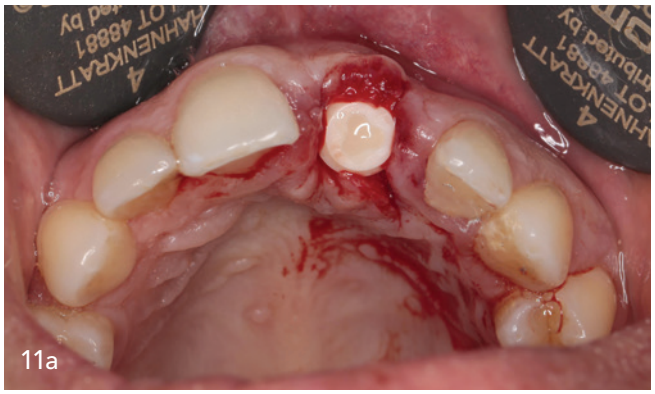
Treatment planning

The treatment would involve extraction of the failing tooth and augmentation of the surrounding hard and soft tissue. This would be followed by placement of a two-piece dental implant in this position after healing.

Surgical procedure

The crown and failing post-and-core restoration were removed (Fig. 3), and the remaining root was extracted (Fig. 4). The extraction socket was then carefully curetted to remove any fibrous tissue and filled with particulate xenograft material (Bio-Oss, Geistlich; Fig. 5). The site was covered with a collagen membrane (Bio-Gide, Geistlich; Fig. 6), and a full-thickness palatal pedicle graft was rotated and positioned to assure closure and augmented soft-tissue volume. The site was then sutured (Fig. 7), and a provisional restoration (Maryland bridge) was bonded to the adjacent teeth (Fig. 8).

After a healing period of 6.5 months (Fig. 9), the provisional restoration was removed (Fig. 10). The osteotomy was prepared according to the surgical protocol of the implant manufacturer and a two-piece dental implant (Patent™ Dental Implant System, Zircon Medical Management; 4.5 mm in diameter and 11.0 mm in length) was placed equigingival to an insertion torque of 30 Ncm. The soft tissue was adapted around the implant on the labial aspect as part of a minimally invasive grafting procedure to increase the gingival volume (Figs. 11a & b). The connection of the implant was sealed with a PTFE strip and flowable composite, and a new provisional restoration (Maryland bridge) was bonded to the adjacent teeth, covering but not touching the implant (Fig. 12).


11a


11b

09a–d
CBCT images after 6.5 months of healing.

10
Clinical situation after removal of the provisional restoration.

11a + b
Clinical situation after implant placement and minimally invasive grafting to increase the gingival volume.

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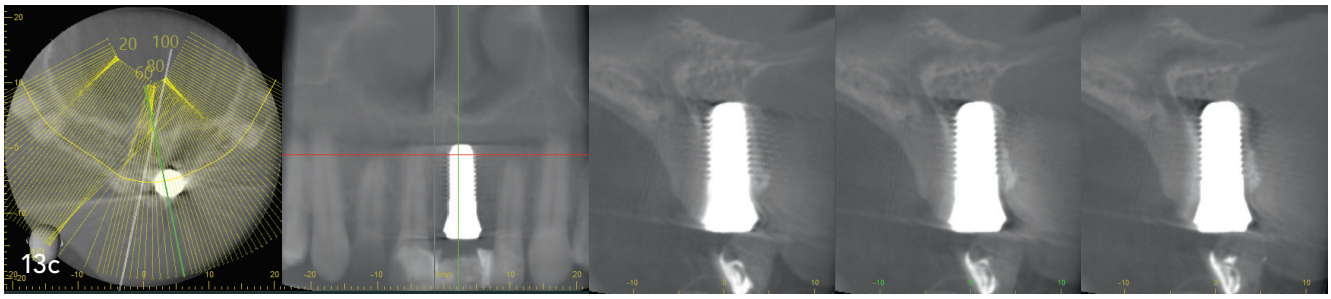
12
Clinical situation after placement of the new provisional restoration.

13a–c
Clinical situation and CBCT images after a further healing period of four months.



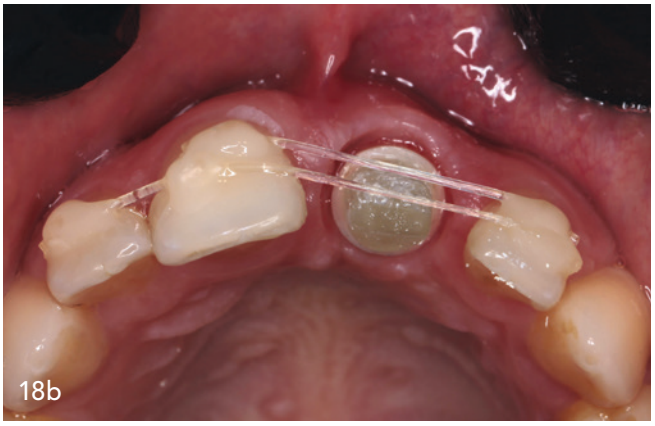
14
Removal of excess gingiva.

15
Cementation of the glass fiber post.

16
Clinical situation after intra-oral preparation of the glass fiber post.

17
Clinical situation after placement of another provisional restoration.

18a + b
Clinical situation one month later, after orthodontic space closure.



19
Fabrication of the final crown.

Prosthetic restoration

After a further healing period of four months, the patient returned for prosthetic restoration, showing a successfully osseointegrated implant with healthy soft tissue and a stable marginal bone level (Figs. 13a–c). Excess gingiva was removed with an electrosurgical device to expose the margin of the implant (Fig. 14). The glass fibre post of the two-piece implant system used was then cemented into the implant's prosthetic connection using a dual-polymerising dental cement (ACTIVA BioACTIVE-CEMENT, Pulpdent; Fig. 15) and prepared using a diamond bur at high speed under water irrigation (Fig. 16). The prepared post received a provisional crown (Fig. 17), and the patient was sent to the referring orthodontist for space closure before the placement of the final crown.

One month later, the spaces on either side of tooth #21 had been closed (Figs. 18a & b), and a final digital impression was taken. The Matisse-protocol was used to match the shade and achieve the proper colour. The scan files were transferred to the dental laboratory (Dentalook), where the final crown was fabricated (Fig. 19). The patient then received a second provisional crown (Fig. 20). Three months later, the patient received the final crown. The result, two weeks after placement of the final restoration, was deemed highly satisfactory (Fig. 21). At a follow-up eight months later, the soft tissue had matured and was deemed healthy and stable (Figs. 22a & b).

Discussion

The challenges of this clinical case included the lack of marginal bone crest because of external root resorption and the absence of an alveolar buccal wall, necessitating augmentation. Also, since the procedure involved restoring the aesthetic zone, a highly visible area, a dental implant was needed capable of maintaining vital and stable hard and soft tissue. The Patent™ system has been demonstrated to have this capability in long-term studies.[1, 2] These studies have reported healthy soft tissue, an aesthetic increase in keratinised gingiva as well as minimal marginal bone losses after nine years of function, and no peri-implantitis even up to 12 years of function. These results reflect the treatment outcome of the case discussed here, where the

20
Clinical situation after placement of another provisional restoration.

21
Satisfactory result two weeks after placement of the final crown.

22a + b
Healthy and stable soft tissue eight months later.

patient presented with stable bone levels around her new implant at the follow-up over 17 months after implant placement, as well as healthy soft tissue (Figs. 22a & b).

A minimally invasive implant placement with a moderate insertion torque of a maximum of 30 Ncm is imperative to ensure minimal bone compression to retain the vitality of the bone after implant insertion, allowing healing to progress undisturbed. This is crucial to maintaining long-term stability of the surrounding tissue. We have found adopting such a low torque strategy together with an atraumatic insertion protocol with this implant system to minimise marginal bone loss and to maintain overall tissue stability in daily practice.

Conclusion

The implant system used in this clinical case represents a viable option for replacing teeth in the aesthetic zone. Owing to the implant's ability to maintain vital and stable hard and soft tissue and to foster strong soft-tissue adhesion, highly satisfactory aesthetic results are to be expected over the long term, and the risk of bacteria-induced chronic tissue inflammation like peri-implantitis is minimised.[1, 2] The healing of the soft tissue in this case progressed rapidly with almost no inflammation.

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Literature

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Impact of periodontitis on systemic health and on implants

Prof. Curd Bollen & Prof. Paul Tipton, UK, Dr Mishel Kocharyan & Prof. Gagik Hakobyan, Armenia

Introduction

Mouth and health go hand in hand. After all, the mouth is the entrance gate to our body. Food enters through there and our teeth are the instruments to chew this food so that the food components we need can also be effectively released. There is a need for a healthy mouth, to keep a healthy body!

After all, infections in the mouth have an enormous impact on the rest of our general health. Biting and chewing can continuously force oral bacteria into our bloodstream, where they move through the body, and can cause damage in several organs (e.g. kidneys, heart, lungs and brain).

Thousands of scientific articles have already been published about this topic: on 1 August 2024, there were 3,966 hits combining both topics on PubMed! However, this phenomenon is still insufficiently known to the public and even to many dentists and physicians.[1]

Meanwhile, periodontitis, the severe gum infection that damages the soft tissue and destroys the tissues that support the teeth, has been linked to several systemic diseases. This connection is largely due to the inflammatory nature of periodontitis which is accompanied by large quantities of highly pathogenic bacteria (eg. *Porphyromonas gingivalis*, *Prevotella intermedia* and *Fusobacterium nucleatum*). These pathogens have far-reaching effects beyond the oral cavity because they strongly trigger the immune response.[2]

The local consequence is limited to tissue destruction: the inflammatory response leads to the destruction of gum tissue, periodontal ligament and alveolar bone.[3]

The systemic impact of these focal infections is however often neglected although the scientific literature is very clear: periodontitis undeniably causes or worsens several systemic health problems.[4]

This first article in a series of two, will focus on six key points about the relationship between periodontitis and systemic diseases. The second article will come up with six more associations between periodontal disease and systemic diseases.

1. Cardiovascular disease

Cardiovascular disease (CVD) encompasses a range of heart and blood vessel disorders, including coronary artery disease, hypertension, and stroke.

Periodontitis and cardiovascular disease are interconnected through various mechanisms, involving systemic inflammation, endothelial dysfunction, and shared risk factors.

The inflammation caused by periodontitis can contribute to the buildup of plaques in arteries (atherosclerosis), leading to heart attacks and other cardiovascular events. Moreover, periodontitis increases the risk of a heart attack by two times.[5] The risk of a stroke or TIA is even three times higher when periodontitis is present.[6] Existing heart problems are also aggravated by the presence of oral infections.

The four main connections between periodontitis and cardiovascular disease are:

1. **Systemic inflammation:** periodontitis can cause an increase in systemic inflammatory markers like C-reactive protein (CRP), which is also linked to atherosclerosis.
2. **Endothelial dysfunction:** bacteria and inflammatory mediators from periodontal disease can enter the bloodstream, leading to endothelial dysfunction, a precursor to atherosclerosis.
3. **Bacterial translocation:** oral bacteria from periodontitis can enter the bloodstream, contributing directly to the formation of arterial plaques.
4. **Immune response:** the immune response to periodontal infection can exacerbate inflammatory processes in the arteries—chronic inflammation is a key factor in the development of atherosclerosis.

Cardiovascular disease and periodontitis have several major shared risk factors: smoking, diabetes, age, genetics and diet.[7]

The obvious link between the two diseases invites patients and practitioners to some clinical implications:

1. **Early screening:** regular dental check-ups and periodontal assessments help identify individuals at risk for CVD.
2. **Structured preventive care:** good oral hygiene and periodontal therapy reduces systemic inflammation, lowering the risk of CVD.

3. **Promoting integrated care:** serious collaboration between dental and medical professionals improves overall patient health outcomes.

2. Diabetes

Diabetes is a chronic metabolic disorder characterised by high blood glucose levels due to either insufficient insulin production (Type 1 diabetes) or insulin resistance (Type 2 diabetes).

There is a bidirectional relationship between periodontitis and diabetes. Not only are people with diabetes more susceptible to periodontitis, but periodontitis can also make it more difficult to control blood sugar levels, thereby exacerbating diabetes.[8] More than 90% of periodontitis patients are at risk of diabetes. In this bidirectional relationship, both conditions can influence the onset and progression of the other.

Impact of diabetes on periodontitis:

1. **Impaired immune response:** hyperglycemia can impair the immune system, making it harder to fight off bacterial infections in the gums.
2. **Increased inflammation:** high blood sugar levels increase the inflammatory response, exacerbating gum disease.
3. **Poor healing:** diabetes can slow down the healing process of gum tissue, worsening periodontitis.[9]

Impact of periodontitis on diabetes:

1. **Increased blood sugar levels:** chronic inflammation from periodontitis can increase insulin resistance, making blood sugar control more difficult.
2. **Systemic inflammation:** periodontitis can elevate systemic inflammatory markers, which can negatively affect blood sugar regulation.
3. **Complications management:** poor oral health can complicate the management of diabetes, leading to a vicious cycle of worsening health.

In these processes there are three mechanisms of interaction. Both conditions increase the production of inflammatory cytokines such as TNF-α and IL-6, which contribute to insulin resistance and tissue destruction. Furthermore, advanced glycation end-products (AGEs) which are elevated in diabetes, can accumulate in periodontal tissues, promoting inflammation and tissue damage there.[10] Finally, increased oxidative stress in both diabetes and periodontitis can lead to further tissue damage and complications.

Due to this two-way relationship, similar clinical recommendations can be highlighted as for CVD:

1. **Screening and monitoring:** for diabetics patients regular dental check-ups are crucial to detect and manage periodontitis early. Whereas for periodontitis patients' blood glucose monitoring can help identify undiagnosed diabetes or prediabetes.
2. **Integrated care:** dentists and other healthcare providers should work together to manage both conditions. Furthermore, educating patients on the importance of oral hygiene and diabetes control is vital for overall health.
3. **Preventive and therapeutic strategies:** regular brushing, flossing, and professional cleanings can help prevent periodontitis. Maintaining optimal blood sugar levels through diet, exercise, and medication can reduce the risk of periodontal disease. Medications and therapies to reduce inflammation can benefit both conditions.

3. Respiratory diseases

Respiratory diseases include a range of conditions affecting the lungs and airways, such as chronic obstructive pulmonary disease (COPD), pneumonia, and asthma. Chronic periodontitis has been linked to an increased risk of

these respiratory conditions. The latter is thought to occur due to the aspiration of bacteria from the mouth into the lungs. A similar link has also been demonstrated with the severity of COVID-19 infections.[11]

The relationship between respiratory disease and periodontitis involves shared mechanisms such as inflammation and bacterial infection.

The interconnection between both pathologies is based on:

1. **Bacterial aspiration:** bacteria from the oral cavity can be aspirated into the lower respiratory tract, leading to infections such as pneumonia. This is particularly a risk in elderly patients and those with weakened immune systems.[12]
2. **Systemic inflammation:** periodontitis can increase systemic inflammatory markers (e.g. IL-6, TNF-α) into the bloodstream, which can exacerbate chronic inflammatory conditions like COPD and asthma.[13]
3. **Immune response:** the immune response to periodontal infection can weaken the body's ability to fight off respiratory pathogens.
4. **Oral hygiene:** poor oral hygiene associated with periodontitis can increase the risk of respiratory infections due to higher levels of pathogenic bacteria in the mouth.

The same clinical recommendations as for periodontitis–diabetes/CVD are also applicable here: good oral hygiene, regular dental check-ups, interprofessional dental–medical collaboration and early screening.

The therapy consists of anti-inflammatory treatments (managing periodontal inflammation reduces systemic inflammation and potentially improve respiratory health) and eventual antibiotic therapy (when the bacterial infection is significant, targeted antibiotics may be necessary).

4. Pregnancy

Pregnancy is of course not a disease, but it involves significant physiological changes that can influence oral health. Pregnant women with periodontitis are at a higher risk of adverse pregnancy outcomes because inflammatory mediators from periodontitis may affect the fetal environment.

There are three main types of impact from periodontitis on pregnancy:

1. **Preterm birth:** periodontitis has been linked to an increased risk of preterm birth (delivery before 37 weeks). The inflammatory mediators produced in response to periodontal infection can enter the bloodstream and potentially trigger premature labor.[14]
2. **Low birth weight:** inflammatory cytokines and bacterial endotoxins from periodontitis can affect the placental function, potentially leading to low-birth-weight babies.[15]
3. **Preeclampsia:** periodontitis has been associated with an increased risk of preeclampsia, a pregnancy complication characterised by high blood pressure and damage to other organs, often the kidneys.

Furthermore, there are also three sorts of impact from pregnancy on periodontitis:

1. **Pregnancy gingivitis:** increased hormone levels can cause gums to become more sensitive and prone to inflammation, known as pregnancy gingivitis. If left untreated, it can progress to periodontitis.[16]
2. **Exacerbation of existing periodontitis:** hormonal changes during pregnancy can exacerbate existing periodontal disease due to increased blood flow to the gums and an altered immune response.[17]
3. **Altered oral hygiene:** morning sickness and changes in diet can lead to increased plaque accumulation, affecting periodontal health.[18]

The key aspects of these interactions include:

1. **Hormonal changes:** elevated levels of estrogen and progesterone. These hormones can enhance the inflammatory response in gum tissues.
2. **Immune system alterations:** modulated immune response to accommodate fetal development. These changes in the immune system can alter the host response to periodontal pathogens.
3. **Inflammatory mediators increase:** cytokines and prostaglandins produced during periodontal inflammation can affect pregnancy outcomes.
4. **Increased blood volume:** enhances tissue sensitivity and bleeding.

The clinical advice consists of: pre-conception care, regular dental visits, oral hygiene education, professional cleaning, good oral hygiene practices, nutritional guidance and management of morning sickness.

5. Rheumatoid arthritis

RA is an autoimmune disorder characterised by chronic inflammation of the joints, leading to pain, swelling, and eventual joint destruction. There is evidence suggesting a link between periodontitis and rheumatoid arthritis. Both share several pathogenic mechanisms and risk factors. The more severe the periodontitis, the more severe the rheumatism. Specific oral bacteria are responsible for this.

Emerging evidence suggests a bidirectional relationship between these diseases.

There are four shared mechanisms between rheumatoid arthritis and periodontitis:

1. **Chronic inflammation:** both conditions involve chronic inflammation driven by an overactive immune response.
2. **Cytokine production:** elevated levels of pro-inflammatory cytokines like TNF-α, IL-1, and IL-6 are common in both RA and periodontitis.
3. **Genetic predisposition:** certain genetic factors, such as shared susceptibility loci, may predispose individuals to both conditions.
4. **Autoimmunity:** the presence of autoantibodies like rheumatoid factor (RF) and anti-citrullinated protein antibodies (ACPAs) is common in RA and may be found in periodontitis patients.

The impact of periodontitis on RA deals not only with increased inflammation (periodontal infection can exacerbate systemic in-

flammation, potentially worsening RA symptoms), but also with bacterial translocation (oral bacteria, particularly *P. gingivalis*, can enter the bloodstream and contribute to RA pathogenesis through molecular mimicry and citrullination of proteins).[19]

Meanwhile, the impact of RA on periodontitis bears with an altered immune response (the dysregulated immune response in RA can impair the body's ability to control periodontal infections) and the effects of medication (immunosuppressive medications used to treat RA can affect oral health, either by increasing susceptibility to infections or causing dry mouth, which can exacerbate periodontitis).[20]

Clinical implications comprise again: screening and diagnosis (regular periodontal assessments for RA patients—individuals with severe periodontitis should be evaluated for signs and symptoms of RA), integrated care (rheumatologists and dentists should collaborate) and preventive and therapeutic strategies (oral hygiene, professional dental care and anti-inflammatory treatments).

6. Chronic kidney disease

CKD is a progressive loss of kidney function over time, which can eventually lead to kidney failure. It is often associated with other comorbidities, such as cardiovascular disease and diabetes. Periodontitis has been associated with an increased risk of chronic kidney disease. Inflammatory processes and bacterial infections common to both conditions might play a role in this connection.

The combination of periodontitis and kidney disease leads to increased mortality due to the increase in the total inflammatory burden.

Chronic kidney disease (CKD) and periodontitis are interconnected through shared risk factors, inflammatory mechanisms, and potential bidirectional influences.

The shared mechanisms between these two diseases are based on:

1. **Chronic inflammation:** both CKD and periodontitis involve chronic inflammatory responses. Periodontitis can contribute to systemic inflammation, exacerbating CKD.
2. **Immune dysregulation:** CKD can impair the immune system, making individuals more susceptible to infections, including periodontal disease.
3. **Common risk factors:** conditions like diabetes and cardiovascular disease are risk factors for both CKD and periodontitis.

Periodontitis has a three-way influence on CKD:

1. **Systemic inflammation:** periodontal infection can increase systemic inflammatory markers such as C-reactive protein (CRP), which can worsen kidney function.
2. **Bacterial translocation:** oral bacteria and their by-products can enter the bloodstream, potentially affecting the kidneys and contributing to the progression of CKD.
3. **Endothelial dysfunction:** chronic inflammation from periodontitis can lead to endothelial dysfunction, a factor in the progression of CKD.[21]

In the other direction, CKD has a trilateral impact on periodontitis:

1. **Reduced immune function:** CKD impairs the immune response, increasing susceptibility to periodontal infections.
2. **Altered oral environment:** CKD and its treatments can alter the oral environment, making it more conducive to periodontal disease. For instance, reduced salivary flow can lead to increased plaque accumulation.
3. **Medication side effects:** medications for CKD, such as immunosuppressants and antihypertensives, can affect oral health and increase the risk of periodontal disease.[22]

The clinical implications are similar as for the other systemic conditions: screening and diagnosis, integrated care and preventive and therapeutic strategies.

Summary

The effect of periodontitis is not limited to the oral cavity. Periodontitis is not only causing tooth loss, but it has also a far-reaching impact on general health. Periodontopathogens and their toxins are causing harm to different organs and systems in our body.

Therefore, dentists and all other medical practitioners are not only responsible for their specific field of training/interest, but they are all co-responsible for the overall health of their patients.

It is of utmost importance to not only make patients aware of the dental–general health connection, but also to sensitise all medical professionals for this link. Therefore, a holistic medical/dental approach is highly advised.

Literature

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Peri-implantitis prevention starts with the choice of a clean implant

Two years ago, in *implants 4/2022*, we raised an important question: how clean must sterile-packaged implants be to meet the high expectations of dental professionals who entrust these medical devices to their patients? At that time, extensive quality assessments conducted by the CleanImplant Foundation revealed troubling impurities on the surfaces of new, sterile-packaged implants, identified through independent laboratory testing. It was reasonable to expect that the manufacturers involved would address these issues promptly and ensure that their medical devices meet the highest standards of cleanliness. Regrettably, even after two years, we cannot give the "all-clear". Here's an update to where things stand now.

Drs Dirk U. Duddeck and Dana Adyani-Fard, Germany

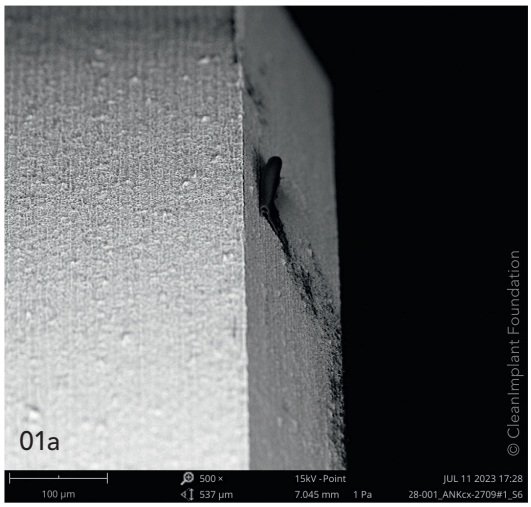
For decades, dental implants have been the gold standard for replacing missing teeth, whether it's a single tooth or an entire dental arch. However, alongside this success, experts have noted a rise in cases of peri-implantitis and the associated peri-implant bone loss.

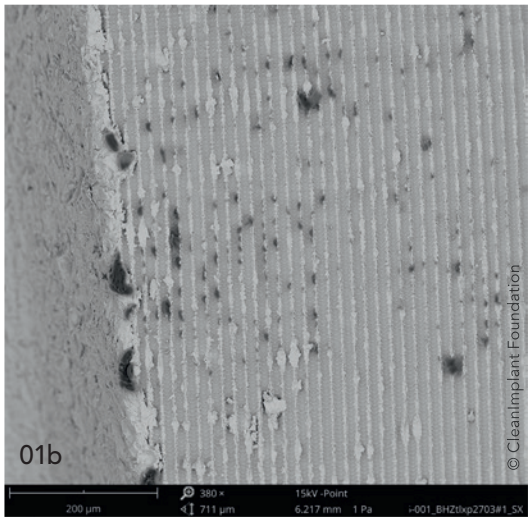
Peri-implantitis is a pathological condition affecting the bone surrounding dental implants, characterised by inflammation of the adjacent soft and hard tissues, leading to progressive bone loss.[1,2] If not diagnosed and treated promptly, this condition can result in the loss of the implant. Unfortunately, the clinical and histological factors that contribute to the progression from peri-implant mucositis to peri-implantitis are still not completely understood.[3] Clinically, sites affected by peri-implantitis often exhibit more extensive inflammatory lesions compared to periodontal sites around natural teeth.

Sterile yet contaminated implants

A vastly underestimated risk factor that needs to be better understood has recently gained attention: the manufacturing and packaging processes of dental implants. These largely overlooked factors can significantly impact the short- and long-term success of implants placed intraorally. The cleanliness of the implant surface is crucial, particularly because it directly affects the surrounding bone during placement and the early phases of osseointegration.[4]

It is imperative that every stage of the manufacturing process is meticulously controlled to ensure that the final





01a + b SEM 500x (a) and SEM 380x (b). Significant impurities located at the shoulders of two sterile packaged titanium implants.

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product is not only sterile but also free from any surface contaminants that could provoke an immunological response. While the implant may be sterile when it is removed from its packaging, there is a possibility of thin film contaminants, as well as plastic or metallic particles, remaining on the surface—residuals of the complex and intricate manufacturing process.[5]

Methods of analysis

Contaminants, whether in the form of particles or thin layers on the implant surface, can be accurately identified through a combination of advanced analysis techniques. In a particle-free clean room environment, the precise location of these impurities is determined using material contrast imaging in a scanning electron microscope (SEM). To further characterise the impurities, energy-dispersive X-ray spectroscopy (EDS) provides initial insights into their elemental composition. The exact chemical nature of these contaminants is then identified through time-of-flight secondary ion mass spectrometry (ToF-SIMS). The CleanImplant Foundation ensures that all these analyses are conducted exclusively in accredited testing laboratories, adhering to the stringent standards of DIN EN ISO/IEC 17025:2018, guaranteeing precision and objectivity in every analysis.

Results

In quality assessment studies conducted by the CleanImplant Foundation in collaboration with Charité–Universitätsmedizin Berlin and the Sahlgrenska Academy in Gothenburg, Sweden, significant impurities were discovered on new, sterile-packaged dental implants. These impurities affected both titanium and zirconia implants.[5,6] On average, one in three analysed implant systems exhibited notable factory-related contamination on the implant surface immediately after removal from the packaging. The contaminants identified included organic particles from the manufacturing process, metallic particles—such as iron-chromium compounds, nickel, or tungsten—resulting from milling or surface treatments, and plastic residues from handling and packaging. The areas most frequently contaminated were the shoulder region of the implant platform (Figs. 1a & b) and the implant threads (Figs. 2a & b). In some instances, analyses revealed not only isolated impurities but also larger areas of the implant surface that had either been inadequately cleaned during production or contaminated during packaging.

At high magnification, SEM images showed carbonaceous particles as black spots, alongside thermoplastic materials, synthetic polymers, and

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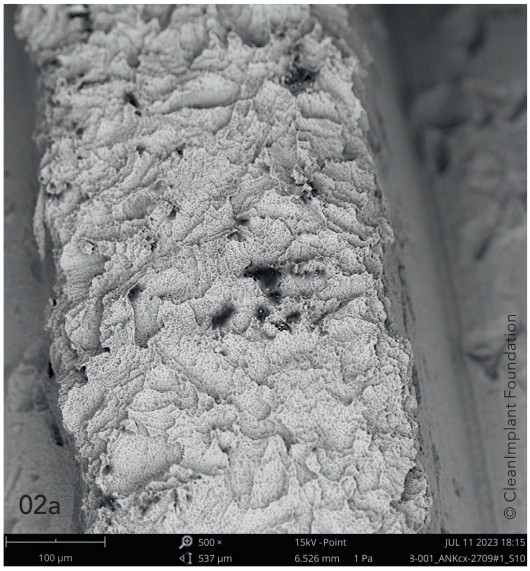

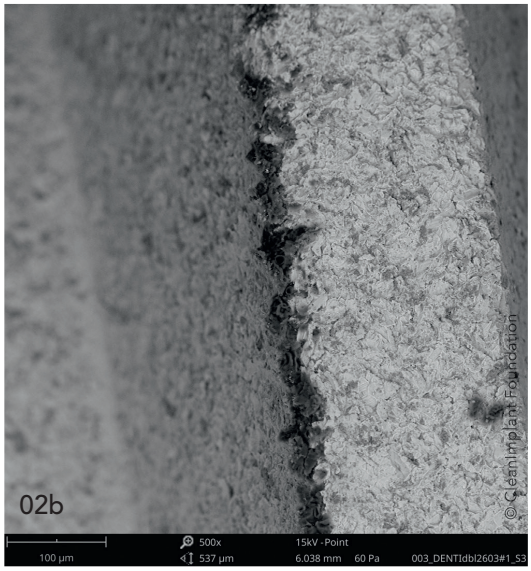

02a + b
Major carbon-based contamination of titanium implant threads straight after unpacking, shown at SEM 500x.

"As analyses by independent laboratories show, cell-toxic impurities can be found not only in some titanium implants but also in those made of ceramic. This makes choosing the right system even more important."

Dr Dirk U. Duddeck, Founder & CEO of CleanImplant Foundation

polysiloxanes on sterile implant surfaces. Both titanium implants (Figs. 1a–2b) and zirconia (ceramic) implants from various manufacturers were found to be affected by these contaminants.

Certain ceramic implants were found to have significant deposits of polysiloxane, which could be traced back to the packaging material (Fig. 3). Another potential threat to successful healing (osseointegration) after implantation comes from thin-layer residues of highly aggressive, cytotoxic cleaning agents, such as dodecylbenzene sulphonic acid (DBSA)[7] or the pesticide didecyldimethylammonium chloride (DDAC-C10)[8]. This quaternary ammonium compound was identified using ToF-SIMS on the surface of a sterile-packaged ceramic implant (Figs. 3 & 4).

Alarmingly, all implants analysed and found to contain contaminants carried the CE mark or had received clearance from the US Food and Drug Administration. This highlights a critical concern: even sterile-packaged medical devices can pose risks to patients if contaminated. Such contamination can lead to implant failure, often associated with peri-implantitis, as a result of inflammatory reactions triggered by these impurities.

However, it is important to note that many implants examined under SEM revealed flawless surfaces, completely free of inorganic, organic, and plastic particles (Fig. 5). This demonstrates that contamination is not only a significant concern but also one that is technically preventable.

Clinical effects

Even at low concentrations, thin-film contaminants—such as those containing DBSA or quaternary ammonium compounds—are cytotoxic to cells and impede rather than facilitate implant healing. DBSA, an aggressive surfactant, is categorised as a "hazardous substance" by the EPA. Similarly, the biocide/pesticide DDAC-C10 disrupts intermolecular interactions and destroys cell membranes.[9]

Carbon-containing organic particles that persist on the implant's surface during manufacturing or plastics from packaging can provoke an immune response in the form of a foreign body reaction (Fig. 6). During implant insertion, particles that detach from the surface are engulfed by macrophages through phagocytosis. This process triggers a cascade of proinflammatory cytokines, including TNF-α, interleukin(IL)-1β, and IL-6. These cytokines promote the differentiation of osteoclast precursors into mature osteoclasts, which can enhance osteoclastic activity and result in peri-implant bone resorption.[10]

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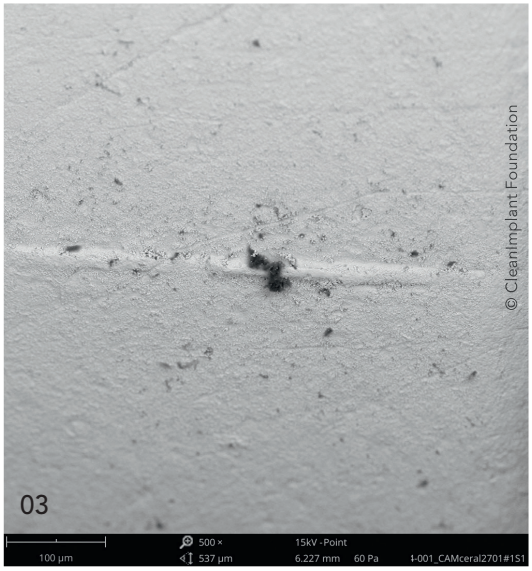
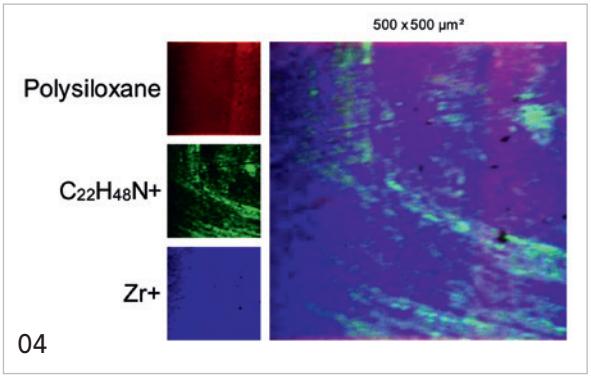
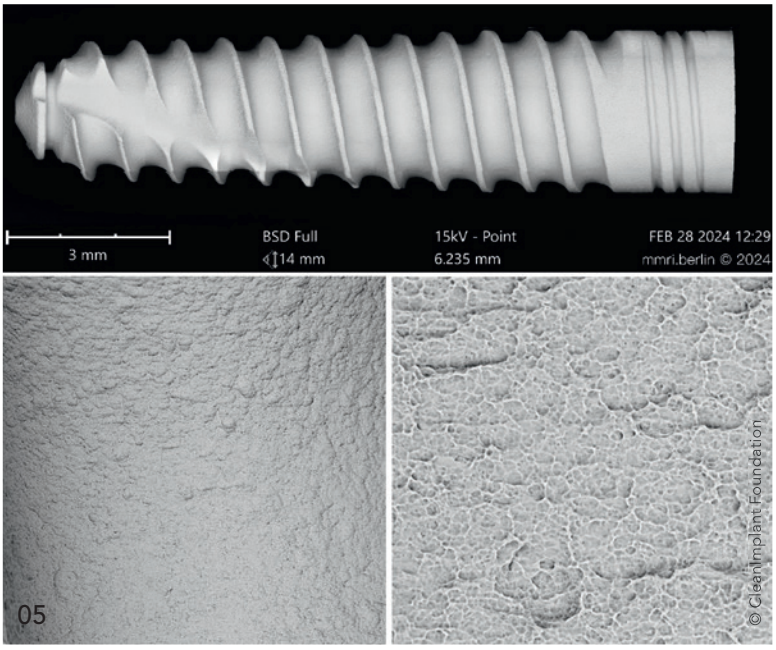


03
SEM image at 1,000× revealing significant plastic material and thin-film contamination on a sterile-packaged ceramic implant.



04
ToF-SIMS visualisation of polysiloxane (red) and the quaternary ammonium compound DDAC ($C_{22}H_{48}N+$; green) on the surface of the ceramic implant shown in Figure 3 (with permission of Tascon GmbH, Münster, Germany).



05
SEM mapping image of the whole implant after removal from the manufacturer's packaging (top); SEM magnification 500x (left) and 2,500x (right), demonstrating a clean surface free of any organic or metallic particles or other debris.

Particularly, foreign particles ranging from 0.2 to 7.2 µm in size are known to be highly proinflammatory.[11–13] The increased expression of Matrix Metalloproteinase-8 (MMP-8) exacerbates soft-tissue damage and inflammation, which can progressively affect the adjacent bone.[10] Consequently, the rough implant threads become exposed to the oral environment, leading to bacterial colonisation, often described as the "beginning of a bad ending" and accelerating peri-implant disease. This progression often culminates in further crestal bone loss and, potentially, implant failure.

Discussion

The immunological response to contaminants varies among patients. While some may exhibit minimal or no reactions, others may experience severe responses. The growing recognition of peri-implant disease, facilitated by advances in clinical understanding, indicates that contaminants can provoke immunological reactions in a significant number of patients.

Contaminants on an implant's surface signify a compromised implant. Addressing this issue is not complex: manufacturers have the capability to prevent such contamination, and it is their responsibility to do so. There is no justification for failing in this regard; the well-being of patients and the integrity of scientific standards demand the highest quality control. As dental implants become more widely used, it is imperative to monitor patients closely throughout the lifespan of their restorations. Early detection and intervention for peri-implant mucositis are crucial for preserving the surrounding bone, halting the progression of peri-implantitis, and enhancing long-term clinical outcomes.

However, preventing undesirable foreign body reactions and early-stage peri-implantitis begins with selecting an implant system that is rigorously proven to be clean. Sterility alone does not ensure safety, as contaminants—regardless of being labelled as "sterile dirt"—can still trigger immunological responses.

Conclusion

The quality of the implant surface and the cleanliness of the implant are crucial factors in peri-implant diseases, though they remain significantly underestimated. Whether the implants are made of titanium or ceramic, it is essential that the implant's surface is free from foreign particles after removal from sterile packaging. Particulate and thin-film contaminants are often invisible to the naked eye, even under magnification with magnifying glasses or microscopes.

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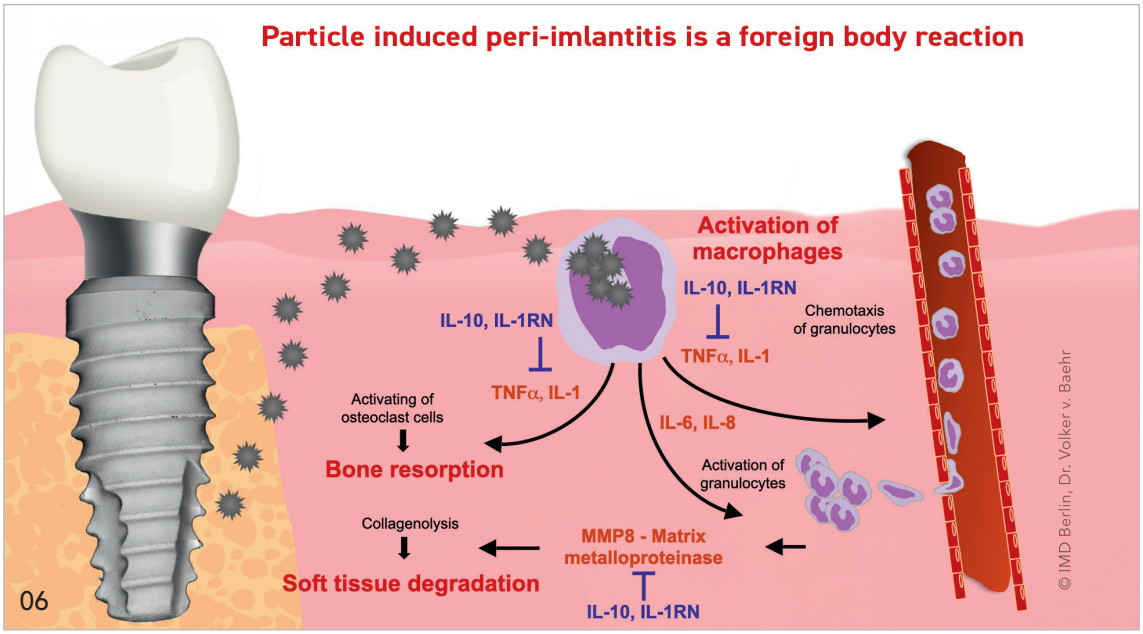

06
Impurities detach during implant insertion from the surface and induce a storm of pro-inflammatory cytokines leading to bone resorption and soft-tissue degradation.

Read the previous article

In most cases of peri-implantitis or implant failure, clinicians may attribute the issue solely to patient factors. However, the results from quality assessments of sterile-packaged implants suggest that the medical device itself should also be considered a potential source of inflammatory reactions and a possible trigger for peri-implantitis during the placement process.[5]

For the past eight years, the CleanImplant Foundation has collaborated with an expanding network of industry partners to ensure particle-free implant production. It has established the "Trusted Quality" seal as a mark of assurance for implants that have been rigorously tested and deemed clean.

The foundation acts as an intermediary, bridging the legitimate expectations of patients and providers with the quality assurance processes of medical device manufacturers. Through its initiatives, the foundation has frequently identified previously unrecognised deficiencies in manufacturing and packaging, leading to significant and lasting improvements in production protocols. The shared commitment to the fundamental medical ethics principle of *primum non nocere* (first do no harm) highlights the collaborative nature of the Foundation's work with its partners and manufacturers. Moreover, understanding the implications of residual biocides, such as DDAC, and cytotoxic, surface-active agents like DBSA on sterile-packaged implants intended for patient use is critical to ensuring product safety and efficacy.

Dentists interested in supporting the CleanImplant Foundation can become members through the website. This non-profit organisation provides details on the benefits of membership and showcases numerous implants that have received the prestigious seal of quality, the "Trusted Quality" mark, after thorough testing. The criteria for ensuring that implants are largely free of particles were established in a consensus paper published in 2017.[14]

The decision to award this quality mark is made by the renowned scientists on the Foundation's Scientific Advisory Board through a rigorous peer review process. To uphold the Trusted Quality seal, a random sample of five implants from each system undergoes comprehensive, independent analysis every two years.

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Dr Dana Adyani-Fard

Literature

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Are you a writer?

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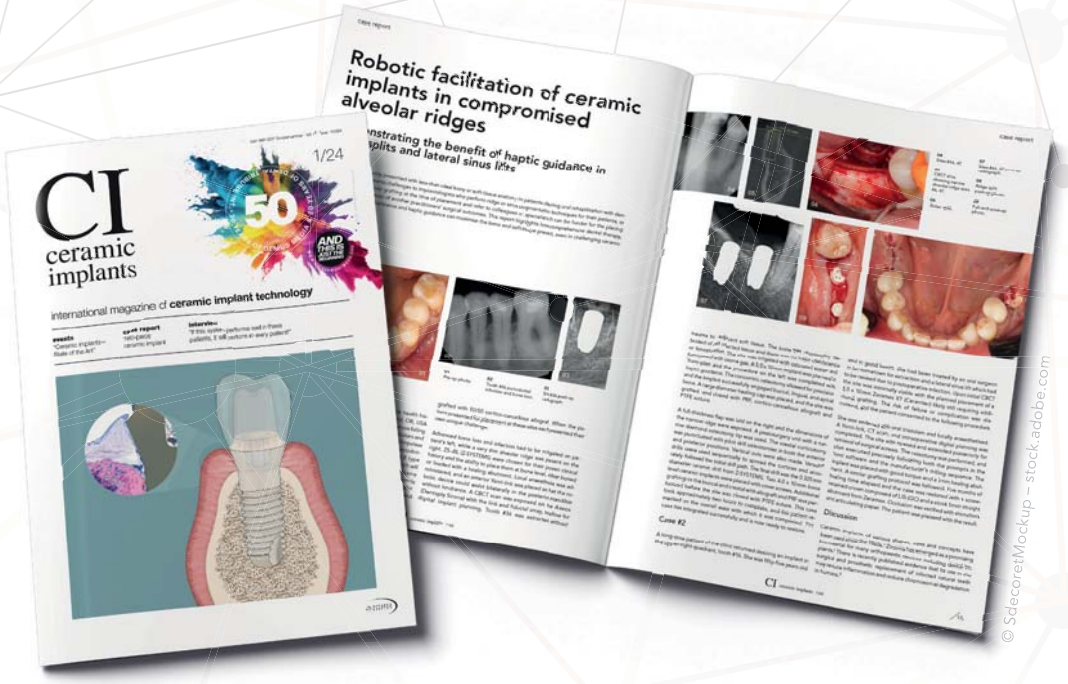

Submission checklist

Send us a text with length of 10,000 to 15,000 characters. We do not want to limit you in terms of article length, so please use the word count as a general guideline!

Numbered images in TIF or JPEG format, in a printable quality of at least 300 dpi.

Most important: we would like to introduce you/the mind behind the article. So please send us also your portrait photo with a short biography about your professional career and your contact information.

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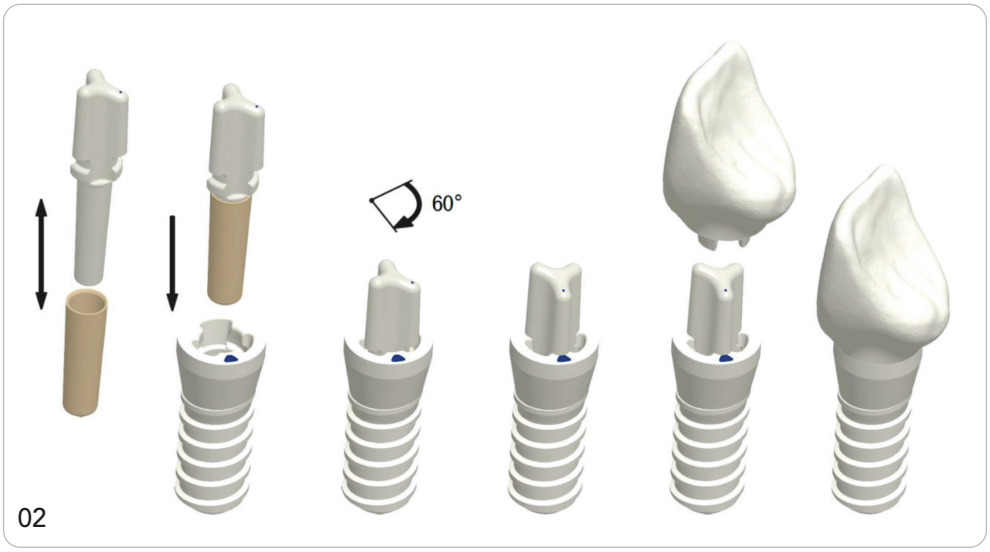
From concept to patented innovation

Implantology is shaped by constant development and innovation. Dr Dr Gerd Axel Walther, an oral surgeon and practice owner from Germany, has had a remarkable journey, during which he developed a new implant system that stands out for its patented design principles. In this interview with Timo Krause and Henrik Eichler from OEMUS MEDIA AG, Dr Walther offers insights into the inspiration behind this innovation, the development process, and the unique attributes of his implant system.

Dr Walther, the ZIRKONUS implant system is a metal-free, modular system that comes in single- and multi-part versions. One of its standout features is the patented coupling mechanism between the implant, abutment, and crown in the multi-part system. The design harmonises perfectly with the material properties of ceramic. What motivated you to develop a new type of connection?
The pivotal moment came when the manufacturer of the implant system I was using in my practice transitioned from a transgingival concept to a bone-level approach. Although I had been highly satisfied with the previous system, the often-visible dark titanium beneath the gum tissue was aesthetically unpleasing. I was also concerned about the long-term health effects of metal oxide release. It became clear to me that simply changing the material was not enough—the design itself needed to be rethought. Instead of opting for a hybrid solution with a steel screw or a shoulder support, I wanted to develop a truly ceramic-appropriate design that maximised the material's unique properties.

Could you walk us through the development process?
In the beginning, I found myself sitting on my sofa, reflecting on the best way to bring this concept to life. I started by sketching my ideas on paper and discussing them with experts in the field. The actual development took off after I secured the patent for my system in 2007.

01
Dr Dr Walther, oral surgeon and practice owner, discussing the development of the ZIRKONUS implant system.



02
Connection between the implant body and abutment via a Renk connection. The abutment rotates 60 degrees to the right, lowering by 5 degrees into the final position when screwed in. Rotational stability is achieved by securing the dental crown.

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03

03
Implant, custom abutments, and bridge on non-axially aligned implants.

One of the defining characteristics of the design is how the components fit together like a three-dimensional puzzle, significantly reducing the hollow spaces typically found in screw-based connections. Later, patents were also secured in the EU and the USA.

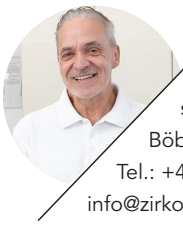
What were the main challenges you faced during the system's introduction?
Finding the right industrial partner proved to be much more difficult than I anticipated, especially when it came to meeting ISO standards and ensuring the material's durability. After investing a considerable amount of time and resources, I decided to take matters into my own hands and develop the implant system independently. Today, we can produce implants with undercuts in various sizes, and I believe this capability is one of the company's most valuable assets.

Please explain the core principles behind the system.
The ZIRKONUS system stands out for its screwless design, made entirely from ceramic material. Surgeons using this system must adjust to a new approach, as its geometric structure is fundamentally different from metal-based systems.

The system features a patented "Renk connection" between the implant and abutment. When the abutment is screwed in, it lowers by 5 degrees into place. The anti-rotation mechanism is secured with the placement of the dental crown. The abutment, made of zirconium dioxide, utilises a PEEK sleeve for optimal force transmission to the implant walls. This eliminates the need for screw channels in both the abutment and superstructure, enabling more delicate abutments and frameworks. Additionally, the design minimises hollow spaces, reducing bacterial reservoirs common in metal-based systems. The system allows for easy replacement of secondary components, and the crown is cemented onto the implant–abutment complex. To reverse the abutment, the crown must first be removed. A colour-coded marking on the implant shoulder ensures precise placement and replacement of components.

The ZIRKONUS implant system is ideal for fixed prosthetics, whether for single-tooth restorations or bridges of any size, and is also suitable for immediate implantation procedures.

We thank you for this enlightening conversation, Dr Walther, and wish you continued success in your endeavours!



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Dr Dr Gerd Axel Walther

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European Society of Ceramic Implantology (ESCI) satellite symposium—"Ceramic Implantology"

The European Society of Ceramic Implantology (ESCI) proudly presented its satellite symposium, "Ceramic Implantology," at the 6th Swiss Implant Congress of the Implant Foundation Switzerland, held from 19 to 21 September 2024. The symposium, hosted at the renowned Kursaal Bern, marked a pivotal moment in the advancement and recognition of ceramic implantology within the larger field of dental implants. As a featured event on the afternoon of 19 September, ESCI's symposium attracted attention from professionals eager to explore ceramic implants' growing role and their practical applications.

Dr Jens Tartsch

The symposium offered a dedicated platform to delve into the latest innovations and research in ceramic implantology, fostering a community of experts and practitioners committed to advancing the field. The symposium brought together leading voices in ceramic implantology to discuss the most current trends, challenges, and emerging opportunities. This satellite event served as an essential forum for participants to familiarise themselves with the specific benefits of ceramic implants, including their clinical reliability, biological compatibility, and potential as a viable alternative to traditional implants.

Structured into two key parts, the symposium opened with a series of scientific lectures presented by respected experts. Prof. Ronald Jung and Dr Jens Tartsch, who led the welcome and opening remarks, set the stage for a series of in-depth presentations. Dr Jens Tartsch discussed whether ceramic implants are more than just a trend, followed by Dr Stefan Röhling's assessment of their reliability in daily practice. Prof. Ralf Kohal addressed the durability of ceramic implants for clinical use, while Dr Frank Maier provided insights into managing hard and soft tissue around ceramic implants. Prof. André Chen rounded off this segment by exploring digital workflows involving ceramic implants. Together, these lectures emphasised the robust scientific foundation behind ceramic implants and presented the latest data-driven results that support their use in clinical settings.

The second part of the symposium focused on practical, case-based learning through a session titled "My approach with...," a unique feature organised in collaboration with ESCI's company partners. This session allowed seasoned clinicians to share their preferred implant systems and personal insights from real-world

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applications, offering a deep dive into individual approaches. Dr Jens Tartsch shared his experiences with Zeramex XT and Nobel Pearl, while Prof. Sebastian Kühl presented his approach with Straumann Pure. Dr Frank Maier discussed CERALOG implants, and Dr Lars Börner presented on Z-SYSTEMS. Each speaker shared their methodology, system-specific advantages, and firsthand clinical observations, giving participants a thorough understanding of the versatility of ceramic implant options.

This ESCI satellite symposium was a cornerstone event, providing a rare and valuable opportunity for dentists, oral surgeons, researchers, and industry professionals to gain practical insights and deepen their expertise in ceramic implantology. It enabled them to explore the technical, scientific, and clinical dimensions of ceramic implants and understand the latest applications that can shape future practices. Attendees were encouraged to take advantage of this gathering to expand their knowledge, network with industry leaders, and directly contribute to the continued acceptance and development of ceramic implants within implantology.

The satellite symposium was strategically designed to complement the larger 6th Swiss Implant Congress, where a broader range of implantology topics and esteemed speakers—such as Prof. Bilal Al-Nawas, Prof. Tomas Albrektsson, Prof. Giovanni E. Salvi, and Prof. Hannes Wachtel—enhanced the overall learning experience for all attendees.

About ESCI

The European Society of Ceramic Implantology—ESCI is a leading international professional society dedicated to promoting research, education, and innovation in the field of ceramic implantology. Through collaboration with experts from various disciplines, ESCI strives to improve patient care and further raise standards in ceramic implantology.

About ESCI

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EAO Congress 2024: Advancing excellence in implant dentistry

Over 4,600 attendees from more than 70 countries gathered in Milan from 24 to 26 October for an exceptional EAO Congress, themed "Details Make Perfection". This year's programme, thoughtfully curated by the scientific committee, was designed to both inspire and challenge participants, with each day focusing on a specific theme: The Fundamentals, State of the Art—Certainties, and Beyond the Limits. Sessions featured the latest evidence-based practices, delivering practical techniques that dentists can readily implement in their practices.

The congress, as always, provided a unique opportunity to learn from leading experts in the field. Continuing its tradition of collaboration with prominent local

associations, the EAO partnered with the Italian Academy of Osseointegration (IAO) and the Italian Society of Periodontology (SIdP). Their invaluable contributions enriched the programme, presenting a comprehensive perspective on the latest advancements in implant dentistry.

Among the many highlights, distinguished specialists shared insights on the challenges and innovations in implant care, covering topics such as sustainable treatment models, digital advancements, and optimised protocols for complex cases. Workshops offered participants hands-on experience with the latest techniques, equipping them with practical skills for immediate application.

Attendees enjoyed cutting-edge presentations, connected with esteemed colleagues from around the world, and experienced the dynamic ambiance of one of Europe's most iconic cities. Meanwhile, an extensive industry exhibition featuring leading companies in the field fostered the exchange of the latest materials, techniques, and technologies.

This congress marked the EAO's second event in Italy in the past decade, following the successful congress in Rome in 2014. Milan, with its vibrant culture and cosmopolitan energy, served as an inspiring setting for this global gathering.

For those who could not attend all sessions, a selection of conference recordings is available on the congress platform starting 5 November free of charge.

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International experts define standards for edentulous maxilla treatment

During a press conference at the Annual Meeting of the European Association for Osseointegration (EAO) in Milan, the Global Consensus for Clinical Guidelines (GCCG) was announced. For this pioneering initiative, the EAO, the International Team for Implantology (ITI), and the Osteology Foundation have joined forces with the aim of establishing clinical guidelines for the treatment of the edentulous maxilla. Contributors from around the world and professional organisations have been invited to ensure global relevance. The GCCG uniquely integrates feedback from international clinicians, researchers, patients, and stakeholders, with the goal of enhancing patient outcomes.

"The GCCG represents an innovative, evidence-based approach to consensus-building in implant dentistry," explained the scientific leaders and co-initiators, Frank Schwarz and Hom-Lay Wang. Engaging a broad spectrum of international experts, patients, and stakeholders, this initiative contrasts traditional consensus conferences by aiming to create straightforward, practical clinical workflows that improve outcomes for clinicians and patients alike.

Enhancing treatment through evidence-based guidelines

This first GCCG focuses on the rehabilitation of the edentulous maxilla, which significantly affects patients' quality of life. Therefore, by focusing on real-world application, the GCCG seeks to equip clinicians with actionable, evidence-driven guidelines to improve treatment outcomes for these patients.
Frank Schwarz emphasised the importance of integrating patient and clinician perspectives in the GCCG: "Our guidelines aim to be clinically effective and reflective of patient needs, ensuring that our recommendations enhance treatments and ultimately improve patients' lives."

"Therefore, at the core of the GCCG's methodology are Patient Reported Outcome Measures (PROMs) and Clinician Reported Outcome Measures (CROMs), evaluated through systematic reviews," he explained. "What also makes the GCCG unique is that comprehensive feedback is gathered via tailored Delphi surveys that have been distributed to a substantial number of clinicians, patients, and public stakeholders. We have undertaken these extensive efforts to incorporate a wide range of perspectives. The results from these reviews, surveys, and associated meta-analysis then form the basis for formulating the actual clinical guidelines, ensuring their clinical relevance and practicality."

A global collaborative effort

The GCCG draws expertise from around the world, making the guidelines applicable in various cultural and clinical contexts. "This is not just about developing another set of guidelines; this is about reshaping how we approach clinical practice in implantology," explained Hom-Lay Wang and continued: "By bringing together voices from all over the world and including both clinicians and pa-


01

02


03

01
The GCCG involves contributors and associations from around the world.

02
Press conference during the EAO Annual Meeting in Milan.

03
Signing of the Memorandum of Understanding.

"Our guidelines aim to be clinically effective and reflective of patient needs, ensuring that our recommendations enhance treatments and ultimately improve patients' lives."

tients, we are creating a global framework that will have a lasting impact on the way we care for patients."

Many traditional consensus conferences had only regional impact and did not achieve global recognition and clinical relevance. The GCCG wants to overcome this by involving contributors and associations from around the world.

The efforts will culminate in a consensus conference in Boston in June 2025, where over 120 international experts will discuss and formulate the first global guidelines for the treatment of the edentulous maxilla.

Joining forces to advance clinical practice

Representatives of the three core organisations that have teamed up to jointly organise the GCCG were also present at the press conference.

Ronald Jung, President of the EAO and a co-initiator of the GCCG, underlined the collaborative strength of the GCCG, noting, "The strength of the GCCG lies in its ability to unite experts from around the world and create guidelines that will benefit clinicians and patients alike. We are striving to make sure that these guidelines will be useful across different clinical environments, ensuring better treatment outcomes for patients facing the challenges of edentulism."

Charlotte Stilwell, President of the ITI, supported this sentiment, adding, "The ITI is proud to support the GCCG because it aligns with our mission of promoting the highest standards of clinical practice. We believe that by integrating patient feedback and focusing on evidence-based solutions, the GCCG will deliver guidelines that have a tangible impact on improving patient care."

Frank Schwarz, commented on behalf of Christer Dahlin, President of the Osteology Foundation, who could not attend. He also emphasised the alignment with their goals: "The GCCG aligns perfectly with the Osteology Foundation's focus on oral regeneration and its mission to ultimately improve patient care. Our joint aim in this collaboration is to create clinical guidelines that directly translate into better treatments for patients."

With these statements, the leaders highlighted the powerful collaboration in developing globally applicable clinical guidelines. Concluding the press conference with a strong message of unity and a forward-looking vision, they added that this alliance might be a starting point for further collaborative efforts and could serve as a stepping stone for additional activities. "Discussions are already ongoing," they said.

Source: Global Consensus for Clinical Guidelines

COHO Biomedical Technology Company: Delivering excellence in zirconia implants and medical devices

At COHO Biomedical Technology Company, we pride ourselves on being at the forefront of innovation and quality in the healthcare industry. Our commitment to excellence is evident in the specialised services we provide, particularly in the realm of zirconia implants and medical devices. Through our flagship product line, the ZIBONE Zirconia Implant, and other cutting-edge zirconia-based medical solutions, we have established ourselves as leaders in providing safe, effective, and durable products that meet the highest standards of patient care.

Expertise and innovation in zirconia technology

Zirconia has emerged as a revolutionary material in the medical field, especially in dental implants. Known for its exceptional biocompatibility, strength, and aesthetic appeal, zirconia offers a superior alternative to traditional materials like titanium. COHO Biomedical has harnessed the full potential of this advanced material through rigorous research and development, ensuring that our products not only meet but exceed industry expectations.

The ZIBONE Zirconia Implant is the culmination of years of research and development. Our team of experts has meticulously designed and tested this implant to ensure it delivers unparalleled performance in terms of strength, durability, and patient comfort. The implant's unique design allows for optimal osseointegration, ensuring a secure and long-lasting bond with the surrounding bone tissue. This results in improved patient outcomes and a higher success rate in implant procedures.

Commitment to quality and safety

At COHO Biomedical, quality and safety are not just priorities—they are the foundation of everything we do. We understand that medical devices, especially those implanted in patients, must adhere to the most stringent safety standards. That's why our ZIBONE Zirconia Implant and other zirconia medical devices undergo rigorous testing at every stage of production. From raw material selection to final product inspection, we implement comprehensive quality control measures to ensure that our products are free from defects and safe for use.

Our commitment to quality extends beyond our products to the services we provide. We work closely with healthcare professionals to ensure that they have the necessary training and support to use our products effectively. Our technical support team is always on hand to provide assistance, whether it's answering questions about product specifications or offering guidance on best practices for implant procedures.

Aesthetic and functional advantages

One of the standout features of zirconia as a material is its aesthetic appeal. Unlike metal implants, zirconia implants are naturally white, making them an ideal choice for patients seeking a more natural-looking solution. The ZIBONE Zirconia Implant is designed with aesthetics in mind, ensuring that it blends seamlessly with the patient's natural teeth. This makes it particularly suitable for use in the anterior region, where the appearance of the implant is crucial to the overall success of the procedure.

In addition to its aesthetic benefits, zirconia also offers functional advantages. It is highly resistant to corrosion and does not conduct heat or electricity, reducing the risk of adverse reactions in patients. Furthermore, zirconia's non-metallic nature means it does not interfere with medical imaging techniques, allowing for clearer and more accurate diagnostic results.

Comprehensive product portfolio

While the ZIBONE Zirconia Implant is our flagship product, COHO Biomedical offers a comprehensive range of zirconia-based medical devices to meet the diverse needs of healthcare providers. Our product portfolio includes everything from dental crowns and bridges to surgical instruments and orthopaedic implants, all made from the highest quality zirconia. Each product is designed with the same attention to detail and commitment to excellence that has become the hallmark of our company.

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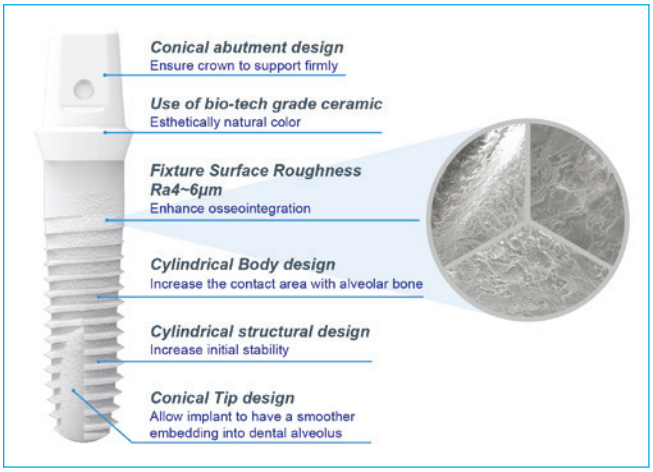

Our extensive product range allows us to offer complete solutions to our clients, ensuring that they have access to the best possible tools and materials for their practice. Whether it's a single dental implant or a full set of zirconia prosthetics, COHO Biomedical has the expertise and resources to deliver products that meet the highest standards of performance and patient satisfaction.

Professional support and training

At COHO Biomedical, we believe that providing exceptional products is only part of the equation. Equally important is the support and training we offer to the healthcare professionals who use our products. We understand that the success of any medical device depends on the skill and knowledge of the practitioner, which is why we invest heavily in training and education.

Our comprehensive training programmes cover everything from product installation and maintenance to advanced surgical techniques. We also offer ongoing support to our clients, ensuring that they have access to the latest information and best practices. Whether it's through in-person workshops, online training modules, or one-on-one consultations, we are committed to helping our clients achieve the best possible outcomes for their patients.

COHO Biomedical Technology Company is dedicated to advancing healthcare through innovative zirconia implants and medical devices. Our ZIBONE Zirconia Implant is a testament to our commitment to quality, safety, and patient satisfaction. By combining cutting-edge technology with professional support and training, we are helping healthcare providers around the world achieve better outcomes for their patients.

COHO Biomedical remains focused on our core mission: to provide the highest quality medical devices that enhance patient care and improve lives. Whether you are a healthcare provider looking for the best in zirconia implants or a patient seeking a safe and effective solution, COHO Biomedical is your trusted partner in healthcare innovation.

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Z-SYSTEMS reaches 20-year milestone in advanced dentistry, pioneering zirconia implants

Z-SYSTEMS Ceramic Implants is proud to celebrate the continued success of our bone-level and tissue-level ceramic implants—the world's first and only 100 per cent ceramic dental implants with a screw-retained conical connection. These groundbreaking implants have set a new standard in implantology, offering unmatched strength, biocompatibility, and aesthetic excellence.

With 20 years of dedicated research and clinical expertise, Z-SYSTEMS has revolutionised the field of implants and their commitment to innovation has propelled the company to the forefront of dental implant technology. The advanced design of the 100 per cent ceramic implants provides patients with a metal-free solution that promotes optimal long-term outcomes, ensuring stability, natural appearance, and improved oral health.

Key features and benefits:

1. **Superior aesthetics:** The tooth-coloured zirconia material closely resembles natural teeth, allowing for seamless and lifelike restorations.
2. **Enhanced biocompatibility:** Our zirconia implants feature biocompatible materials with excellent tissue acceptance, promoting healthy osseointegration and long-term implant success.

3. **Two-piece conical connection:** This unique connection ensures a precise fit and stability while minimising the risk of bacterial penetration, contributing to lasting implant success.
4. **Outstanding durability:** Zirconia's exceptional strength and fracture resistance make our implants highly durable and suitable for a wide range of clinical cases.

Join us as we celebrate 20 years of pioneering excellence, as the world leader in zirconia implants, and discover how Z-SYSTEMS' bone-level and tissue-level implants can grow your practice and improve patient outcomes. For more information, visit www.zsystems.com.

Z-SYSTEMS Ceramic Implants is a leading dental implant manufacturer specialising in advanced ceramic implant solutions. With a focus on innovation, precision, and patient-centric outcomes, Z-SYSTEMS has set a new standard in implant dentistry. The company's commitment to excellence is rooted in a passion for enhancing smiles and improving the lives of patients worldwide.

Z-SYSTEMS AG
www.zsystems.com

Secure your spot and discover ZIRKONUS' patented implant system!

At the 53rd International Annual Congress of the DGZI, held on 8 and 9 November in Düsseldorf, Germany ZIRKONUS will present its groundbreaking implant solution. This innovative, multi-part, all-ceramic system introduces a cutting-edge coupling geometry that seamlessly connects the implant body, abutment, and crown. The abutment rotates 60 degrees before settling into its final position without the need for adhesive, allowing it to be replaced as often as needed when the crown is removed. Additionally, the absence of a screw channel enables very delicate superstructures. Another unique feature of ZIRKONUS is the availability of implants with diameters ranging from 3.5 to 11.5 mm, catering to a variety of clinical needs.

© ZIRKONUS

At this year's DGZI congress, the popular table clinics provide an ideal platform for showcasing this innovative system. These interactive sessions allow participants to engage with leading experts on a variety of specialised implantology topics, expanding their knowledge and gaining valuable cross-disciplinary insights.

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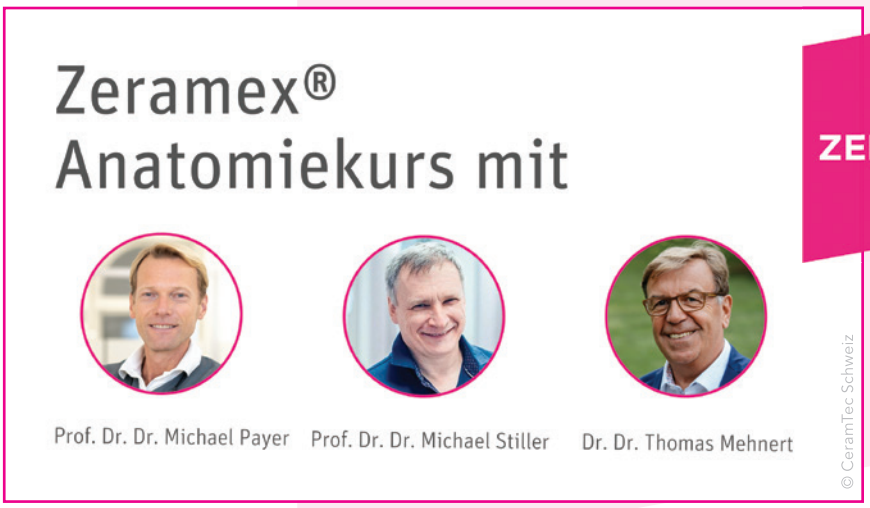
Zeramex anatomy course in Graz

CeramTec Switzerland has prepared an exciting training course: Dentists working in implantology can now attend an anatomy course. The Zeramex course, which is certified with continuing medical education points, will take place under the direction of Prof. Dr Dr Michael Payer on 22 and 23 November 2024 at the Medical University of Graz (AT). The programme includes lectures by Prof. Dr Dr Michael Stiller and Dr Dr Thomas Mehnert on the topics of anatomy & ceramic implants as well as practical work on human specimens.

Friday will begin with a guided tour through the old town of Graz and a get-together from 7 p.m. Lectures and practical work are planned for Saturday.

Course fee and registration

Registration is via e-mail event@zeramex.com or via the attached QR code. The number of places is limited.



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"BAYERNS BEST 50"—bredent receives an award for best performance

bredent GmbH & Co. KG was honored by the Bavarian State Ministry of Economic Affairs, Regional Development and Energy as one of the fastest-growing medium-sized companies in Bavaria. As part of the "BAYERNS BEST 50" event, the company and 49 other winners received the award, which stands for outstanding entrepreneurial growth, employee growth and sales growth. The award was handed over by Hubert Aiwanger, Bavarian State Minister for Economic Affairs, Regional Development and Energy.

"The award is a confirmation of our continuous corporate development and our commitment to our employees and the region," explains Peter Brehm, founder and owner of bredent. "With our innovative approach and a strong focus on quality and training, we have not only created jobs, but also actively contributed to the creation of a high standard of living in Bavaria."

The "BAYERNS BEST 50" award recognises companies that have achieved superior growth in recent years. Important selection criteria are the economic success of the company and the active role of the company management in the business.

bredent medical GmbH & Co. KG
www.bredent-medical.com

bredent medical
GmbH & Co. KG

Neodent® Zi Ceramic Implant System: performance with outstanding aesthetic result

The Neodent® Zi Ceramic Implant System combines the notions of aesthetic, stability, and flexibility. This solution allows clinicians to immediately treat patients due to the modern naturally-tapered design and wide prosthetic portfolio, achieving high-end aesthetic results.

Treatment flexibility

Designed to provide several treatment solutions and a wide range of prosthetic possibilities through a two-piece connection, Zi offers solutions from conventional to digital workflow, able to treat bone types I to IV.

Tapered design and connection for stability

The Ceramic Implant System exhibits a modern tapered geometry designed for predictable immediate load. This feature is designed to mimic the tapered shape of a natural tooth root, achieving high primary stability.

Additionally, Zi has the exclusive ZiLock® internal ceramic connection, a user-friendly system designed with a longer screw which provides a secure engagement between the ceramic implant and the ceramic abutment. This design improves the performance by optimising the force distribution along the internal connection.

Ceramic prosthetic portfolio

The Ceramic prosthetic portfolio allows conventional or immediate protocols. In addition, both conventional and digital workflows can be applied, resulting in a natural-looking restoration.

Neodent—
A Straumann Group Brand
www.neodent.com

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Events

French Dental Association Annual Meeting
26–30 November 2024
Paris, France
adfcongres.com/en

EACim Seminar—"Ceramic implant as an alternative to titanium: Immediacy in implant dentistry"
8 February 2025
Lisbon, Portugal
www.eacim-ceramic-implantology.com

IDS 2025—International Dental Show
25–29 March 2025
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BIOLOGISATION IN REGENERATIVE DENTISTRY

25–26 SEPTEMBER 2025
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DO YOU TRULY KNOW YOUR IMPLANT SYSTEM?

sterile + clean

sterile + dirty

(R)Evolution – **CHAMPIONS IMPLANTS**
SDS 1.2 – **SWISS DENTAL SOLUTIONS**
SDS 2.2 – **SWISS DENTAL SOLUTIONS**
ICX-Premium – **MEDENTIS MEDICAL**
Astra Tech EV – **DENTSPLY SIRONA**
Spiral SB/LA – **RITTER IMPLANTS**
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whiteSKY – **BREDENT MEDICAL**
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BlueDiamond – **MEGAGEN**
s-Clean SQ-SL – **DENTIS**
ZENEX – **IZEN IMPLANT**
AnyRidge – **MEGAGEN**
SuperLine – **DENTIUM**
T6 torQ – **NUCLEOSS**
In-Kone – **GLOBAL D**
T6 – **NUCLEOSS**
UnicCa – **BTI**

*) Scanning electron microscope images (BSE mode) of new implants after unboxing – Both implants were sterile packaged, FDA labeled and ready for clinical use.

Sterile does not mean clean. Far too many implant systems have concerning residual surface contaminants.

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