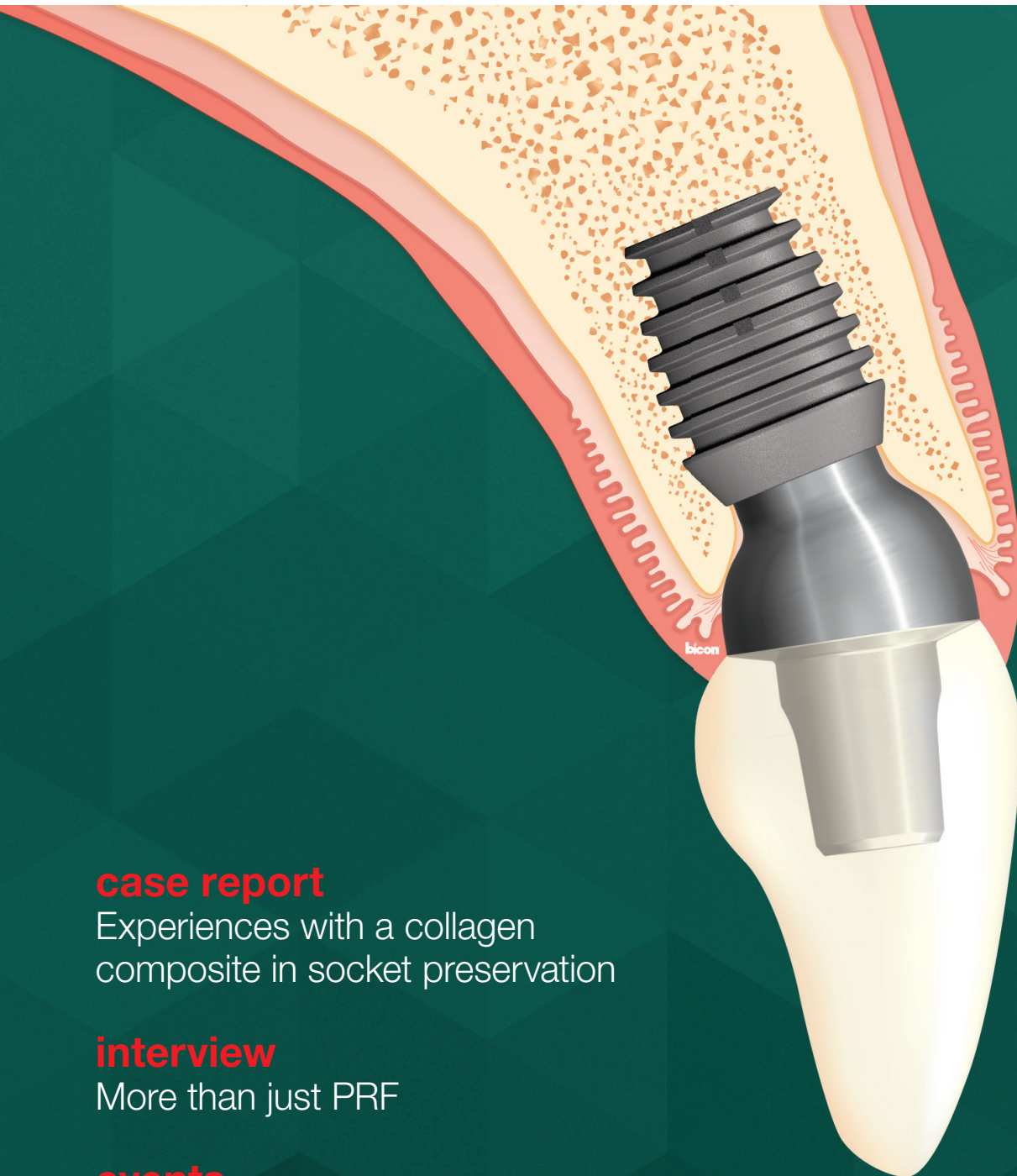


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**Dr Georg Bach**

President of the DGZI



## Visions of the future

Dear friends and colleagues,

Behind us lies an extremely successful dental weekend of noteworthy accomplishments: the second Future Congress for Dental Implantology of the German Association of Dental Implantology (DGZI), which was held in early October in Munich, not only was informative and appealing to clinicians from Germany and abroad, but also proved that our visionary Future Congress concept is gaining ground. This concept, which we presented for the first time in Düsseldorf in 2018, represents a radical turnaround from the conventional parliamentary congress format through the introduction of fresh, interactive elements. In this context, the table clinics and the digital poster presentation are particularly worth a mention.

The fact that our new format is growing in acceptance is reflected in the significantly increased number of participants compared with previous years, but even more so in the fact that about half of the participants in Munich were under the age of 40—which we are very pleased about! We take this not only as a complement but also as a clear responsibility towards the younger generations that represent our future. The future concept runs like a thread through all our work at DGZI, including further training and curricula, and collaboration with dental technicians, always with an overriding focus on the practice of implant dentistry. I can confidently say

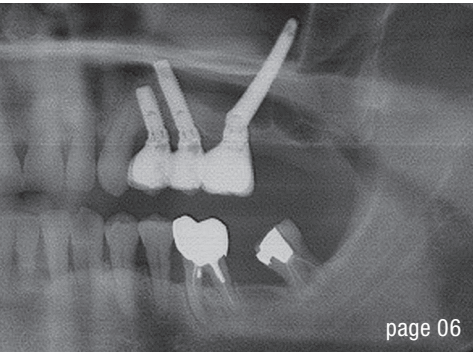
that, at the beginning of October, we succeeded in presenting oral implantology not as it is today, but as it will be in five to ten years from now.

I am personally very happy and utterly grateful that I was elected new DGZI President at this year's general meeting, which was held in Munich one day ahead of the congress. Embracing the responsibility that my new role as President entails, I will accompany and support our DGZI and lead it into its anniversary year in 2020, when we will celebrate half a century of DGZI. This will truly be a worthy event and we will celebrate it duly. It will not only be the anniversary of the oldest expert society for oral implantology in Europe but also an anniversary of German implantology itself, since the courageous and visionary founders of DGZI have contributed a great deal to establishing this dental discipline and to eventually developing its wider application. We are looking forward to our anniversary year!

Yours,

A stylized, handwritten signature in black ink, consisting of a large, sweeping 'G' followed by a few smaller strokes.

Dr Georg Bach



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# Rehabilitation of maxillary unilateral posterior edentulism

Drs Jean-Baptiste Verdino, Sepehr Zarrine, Thierry Louvet & David Mardenalom, France

There are two options for treating partially edentulous maxillae: a removable partial denture or an implant-supported fixed partial denture. The resorption of the upper jaw, in association with maxillary sinus pneumatization, often requires pre-implant surgery, such as inlay/onlay grafting or crestal/lateral sinus lift to allow the insertion of regular implants. A graftless approach including tilted implants,<sup>1</sup> such as zygomatic implants, has been proposed to avoid long-lasting treatment sequences.

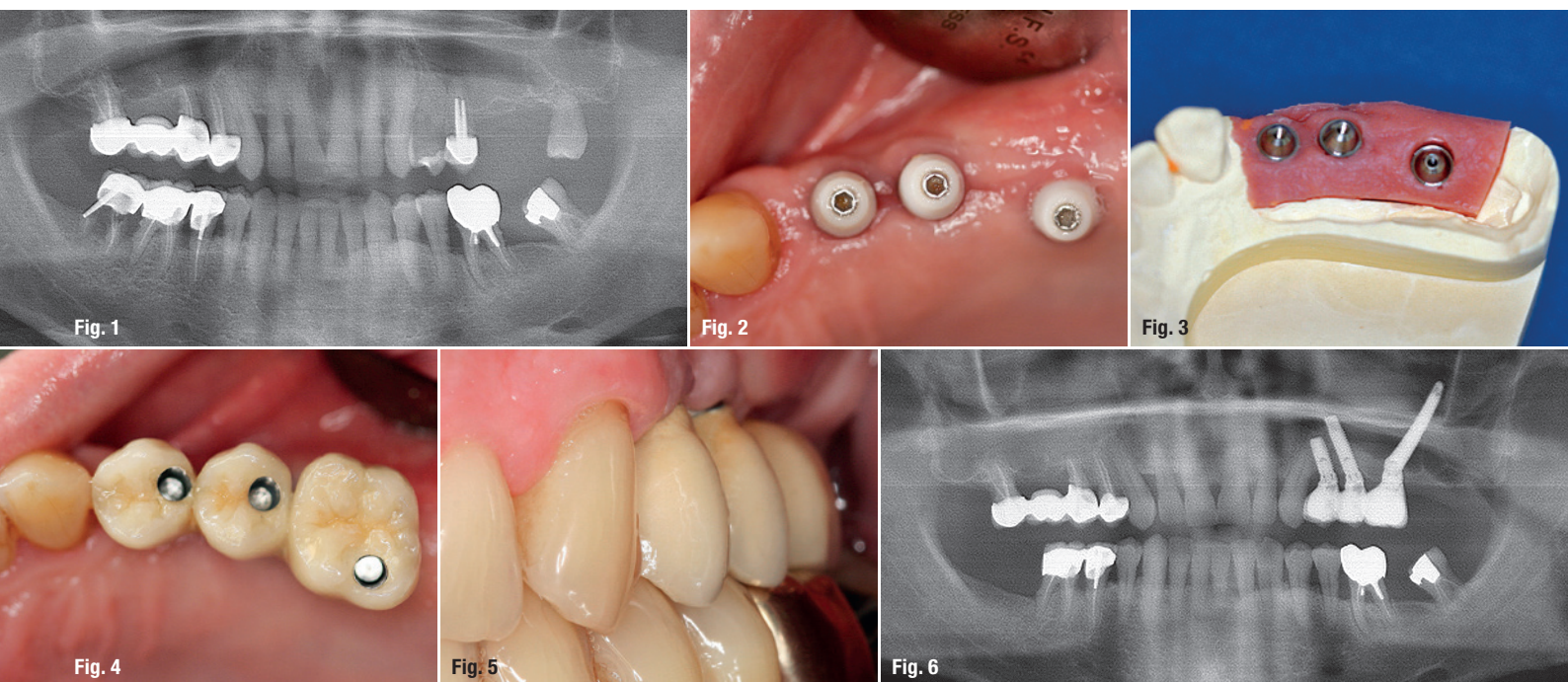
## Zygomatic implants

Introduced by P.-I. Brånemark in the 1980s, the zygomatic anchorage was developed to treat patients after a complete or partial maxillectomy.<sup>2-4</sup> The development of this technique allowed the rehabilitation of completely edentulous atrophied maxillae. The process was then

described as an alternative to a sinus lift.<sup>5</sup> This procedure requires the insertion of a 30.0–52.5 mm long titanium implant (NobelZygoma, Nobel Biocare) from the maxillary edentulous ridge to the zygomatic bone, with an intra- or extra-sinus path (ZAGA classification<sup>6</sup>). The diameter of the apical part is 3.9 mm, while the maxillary part is 4.1 mm. The platform is a 4.2 mm external hexagon with a 45° angle to allow for the prosthetic restoration.

## Completely and partially edentulous maxillae

The original protocol for treating completely edentulous maxillae was carried out using two zygomatic implants and two or four regular implants inserted in the anterior maxilla.<sup>7</sup> In the case of terminal atrophied maxillae, a quadruple zygomatic implant placement can currently be



**Case 1—Fig. 1:** Pre-op radiograph: the two premolars and the third molar of the left maxilla would have to be extracted, and there was insufficient bone quantity under the sinus to allow for implant placement. **Fig. 2:** The impression was taken after a healing period of four months. **Fig. 3:** Master model, in which the emergence of the zygomatic implant is in the region of the palatal root of the first molar. **Fig. 4:** A porcelain-fused-to-metal fixed partial denture (ceramic on titanium) was screwed on. **Fig. 5:** Buccal view of the fixed partial denture. **Fig. 6:** Control radiograph: the treatment of the case was completed in five months.

achieved: a traditional molar zygomatic implant and an additional canine zygomatic implant are inserted on each side of the maxilla.<sup>8,9</sup> The treatment of unilateral posterior edentulism must be considered as a high priority considering the loss of masticatory efficiency. There is rapid resorption of bone of the alveolar ridge immediately after tooth extraction. The insertion of a zygomatic implant in this situation is not available considering the biomechanical aspect. The zygomatic implant has to be used with other implants to allow the stabilisation of the restoration. This solution can then be considered only in the case of extractions of the molars in association with avulsion of the premolars.

## Case reports

All the patients were healthy non-smokers with satisfying oral hygiene and no general diseases. They desired improvement in comfort, aesthetics and quality of life with a fixed solution. The remaining teeth were not sufficient to support a fixed partial denture. For the treatment of the unilateral posterior edentulous area of their maxillae, two approaches were presented to each patient. On the one hand, a reconstructive option would entail the extraction of the hopeless teeth, the insertion of immediate implants if possible and the achievement of a lateral sinus lift during the same surgery. After six months of healing with a removable partial denture, the remaining implants could be inserted to complete the implant treatment. On the other hand, a graftless solution was proposed, which would involve placing two regular implants in the premolar region and a zygomatic implant in the molar area or a regular implant associated with one zygomatic implant and one pterygoid implant. These three implants connected to healing abutments could be loaded after a four-month period of healing or loaded immediately with a provisional screw-retained fixed partial denture. All the risks of the two options were explained to the patients before they made the final decision. In these three reported cases, the graftless approach was selected because of the shorter duration of the treatment and fewer number of surgeries required. The cost of each treatment was similar for the two options.

### Case 1

A 56-year-old male patient presented for the rehabilitation of his partially edentulous left maxilla, complaining of low masticatory efficiency. Teeth #26 and 27 had been extracted and had not been restored, while teeth #28 and 24 were mobile. Tooth #25 was endodontically infected. These three teeth were under a high level of occlusal load. They presented a low level of surrounding bone and were diagnosed as hopeless teeth. We noted a generalised but stable periodontitis (Fig. 1). Two cylindrical self-tapping implants (Brånemark System Mk IV TiUnite regular platform [RP], Nobel Biocare) of 10 and

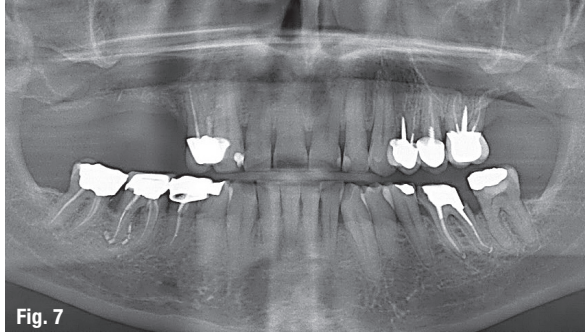


Fig. 7

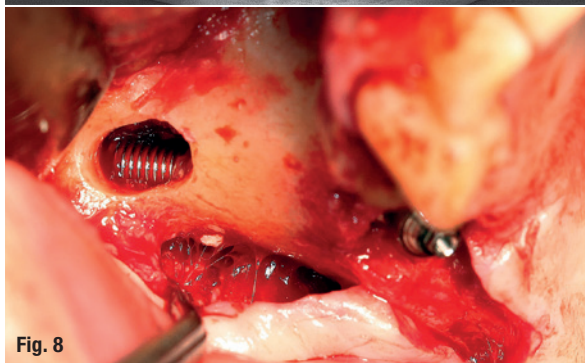


Fig. 8

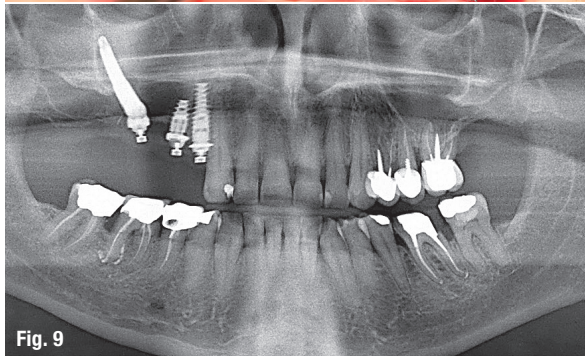


Fig. 9



Fig. 10



Fig. 11

**Case 2—Fig. 7:** Pre-op radiograph: the first premolar would have to be removed and there was insufficient bone under the sinus. **Fig. 8:** A zygomatic implant was placed across the sinus. **Fig. 9:** Two regular implants were inserted in positions #14 and 15 (implant #14 was immediately placed after extraction), and a machined 45 mm Brånemark zygomatic implant was placed into position #14. **Fig. 10:** Full-zirconia fixed partial denture. **Fig. 11:** Buccal view.

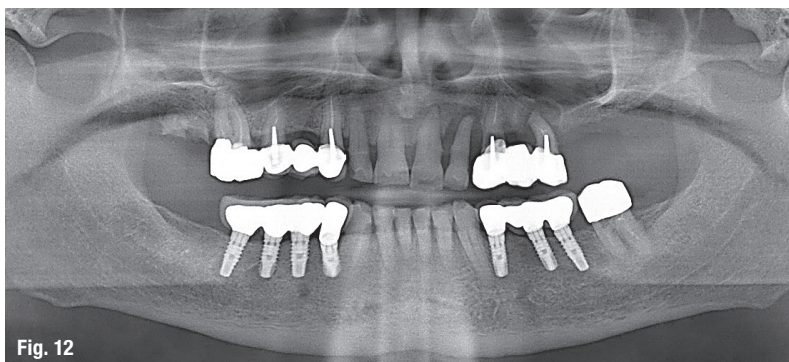


Fig. 12

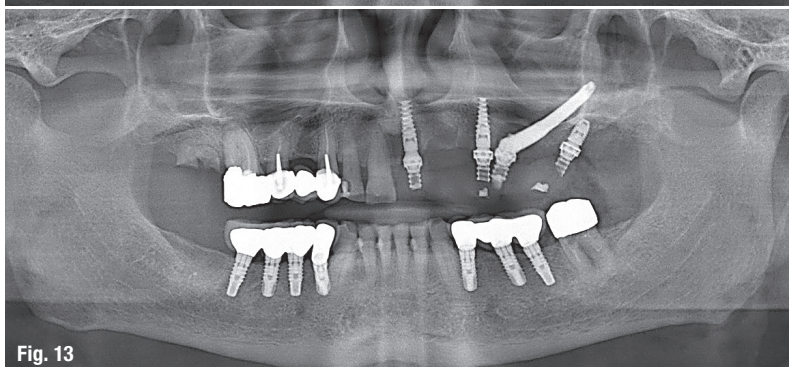


Fig. 13

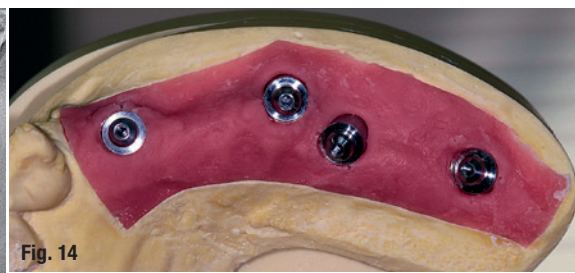


Fig. 14



Fig. 15



Fig. 16

**Case 3—Fig. 12:** Pre-op radiograph: all the teeth of the left maxilla would have to be removed owing to periodontal disease. **Fig. 13:** Three implants were placed into the remaining bone, completed by a 42.5 mm zygomatic implant. **Fig. 14:** Master model, in which the emergence of the zygomatic implant is slightly palatal. **Fig. 15:** Titanium screw-retained fixed partial denture with pink acrylic and composite teeth. **Fig. 16:** Buccal view.

15 mm in length and 4 mm in diameter were inserted as replacements for teeth #24 and 25, respectively, while a 35 mm long zygomatic implant was inserted in position #26. A provisional non-functional screw-retained fixed partial denture was immediately connected to the three implants, considering their sufficient insertion torque. A 3 mm 17°, a 2 mm 17° and a 3 mm straight RP multi-unit abutment (MUA, Nobel Biocare) were used for the screw-retained fixed partial denture. The final fixed partial denture was connected after four months of healing (Figs. 2–6).

### Case 2

A 40-year-old male patient presented for rehabilitation of his right maxilla. Tooth #14 was infected by an abscess due to root fracture (Fig. 7). At the time of the extraction of tooth #14, teeth #14 and 15 were replaced by a 10 mm long and an 8 mm long NobelActive RP straight implant (Nobel Biocare), respectively, while a 40 mm long zygomatic implant was inserted in position #16 (Figs. 8 & 9). These three implants were connected to a screw-retained fixed partial denture by the use of a 1.5 mm MUA and a 2.5 mm 17° MUA for implants #14 and 15 and a 1 mm straight MUA for the zygomatic implant after four months of healing (Figs. 10 & 11). Note that the use of a machined zygomatic implant allows the use of a larger range of MUAs, which is not possible with TiUnite zygomatic implants (only 3 and 5 mm MUAs are available).

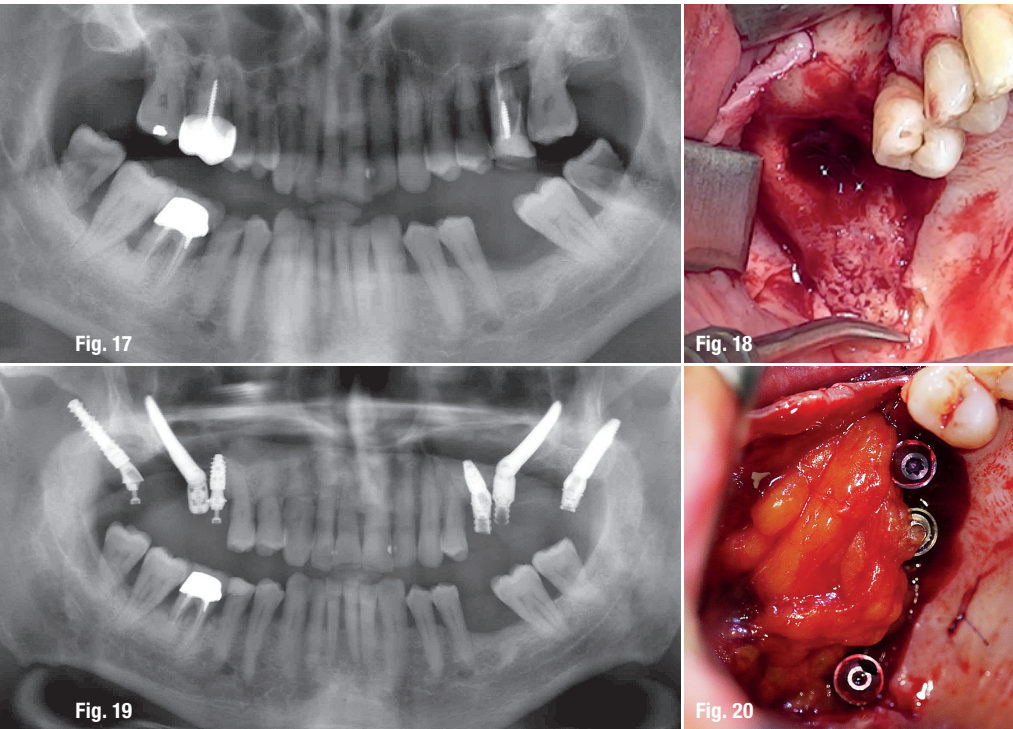
### Case 3

A 70-year-old male patient presented for the treatment of his left maxilla. He presented with a fixed partial denture extending from tooth #23 to tooth #25. Tooth #24 presented a vertical fracture, due to occlusal overload. Teeth #21 and 22 presented a high degree of mobility (Fig. 12). Three NobelActive narrow-platform implants were inserted into the remaining bone: tooth #21 was extracted and immediately replaced with an implant, while two other implants were placed, one in position #23 and one in the tuberosity. Three MUAs (Nobel Biocare) with a diameter of 1.5 mm were immediately screwed on. A 42.5 mm long zygomatic implant was placed between tooth #25 and tooth #26, and received a 1 mm MUA (Fig. 13). Immediate loading was performed with a screw-retained full-acrylic fixed partial denture. After a healing period of four months, a seven-unit fixed partial denture of acrylic on a titanium frame (NobelProcera, Nobel Biocare) was inserted (Figs. 14–16).

### Case 4

A 65-year-old patient with periodontal disease had an infection of the posterior maxillary area and tooth mobility involving a lack of alveolar bone in the molar area (Fig. 17). The radiographic examinations, panoramic radiograph and 3D imaging, showed sinus infection





**Case 4—Fig. 17:** Initial situation with periodontal disease, infection of the posterior maxillary area and lack of alveolar bone. **Fig. 18:** Right sinus with an oroantral communication. **Fig. 19:** Immediate loading on both sides with regular, zygomatic and pterygoid implants. **Fig. 20:** The machined zygomatic implant partially closed the oroantral communication and the rest was closed by the pedicled buccal fat pad.

linked with the teeth. Firstly, teeth #16, 17, 25, 26 and 27 were extracted. The left sinus quickly became healthy, while the right sinus developed a new phase of purulent sinusitis. The left side was implanted with a Straumann BLT implant of 8.0mm in length and 4.1mm in diameter in position #25, with a straight screw-retained abutment. In position #28, a Straumann BLT implant of 16mm in length and 4.1mm in diameter was anchored in the pterygoid notch, and a 25° angulation screw-retained abutment was screwed on. A 40mm long zygomatic implant (Nobel Biocare) was inserted in position #26. In the same surgery, the right sinus was drained by an existing unhealed oroantral communication. On the same day, a provisional non-functional fixed partial denture was screwed on to the three implants. The right side was implanted after six weeks in order to work with a healthy maxillary sinus, but there was still an oroantral communication (Fig. 18).

After locating the pterygoid hamulus, which helps to avoid the descending

palatine artery, a pterygoid implant was inserted in position #18. A Straumann BLX implant of 3.75mm in diameter and 18.00mm in length was placed and a 25° angulation screw-retained abutment was used to achieve the axis correction of this implant. In position #16, with low bone height, another BLX implant (3.75mm in diameter and 8.00mm in length), with an extensive self-drilling capacity, provided high primary stability and a straight screw-retained abutment was screwed on at 35Ncm. A 40mm long Neodent zygomatic implant was strongly anchored in the zygomatic bone (Fig. 19). The machined surface of this implant allowed partial closure of the oroantral communication, the rest of which was covered by the pedicled buccal fat pad (Fig. 20). The implants were loaded immediately with a provisional screw-retained fixed partial denture. After five weeks, the two sinuses were perfectly healthy (Fig. 21). The final screw-retained fixed partial dentures were connected on both sides after four months of osseointegration (Figs. 22–24).



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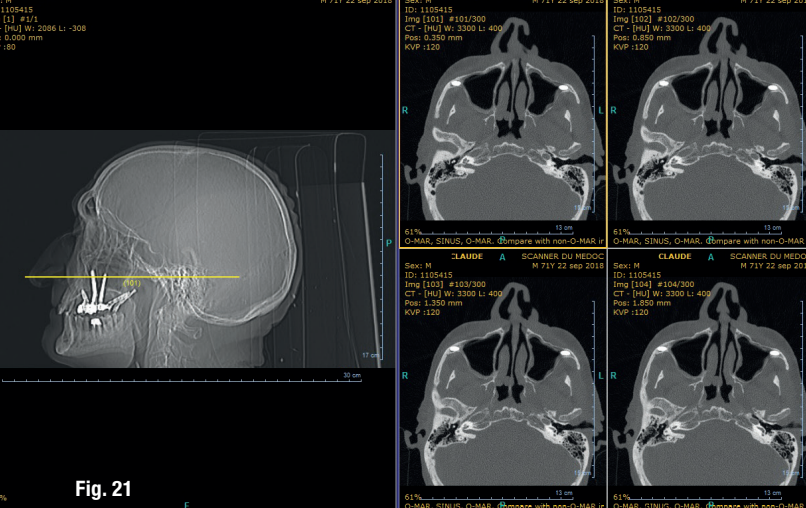


Fig. 21

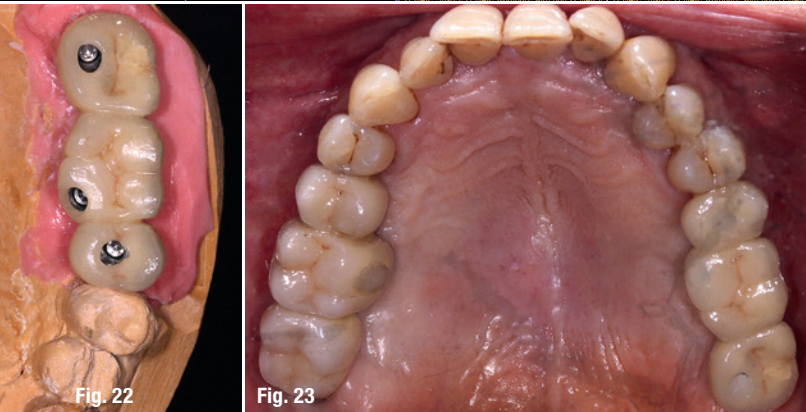


Fig. 22

Fig. 23

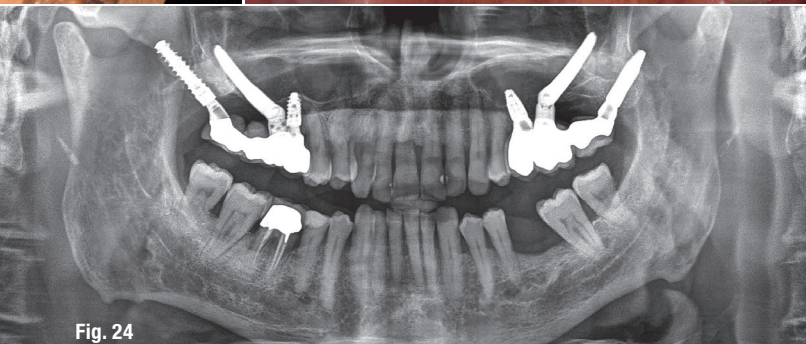


Fig. 24

**Case 4—Fig. 21:** Five weeks after closing the oroantral communication, the two sinuses were perfectly healthy. **Fig. 22:** Screw-retained fixed partial denture. **Fig. 23:** The final fixed partial dentures were connected on both sides after four months of osseointegration. **Fig. 24:** Post-op radiograph.

## Discussion

Regarding the rehabilitation of a posterior maxilla without bone grafting, Schramm et al. reported in 2001 the case of a patient with a maxillary unilateral defect treated with two zygomatic implants and a canine regular implant.<sup>10</sup> In 2004, Ferrara and Stella reported the treatment of a unilateral posterior edentulous maxilla with two regular implants inserted in the maxillary first and second premolar positions and a zygomatic implant.<sup>11</sup> In 2008, Aparicio Magallón and Soto-Yarritu Quintana reported a case of a partially edentulous maxilla treated with a canine regular implant and a pterygoid implant associated with a zygomatic implant.<sup>12</sup> In 2008, Davó et al. reported the rehabilitation of four patients with partially edentulous arches with two regular implants in association with one zygomatic implant.<sup>13</sup> The same concept was also used for the restoration of an anterior edentulous maxilla. In 2010, Apa-

ricio et al. detailed the rehabilitation of two patients with cemented fixed partial dentures.<sup>14</sup>

In this case series, all the surgeries were performed under local anaesthesia and without the use of guided surgery. The postoperative medical treatment consisted of 1 g of paracetamol every six hours for five days, mouth rinsing with chlorhexidine after each meal for seven days, and 2 g of amoxicillin per day for six days, starting the day before the surgery. The three patients were followed for five, four and three years, respectively. No infections, bone loss or prosthetic problems were reported. The three implants were judged as stable. The three patients were fully satisfied regarding the improvement of their aesthetics, masticatory efficiency and comfort.

## Conclusion

Based on the cases described in this article, it can be concluded that the rehabilitation of maxillary unilateral posterior edentulism with zygomatic and regular implants or zygomatic, regular and pterygoid implants is a successful alternative to a grafting approach. This experimental protocol allowed a shorter treatment time with fewer interventions and no risk of morbidity or complications linked to a graft donor site. However, more cases are needed in order to adequately assess the long-term results of this treatment protocol. It is important to note that successfully placing zygomatic and pterygoid implants requires excellent anatomical knowledge. The experienced surgeon must surround himself or herself with an equally experienced and trained team. Moreover, he or she must be familiar with the precise surgical procedures, as well as potential complications and effective ways of solving them if they occur.

Literature



## about the authors

**Dr Jean-Baptiste Verdino** is a French dentist who graduated from Aix-Marseille University in 1985. He currently runs an exclusive private practice in Hyères in France specialising in implant dentistry. In addition, he is an internationally published author with a specific interest in zygomatic implants.

**Dr Sepehr Zarrine** is a France-based dentist, who specialises in implant dentistry and complex cases involving immediate loading, bone grafting, and zygomatic implants. He currently practises in Saint-Dié-des-Vosges in France.

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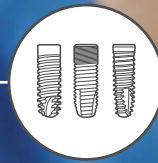
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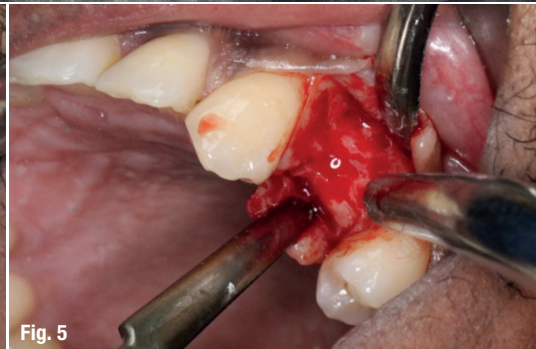
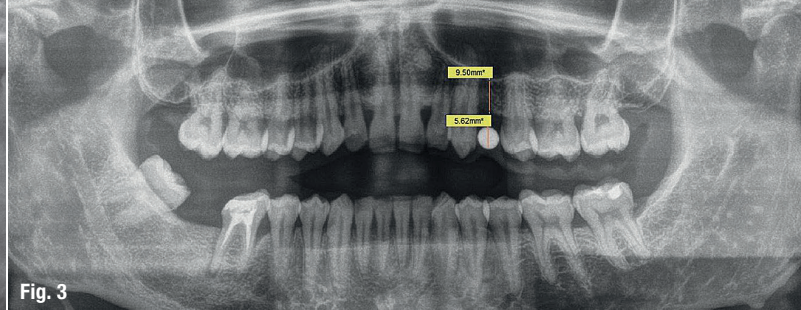
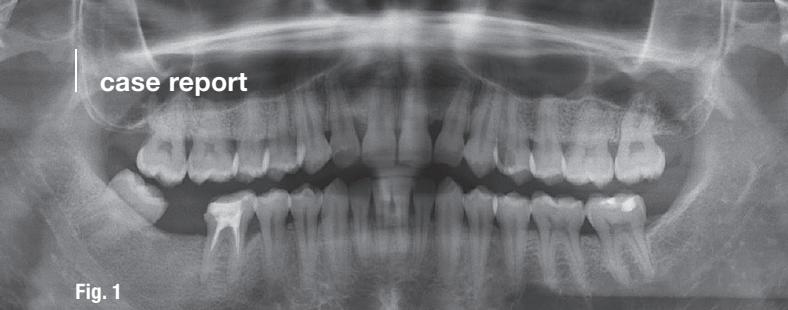
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**Fig. 1:** Radiograph of the initial clinical situation. **Fig. 2:** Clinical situation after extraction and healing. **Fig. 3:** Planning of the implant in region #24. **Fig. 4:** The crestal incision of the gingiva was made. **Fig. 5:** A mucoperiosteal flap was reflected.

# Two-stage implant therapy for single-tooth restoration

Simon Lehner, Germany

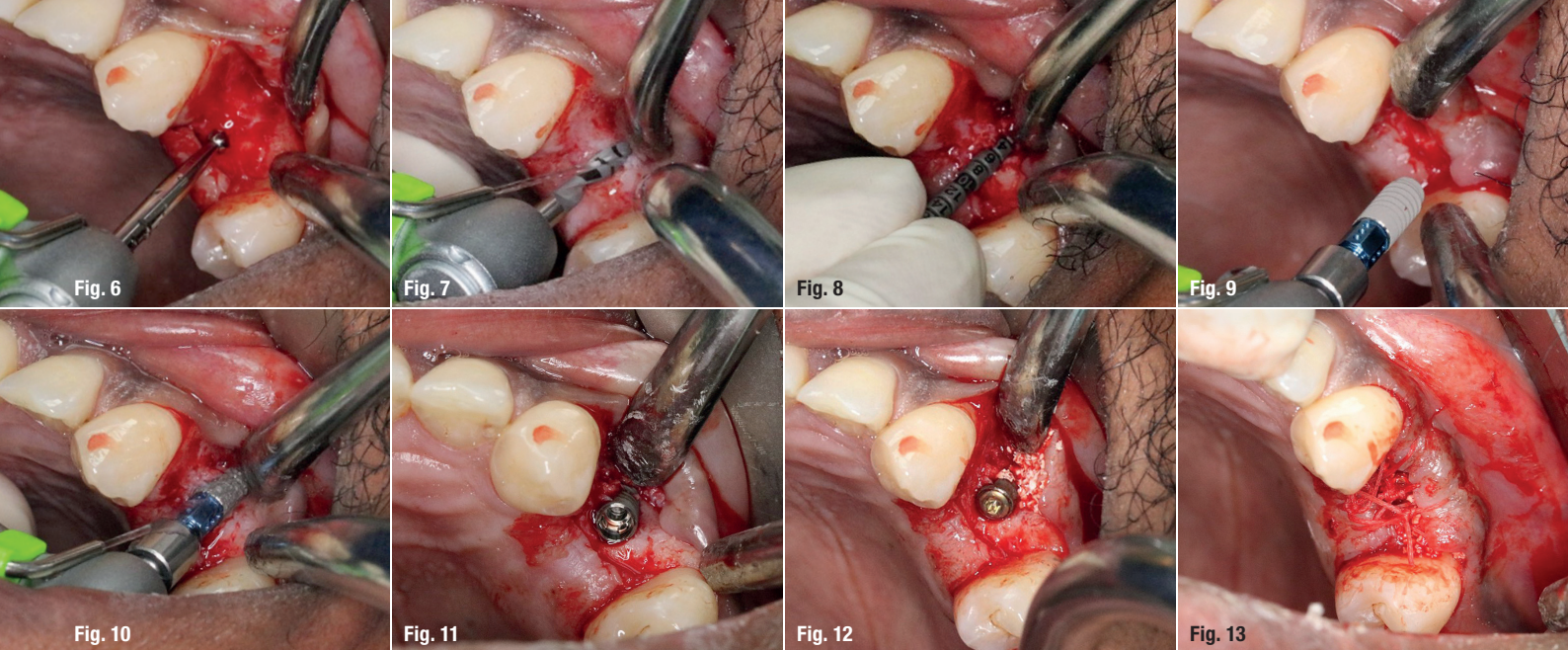
**The choice of implant** is a decisive factor for a successful treatment outcome. Careful planning, taking into account the patient's wishes, is a prerequisite for this. The following article describes the placement of a single-tooth implant in region #24. During surgery, the buccal bone wall proved insufficient and lateral augmentation was necessary. The author explains the choice of implant used in this case.

The patient, a man aged 36, presented to the dental practice. He complained about pain in his left upper jaw. The initial radiograph indicated that the extraction of tooth #24 would be inevitable (Fig. 1). The patient was informed in detail about the implications, and various possible treatment options were discussed. The patient expressed his wish for a fixed restoration and decided on a single-tooth implant in region #24. A tapered bone level implant (Straumann) with a length of 8.0mm and a diameter of 3.3mm was chosen. This implant has clinically proven features and unique advantages. Owing to its tapered implant body, the implant achieves good primary stability in soft bone and fresh extraction sockets. The implant is designed in a way that crestal bone preservation is optimised. This allows for simplified handling and attractive aesthetic results. Furthermore, patient-specific limitations in the anatomy of the jaw can be successfully overcome with this implant.

Another special feature of the implant is its material composition. This implant is made of a titanium-zirconium alloy (Roxolid), which is more stable than pure titanium and has good osseointegration properties. The moderately rough SLA surface, which is sandblasted, large-grit and acid-etched during the manufacturing process, additionally accelerates the osseointegration process. Implants with a rough surface have a higher bone-to-implant contact and higher biomechanical and functional stability.

## Planning and surgical procedure

After extraction of tooth #24 and a complication-free wound healing period (Fig. 2), the implantation was planned (Fig. 3). After opening the gingiva in region #24 by means of a crestal incision (Figs. 4 & 5), the implant bed was prepared (Figs. 6–8). Depending on the bone density (D1 = very hard bone, D4 = very soft bone), different drilling protocols should be used for the implant. This provides the necessary flexibility to adapt the preparation of the implant bed to the individual bone quality and the individual anatomical situation. The conical implant is placed press fit into the under-prepared implant bed. In the next step, the implant was inserted (Figs. 9 & 10). The implant shoulder should ideally be positioned ap-



**Figs. 6–8:** The implant bed was prepared. **Figs. 9 & 10:** The implant was inserted. **Fig. 11:** Primary stability was achieved, and there was a visible buccal bone defect. **Fig. 12:** Lateral augmentation was done, and the healing cap was placed. **Fig. 13:** The surgery site was closed with sutures.

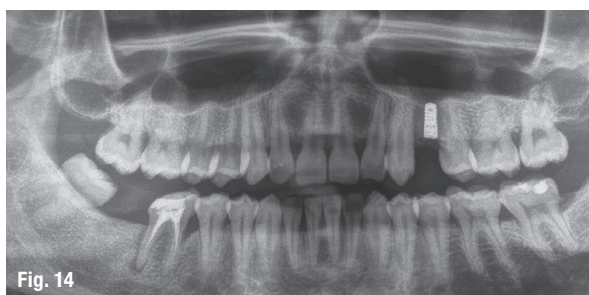
proximately 3–4 mm subgingival to the expected gingival margin in the aesthetically relevant area.

The implant used in this case can be inserted either manually or by means of a contra-angle handpiece. A maximum insertion speed of 15 rpm is recommended. Care must be taken to align the drilled hole to the blue transfer part exactly orofacially. The implant was inserted with high primary stability (Fig. 11). Since the buccal bone wall was found to be insufficient during the implant procedure, lateral augmentation (cerabone granules, 0.5–1.0 mm, botiss biomaterials) was necessary (Fig. 12). The surgical site was closed with sutures (Fig. 13), and the patient was informed in detail about postoperative care. He was prescribed Sympal (25 mg; BERLIN-CHEMIE) for inflammation and pain relief and CEFUROXIM AL (500 mg;

ALIUD PHARMA) to prevent infection. Alternatively, the patient could have been prescribed 600 mg of ibuprofen or Novaminsulfon drops (N1; ratiopharm).

## Conclusion

The implant used for this case is suitable for immediate and early restoration of single-tooth gaps within the confines of the indication. Good primary stability and suitable occlusal loading during the healing period are key for successful osseointegration of the implant (Fig. 14). The design allows for optimal preservation of crestal bone and soft-tissue stability. The unique nature of the implant enables fast and predictable osseointegration. For immediate provisional restoration, the prosthetic portfolio offers a wide range of provisional and final abutments (Fig. 15).



**Fig. 14:** Post-op radiograph. **Fig. 15:** The long-term provisional restoration was inserted using Temp-Bond (Kerr).

## about the author



Germany-based dentist **Simon Lehner** has been specialising in oral surgery since 2013. He studied dentistry at the University of Ulm in Germany between 2001 and 2002 and at the Medical School of Hannover (Medizinische Hochschule Hannover) between 2003 and 2007. He is a member of several dental expert societies, including

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# Experiences with a collagen composite in socket preservation

Prof. Frank Palm<sup>1</sup>, Dr Jan Rupp<sup>1</sup> & Prof. Werner Götz<sup>2</sup>, Germany

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## Introduction

In the first year after tooth extraction, there is bone loss of up to 60%, and the loss in width tends to be greater than in height as has been shown in multiple studies.<sup>1,2</sup> Bone loss by itself is a negative result in procedures where immediate or future placement of an implant is planned. Within today's implantology, there is therefore a need for constant material improvement and innovative products that are easy to use, present no risk for patients, and promote bone remodelling that allows implantation without bone augmentation. One such material is CERASORB Foam (curasan), a novel bone regeneration material composed of 85% beta-tricalcium phosphate ( $\beta$ -TCP) and 15% collagen. The organic phase of bone consists of collagen, contributing to the viscoelasticity of the bone, and a wide variety of collagen-based scaffolds have been proposed to mimic the native bone tissue micro-environment and thereby improve bone regeneration.<sup>3</sup> CERASORB Foam is a collagen composite material built from collagen matrix in which  $\beta$ -TCP granules are homogeneously distributed in a very structured order (Fig. 1). The collagen content is used to embed the granules and fix them in its fibres. The special mixture of both allows for a granular content of 85% by weight and a high-volume stability.

A split-mouth clinical study with 35 patients was designed to evaluate the performance of CERASORB Foam

in socket preservation procedures. As a comparative material, a gelatine haemostatic sponge (stypro, curasan) was chosen owing to similarities in the application techniques of both products. In this article, the authors describe two clinical cases that were part of the study.

## Case 1: Socket preservation after severe periodontal disease affecting the bone

A patient presented to the clinic complaining about periodontal problems. The patient had been treated in the same clinic 20 years before with a sinus lift with CERASORB M (curasan) and the placement of three implants. A panoramic radiograph taken preoperatively revealed the advanced stage of the periodontal disease and indicated the unsalvageable teeth that needed extraction before the treatment could be carried out (Fig. 2). Natural bone tissue could be seen around the implants, whereas remnants of the previously placed material and additional bone tissue were absent. In the first quadrant, teeth #16, 14 and 11 were extracted and grafted with stypro cubes. In the second quadrant, teeth #21, 22 and 23 were extracted and grafted with CERASORB Foam. In all extraction sockets, minor debridement was performed, and after the application of the material, single returned sutures were performed (Figs. 3 & 4). After four weeks, both grafted sites showed very good healing without any signs of inflammation (Fig. 5). However, it could be seen clearly that the gelatine-based product was not

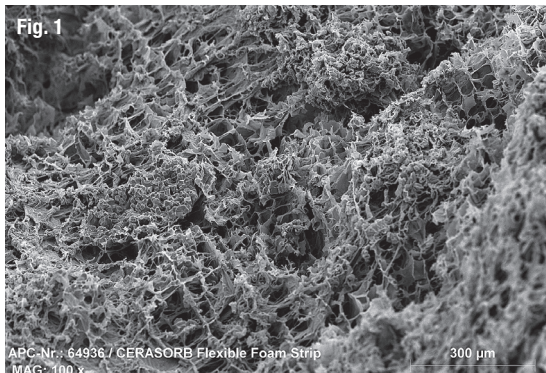
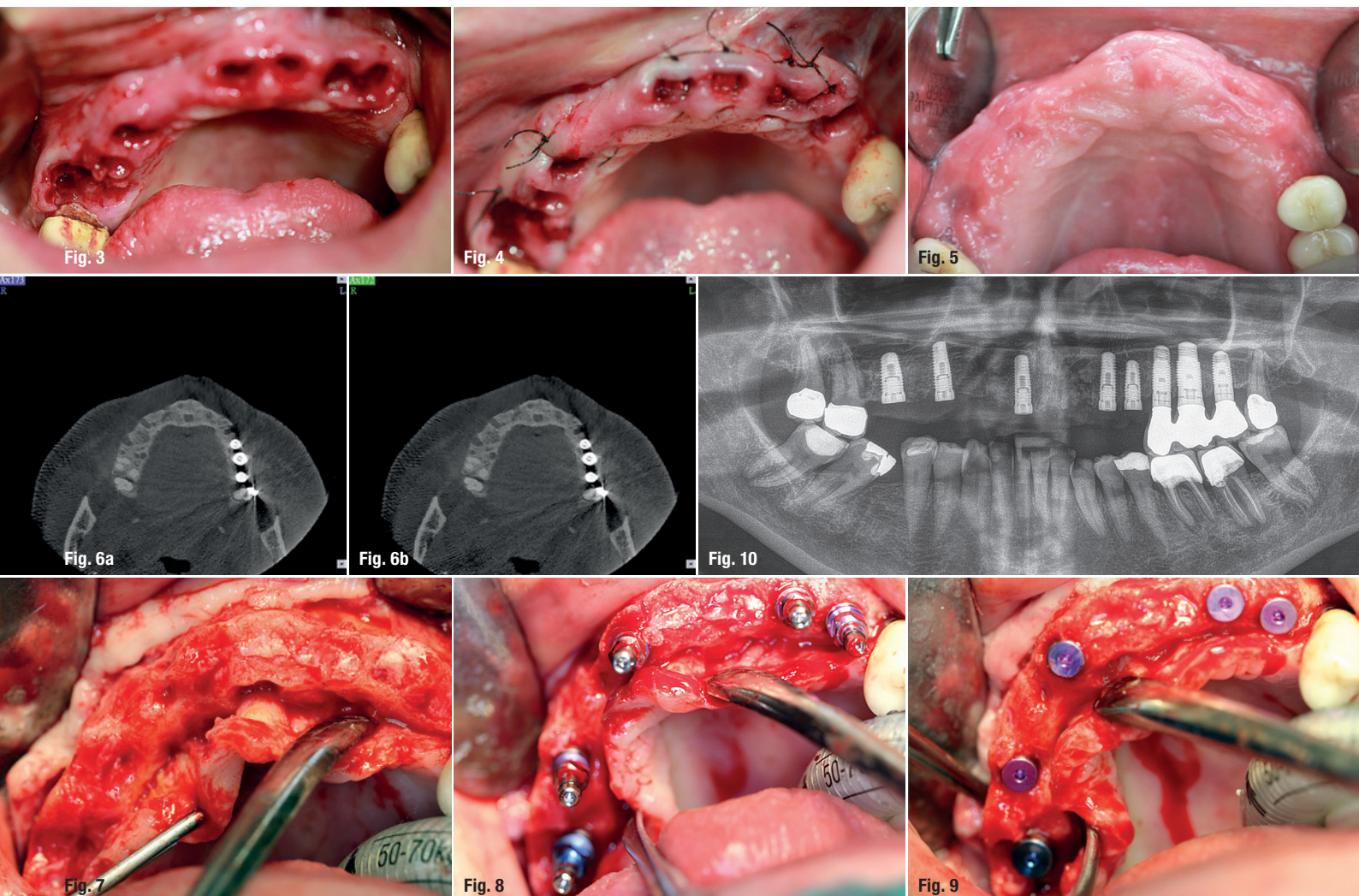


Fig. 1: CERASORB Foam, REM image. Case 1—Fig. 2: Pre-op panoramic radiograph.



**Case 1—Fig. 3:** Vestibular view after multiple extractions. **Fig. 4:** Application of sutures. **Fig. 5:** One-month post-op follow-up. **Figs. 6a & b:** CBCT scan four months post-op. **Fig. 7:** Elevation of the mucoperiosteal flap. **Figs. 8 & 9:** Insertion of the implants and coverage with healing caps. **Fig. 10:** Post-implantation panoramic radiograph.

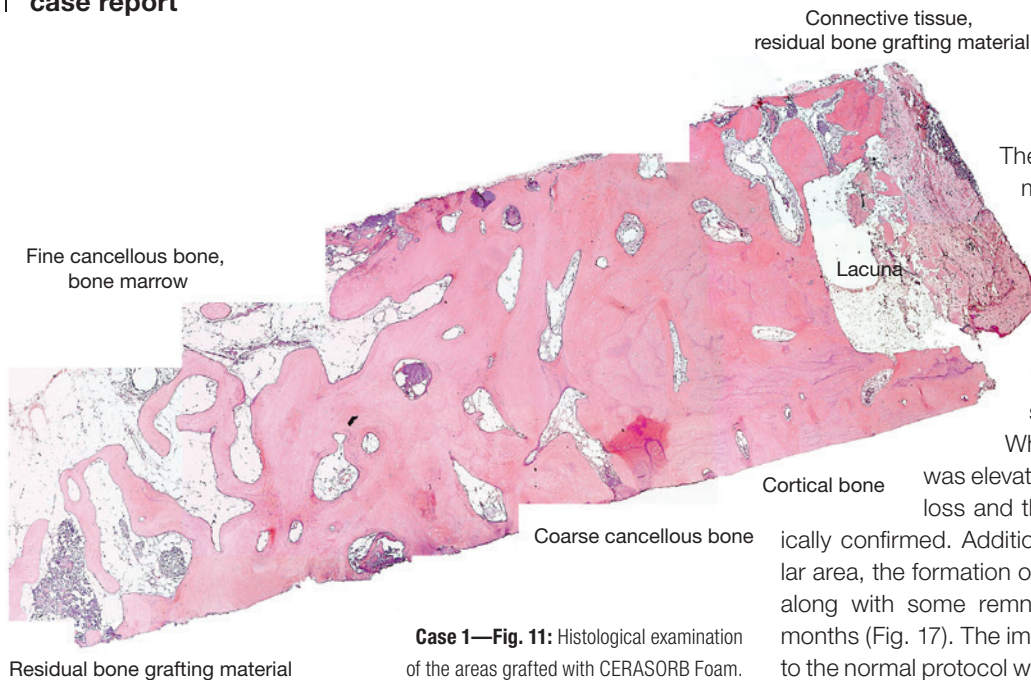
able to preserve the structure of the bone as efficiently as the CERASORB Foam did. In the CBCT scan taken after four months, this was evident too (Figs. 6a & b). It is worth mentioning that a dental barrier membrane was not used during grafting, nor during any of the other procedures performed in the study.

Once a full mucoperiosteal flap had been elevated, the grafted areas were clearly visible (Fig. 7). It was notable that bone had been preserved in the sockets grafted with CERASORB Foam and some small remnants of the particles were visible. In the areas grafted with stypro, the bone was insufficiently preserved and a smaller area of new bone tissue could be seen. In the same area, there was also a small ingrowth of soft tissue where the roots of the teeth had been prior to extraction. The implants were placed in the desired positions (Figs. 8 & 9), and the rest of the procedure was performed consistently on both sides. A control radiograph was taken immediately after

the procedure (Fig. 10). In addition, in the area grafted with CERASORB Foam, a biopsy sample was punched and taken for further histomorphological examination. The biopsy showed mature bone in the grafted sites, and only small remnants of the material could be observed. Overall, a large amount of new bone structure was present (Fig. 11).

### Case 2: Alveolar ridge preservation with CERASORB Foam

In this case, a comparative treatment was performed. Five teeth were extracted (Figs. 12a–d). The sockets of extracted teeth #11, 12 and 16 were closed with stypro cubes and of teeth #26 and 27 were augmented with CERASORB Foam (Fig. 13). It is notable that, in the right molar area, the Schneiderian membrane was perforated during the extraction and the Valsalva test was positive. The normal treatment in this situation is to release



**Case 1—Fig. 11:** Histological examination of the areas grafted with CERASORB Foam.

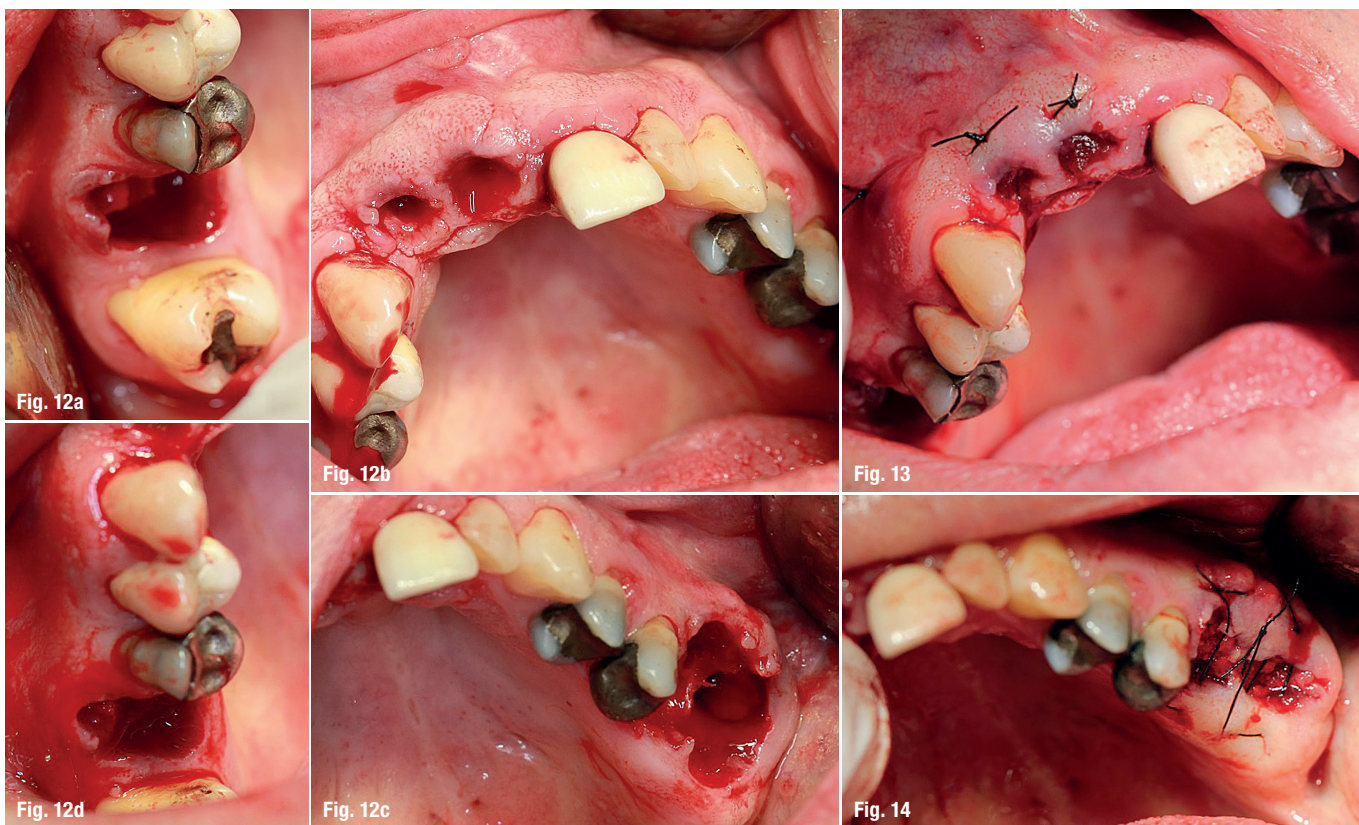
The radiograph taken after four months of recovery showed that the areas treated with only stypro had almost no bone preservation and had increased resorption (Figs. 15a & b). The areas treated with  $\beta$ -TCP and collagen, however, preserved significantly more bone (Fig. 16).

When a full mucoperiosteal flap was elevated in the treated areas, the bone loss and the bone preservation were clinically confirmed. Additionally, in the maxillary right molar area, the formation of new bone tissue was detected along with some remnants of the material after four months (Fig. 17). The implantation proceeded according to the normal protocol without any unusual observations. Only a control radiograph was taken after the procedure (Fig. 18). The histological images showed, once again, that new bone had formed and that few remnants of the material were present.

a small flap to close the sinus; however, because the CERASORB Foam is stable and compact, this is not necessary. It is only applied with medium compression and lightly pressed against the haematoma without the need for any soft-tissue repositioning. The defect was closed with very single returned sutures to adapt the margins and keep the implanted material stable (Fig. 14). Both clinical control photographs after ten days and after one month showed very good healing.

**Conclusion**

The healing in the CERASORB Foam group was as good as the healing in the stypro group. Both materials stabilised the haematoma, which was very good for the healing process. It should be additionally mentioned



**Case 2—Figs. 12a–d:** Extraction of teeth. **Fig. 13:** Closure of sockets with stypro cubes. **Fig. 14:** Augmentation with CERASORB Foam and closure with single returned sutures.



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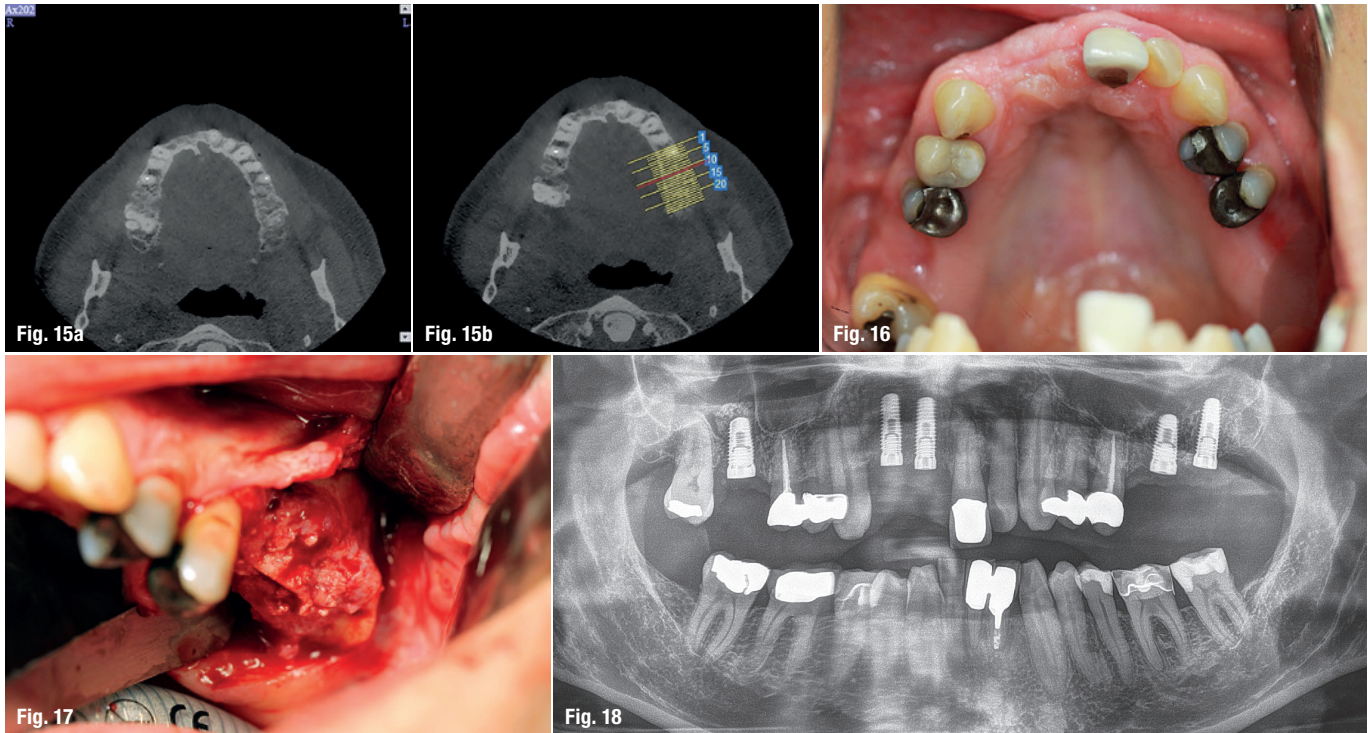
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**Case 2—Figs. 15a & b:** CBCT scans after four months of recovery. Increased bone resorption can be observed at the stypro site (a) and good bone preservation at the CERASORB Foam site (b). **Fig. 16:** Clinical situation at the follow-up after four months. **Fig. 17:** Formation of bone visible after mucoperiosteal flap elevation. **Fig. 18:** Post-op control radiograph.

that, to achieve good healing, both materials should be inserted without compression. There is almost no difference in the surgical steps when using both products; however, a simple suture is recommended. Surgery for oroantral communication can be avoided by applying CERASORB Foam. However, the bone loss in the stypro group was significantly higher than in the CERASORB Foam group. The reason for the higher bone loss might be related to there being no calcium in the stypro product. It is well-described scientific fact that calcium ions ( $Ca^{2+}$ ) increase osteoblastic activity. For instance, back in 1990, it was reported that the increase of calcium inhibits the resorption of bone tissue.<sup>4</sup> Teti et al. showed that an increase in extracellular calcium concentration reduced the resorbing activity of osteoclasts.<sup>4</sup> Riccardi and Gamba found that the activation of calcium receptors triggers an intercellular cascade of secondary messengers, producing a cascade of biological activity, including bone-derived cell lines.<sup>5</sup> Both papers indicate that, by increasing  $Ca^{2+}$  around the bone, we can not only speed up the formation of bone but also inhibit the resorption of the same tissue. In 2006, Kondo et al. implanted highly purified  $\beta$ -TCP in canine dorsal muscles and found that the material had osteoinductivity even without the use of bone marrow cells or cytokines.<sup>6</sup> Research by Ahlstrom et al. showed that *in vitro* it only takes 60 minutes for the effect of  $Ca^{2+}$  stimulation to take place.<sup>7</sup> The extracellular calcium-sensing receptor expressed in bone cells is essential

in the regulation of skeletal homeostasis.<sup>8</sup> Further scientific studies are needed to confirm the findings of the research reported on in this article.



about the author



**Prof. Frank Palm** is a specialist in implantology and oral surgery. He completed his first implant surgeries at the University of Göttingen in Germany in 1991. Today, he works in a joint practice in Constance in Germany, where over a thousand implants are placed each year. Prof. Palm is one of the founding members of the International Society of Metal Free Implantology.

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# What's your favourite colour?

## A quick guide to surface anodisation

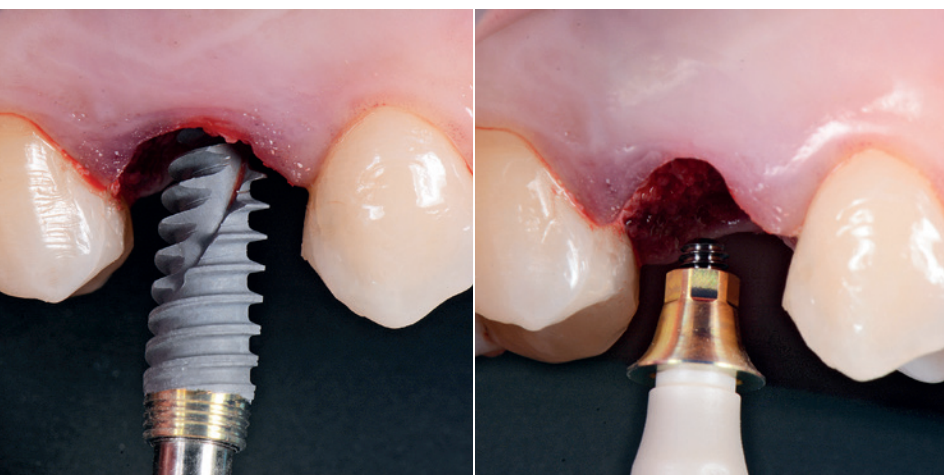
Nobel Biocare, Switzerland

**Surface characteristics** are key to the body's response to the implant and abutment that you place in your patient.<sup>1,2</sup> Ultimately, it could decide whether your mission for tissue integration succeeds or fails, both for early healing and long-term stability.<sup>3</sup> This is why the surface treatment chosen by your implant and abutment manufacturer is so important: their engineering determines those crucial surface characteristics. Despite the importance of changes to the surface, to the naked eye, it might be difficult to see such a difference—other than a different shade of grey, depending on the treatment process. However, with the recently developed anodised surfaces, Xeal and TiUltra, you will see a distinctive golden hue. This

colouration has not been created simply for appearance. The gold is a by-product of our advancements in applying this technology, in order to create different characteristics for different tissue integration—from soft tissue, to cortical bone, to cancellous bone. Anodisation can take titanium through an entire spectrum of colour, depending on the surface characteristics it creates.

### What is anodisation?

Anodisation is an electrochemical process used to engineer a titanium surface. While titanium provides high-strength and cell adhesion, it's the oxide layer—instantly created when titanium is exposed to the air—that makes tissue attachment possible.<sup>4</sup> While subtractive surface technology (such as sandblasting and/or acid etching) removes material to create the roughness, anodisation does the opposite—it increases the thickness of the oxide layer. And it's this change of thickness that causes the change of colour. The basic process is this: We place the implant in an electrolyte fluid, making it the anode when we apply an electric voltage. As the voltage intensifies, and the length of time increases, the oxide layer expands to a thickness of up to 10,000nm.<sup>5</sup> The oxide's changing thickness tailors interference of light at the surface, and the thicker it becomes,



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the more its colour moves along the spectrum. If a critical voltage is reached, sparks appear (spark anodisation) and the oxide begins to break down, creating even more roughness with volcano-shaped nodules.<sup>6</sup> The colour then returns to grey, but with a matt finish.

### Why the golden hue?

Our surface treatment of Xeal abutments and TiUltra implant collars has not been tailored simply for appearance. Nonetheless, the colour at abutment and implant collar level could potentially bring its own benefits: Studies have shown that improved soft-tissue appearance can be achieved by changing the abutment colour from grey to yellow or pink.<sup>7-10</sup> But in essence, the golden hue is a consequence of the time and voltage needed to create a surface topography and surface chemistry specifically designed to optimise tissue attachment at a collar and abutment level.

At abutment level, studies have shown that:

- An oxidised, nanostructured surface stimulates more gingival-fibroblast adhesion than machined.<sup>11,12</sup>
- An oxidised surface enables more epithelial-cell attachment than a machined surface.<sup>13,14</sup>
- Reduced surface roughness at the abutment can decrease plaque accumulation.<sup>15-17</sup>

At implant collar level, it is important to minimise marginal bone loss.<sup>18</sup> Turned surfaces with just a slight roughness have demonstrated this after over ten years of function<sup>19</sup>; and minimal to moderate roughness can reduce marginal bone loss compared to smooth surfaces.<sup>20,21</sup> Built on evidence demonstrating the benefits of a smooth,



anodised, nanostructured abutment and a minimally rough, anodised, nanostructured implant collar, our applied anodisation has been fine-tuned even further.

The result? As well as a desired surface topography and surface chemistry, it's a surface with a golden hue.

### Fine-tuning anodisation— it's more than roughness

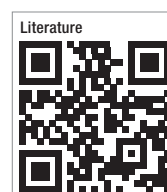
Nobel Biocare has two decades' expertise in applying anodisation technology. After the original transition from machined to anodised implants, the impact on early failure rates was truly remarkable; from 11.4% to just 2.1% in the maxilla\*.<sup>22</sup> When it comes to long-term survival, the anodised surface showed a significantly higher survival rate than surfaces used by other brands for ten years or longer.<sup>19</sup> Our further steps forward today go beyond just roughness, but chemistry, ultra-hydrophilicity and protection of the surface too.

*References are available upon request.*

\* Average failure rate of machined implants 1986–2002, compared to anodised TiUnite implants 2003–2011.

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Literature

# Going digital with the Heron IOS

**It's been just over a year** since American-based imaging company 3DISC made its Heron IOS solution commercially available. In this interview, 3DISC Deputy Group CEO, Thomas Welding, talks about how the solution has developed over the past year and provides his view on how the Heron IOS solution can help dentists overcome the barriers to going digital.

**It's been a year since 3DISC officially introduced the Heron IOS solution to the market. Where is Heron IOS today, when compared to the initial launch?**

The solution we launched a year ago was our first version of an intra-oral scanner, and we have come a long way since the initial release. We've had two subsequent releases, which are important milestones for us, in that they take the solution to the next level of intra-oral scanning. First, in October this year, we had a major software release which improved the scanner performance, in particular. The core technology of this update introduces a new way of storing large amounts of 3D information in real time, improves performance and speed, and offers higher resolution, increased accuracy and higher quality output.

The 3DISC development team is constantly working on improving the product, and through recent software updates we have managed to increase scanning speed by more than 30 per cent, improve bite alignment and add support for 20 series graphics cards. In addition, we have significantly improved the surface quality and detail level of our scans by implementing new processing algorithms. We also have an upcoming software release that will introduce an entirely new user interface (UI) to the Case Management application in the Heron IOS solution. The new application will be based on our own, in-house developed, software platform. The new UI and easy workflow are a big leap forward and offer dentists a premium user experience. With these two releases, I believe we have earned a place among the best intra-oral scanning solutions available for dental practices and their patients.

**How will these enhancements better address the needs of your market?**

We know dentists value two things: user experience and efficiency. Having a faster, more precise scanner enables dentists to feel more confident about using digital technology, and at the same time, reduces chair time, giving them a more efficient practice. We also understand that one of the key barriers to adoption of digital intra-oral scanning technology is dentists' hesitancy to invest in expensive, advanced technology with a steep learning curve. They feel they don't have the time needed to learn the digital workflow and train their staff in using the scanner and software. Another key barrier is concerns about price and ongoing costs related to digital scanning solutions. The Heron IOS addresses these barriers, by giving dentists a solution that is ready to use right out of the box, has a low learning curve, requires little training and implements easily in their daily business. All of this at a very attractive price point, with free upgrades and no additional ongoing cost. With Heron IOS, I truly believe dentists get the best value for their money.

“With Heron IOS, I truly believe dentists get the best value for their money.”

Thomas Welding, CEO 3DISC Deputy Group.

**With so many intra-oral scanners on the market, what should dentists looking to go digital be looking for in a scanner?**

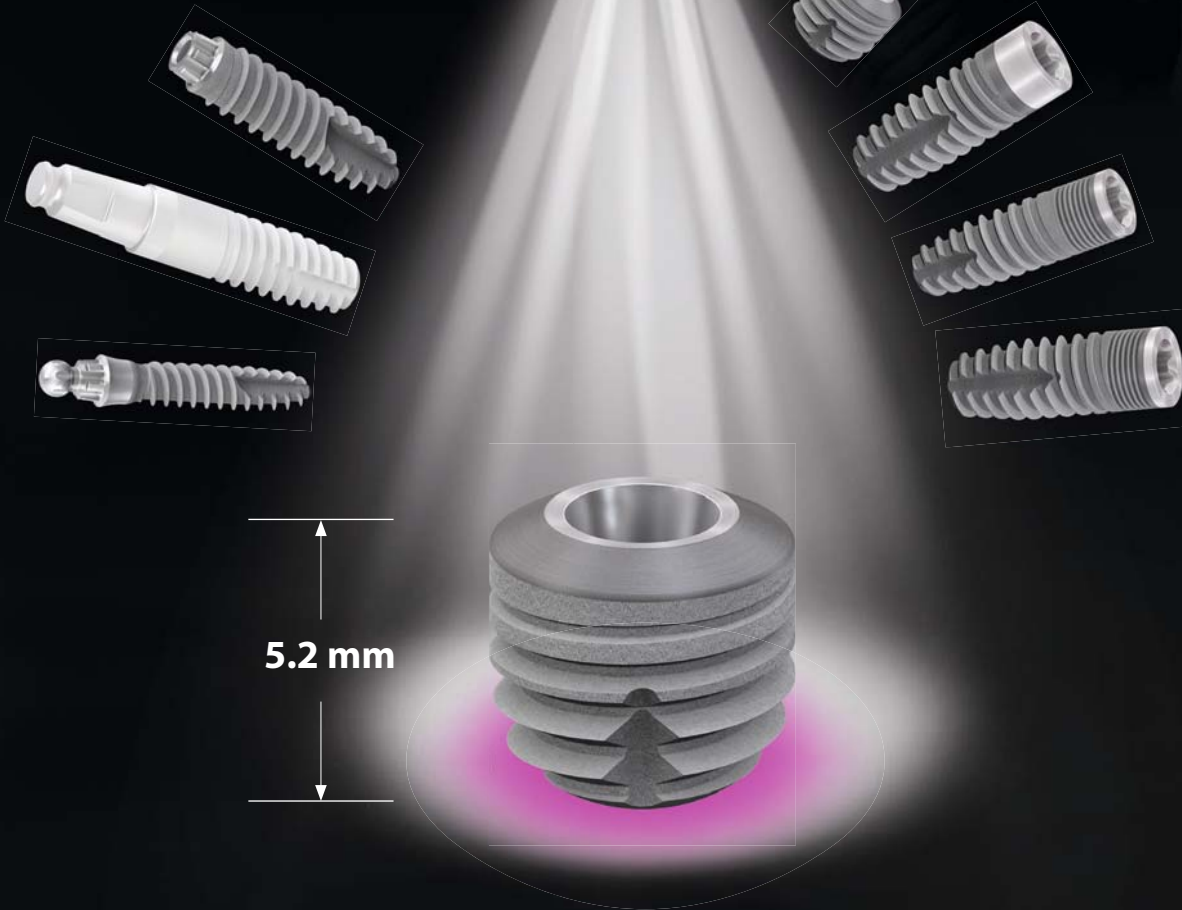
There are more scanners available on the market today than ever before, which means dentists are spoiled for choice. The challenge for many dentists is to sift through the abundance of products available to find the exact fit for their practice. I believe there are three key factors dentists should consider when selecting a solution. First, the solution must cover the dental practice's functional needs in terms of the actual impression taking task and the range of indications the solution sup-



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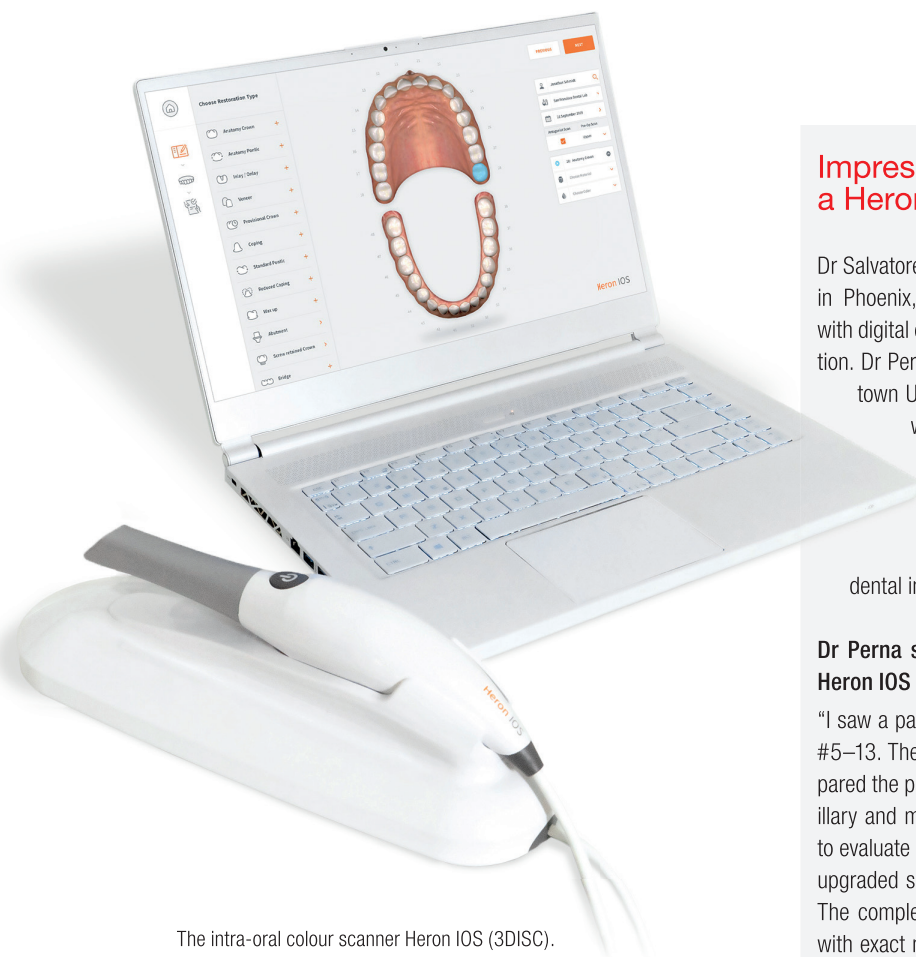


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The intra-oral colour scanner Heron IOS (3DISC).

ports. Next, the solution should offer flexibility in the form of an open architecture that can work with any system. And, as I mentioned before, the solution has to be easy to implement and use; for the dentist, for the lab and for the patient. I believe the Heron IOS ticks all of those boxes.

**Digital technology is everywhere. Why do you think there are still dentists who have yet to embrace digital intra-oral scanning technology?**

What I see when I travel and meet with dentists is that they all understand the benefits of going digital. It's more the barriers I spoke about earlier: price and time, that are preventing wide-scale adoption. Yet, I think we'll see a push towards adoption from two fronts. One, that there are solutions like Heron IOS, which remove the cost and time barriers by providing a cost-effective, easy-to-operate solution; and that we will see a push from patients who choose to go with dentists who use digital technology. I think patients, particularly millennials, will increasingly navigate towards digital dentist practitioners, and that will help drive the next wave of digital intra-oral scanner adoption.

**What can we expect from 3DISC in the coming year?**

We commit to delivering the intra-oral scanning solution you see today with the current price model and upgrade path. In the future, we will offer more advanced add-ons that dentists can purchase in order to expand their solu-

**Impressions from the field—  
a Heron IOS testimonial**



Dr Salvatore F. Perna practises dentistry in Phoenix, Arizona, where he works with digital cosmetic dental reconstruction. Dr Perna graduated from Georgetown University School of Dentistry with a Doctorate in Dental Surgery degree. He has completed more than 2,000 hours of postgraduate clinical education, and holds certificates in a variety of areas, including advanced dental implantology and advanced full mouth reconstruction.

**Dr Perna shares his experience in working with the new Heron IOS solution:**

"I saw a patient for restoration of decayed and misaligned teeth #5–13. The patient requested ideal anatomical cosmetics. I prepared the patient for full coverage crowns and scanned the maxillary and mandibular arches with the Heron IOS. I was curious to evaluate the cross-arch accuracy and marginal integrity of the upgraded software algorithm that 3DISC has recently released. The completed crowns seated perfectly on the patient's teeth, with exact marginal integrity. I found the interface and software module to be very user-friendly. The patient did not experience any discomfort, and I had no problems scanning the distal of any posterior teeth, due to the tapered Heron IOS handpiece. It was easy to transfer STL files to my crown and bridge and denture laboratory. The lab appreciated the digital lab slips comprehensive, yet streamlined approach to communicating my Rx to them."

tion. Our ambition is three-fold: to develop our technology so that we give dentists a quick and easy workflow providing increased productivity; to offer the most reliable solution on the market; and to be the best economical choice for dentists. In addition to these ambitions, we will also focus on our support services. Dentists need fast, reliable, professional help, when they have support questions or issues. Their success is our priority, so in addition to our physical support centres located around the world, we will continue to expand our online support services for end users.

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Fig. 1

Fig. 1: Prof. Shahram Ghanaati (right) and Georg Isbaner (Editorial Manager of *implants*).

## More than just PRF

**Needless to say, the patient's own tissue** is still the augmentation material of choice and often preferred by many clinicians to the various synthetic or xenogeneic bone replacement materials on the market. In recent years, the autologous blood concentrate known as platelet-rich fibrin (PRF) as an adjunct to surgery has established itself as a gentle and practice-oriented method of accelerating wound healing. In this interview, Frankfurt am Main-based Prof. Shahram Ghanaati discusses the significance of autologous blood concentrates in dentistry and the associated challenges. A researcher, expert and oft-invited speaker, Prof. Ghanaati has been active in the field of bone and tissue regeneration for many years.

### Where does PRF come from, and how did its use come into being?

It started with the development of platelet-rich plasma (PRP), which was especially in vogue in the 1980s and 1990s. With PRP, we learned that we could work with blood products. The exclusively liquid concentrate, which was initially produced with a relatively high centrifugal force, was intended to accelerate wound healing processes. Unfortunately, however, this development was quickly followed by attempts to find a healing agent for bone healing in PRP, which heralded the demise of PRP. In the end, one simply had to admit that PRP made no contribution whatsoever to bone healing. How is a blood concentrate supposed to heal bone in the first place? The problem was that the wrong marketing concept had

been pursued. In addition, PRP was seen as a product. However, blood concentrates are not products, but concentrates obtained from the patient's blood. Every human being has a different blood composition and as a result also a specific blood concentrate. This own-blood concentrate serves to accelerate and support the tissue healing of the same patient. Since blood concentrates up to the year 2000, including the PRP successor, plasma rich in growth factors (PRGF), were predominantly liquid, they had to be mixed with an anticoagulant, such as sodium citrate, in order to be centrifuged. And these concentrates were only available in injection form.

It was Dr Joseph Choukroun who finally discovered that it is possible to naturally coagulate the concentrated blood by using either glass or plastic surfaces. For example, PRF clots are made in a glass tube and liquid PRF in a silicone tube, which helps to keep the concentrate liquid for half an hour. The blood concentrates—liquid or solid—that we produce today are known as PRF. It differs from PRP and PRGF in that it does not require the addition of any anticoagulants. Personally, I believe that these concentrates shouldn't be called PRP, PRGF or PRF, but patient-specific blood concentrates, given that they are ultimately nothing more than concentrates made from blood and are produced depending on the centrifugal force. This would be an important contribution to the general understanding. In addition, we should start to move away from the "P" in "PRP", "PRGF" and "PRF". The "P" implies that only the platelets are crucial in a blood concentrate. How-

ever, there are a number of further substances and cells in the blood that make a contribution as well, such as leucocytes, which are the defence cells. It would be wrong to speak only of thrombocytes.

### What is the current significance of autologous blood concentrate in dentistry?

During a surgical procedure, something is opened up which then has to be closed again. In order to heal, every wound needs some form of support. In a surgical situation, the use of patient-specific autologous blood concentrate can serve as support in that it significantly accelerates wound healing—in almost every indication and in every field of dentistry. The work is of course done by the bone substitute material or the collagen membrane used, but the communication between these two components and the rest of the tissue is done by the

“We have to rethink our approach towards blood concentrate-based regeneration.”

autologous blood concentrate. It is similar to the launch vehicle on a space shuttle that is launched on a mission into space: the launcher separates from the space shuttle after leaving the atmosphere and the actual mission is then completed by the space shuttle. We have conducted numerous studies showing that the use of PRF can complete the intended clinical indication more successfully compared with indications without the use of concentrated autologous blood.

There was a time, not long ago, when people were extremely excited by stem cells, which are great cells, of course, with many functions that contribute greatly to regenerative processes in the body. However, in many countries—and that includes Germany—stem cell therapy is, for the most part, still banned from use. It is only permitted for certain exceptional indications, but not for dentistry. In addition, the use of cells or growth factors is actually not possible within the confines of a dental practice. You have to consider that you first have to remove tissue and isolate cells from it, which alone can take weeks. You then have to cultivate these cells in order to transplant them to the patient at an even later point in time. In comparison with this rather cumbersome process, autologous blood concentrates are a much more practice-oriented alternative and not as time-consuming.

### What does the production entail in concrete terms?

The patient comes to a dental practice and lies down on a stretcher. Under sterile conditions, blood is taken from

him or her and then placed in a centrifuge, which stands chairside on an adjacent table. The blood taken from the patient is centrifuged there according to our low-speed centrifugation concept (LSCC). According to the LSCC, autologous blood concentrate can be produced with a high, medium or low centrifugal force. All you have to do is press a few different buttons to rotate the centrifuge differently. In this way, we are able to produce not only PRF but PRP and PRGF as well. The centrifugation duration is always eight minutes, no matter whether you are producing high-, medium- or low-concentrated concentrate. Using glass and silicone-based tubes, a high centrifugal force results in a large clot with a relatively high volume, but few cells and growth factors. The lower the centrifugal force, the smaller the clot, but the more growth factors and cells it contains. As a result, we are able to work with PRF based on indication. In situations where a dense fibrin matrix is required, high centrifugation is required, and in situations where concentrated autologous blood is to be mixed with bone graft substitutes, for example, a matrix is required that allows the cells to grow the tissue between the granules. In periodontal therapy, however, there are times when autologous blood concentrate with a liquid matrix is needed as an alternative to Emdogain (Straumann) or to treat the mucous membrane.

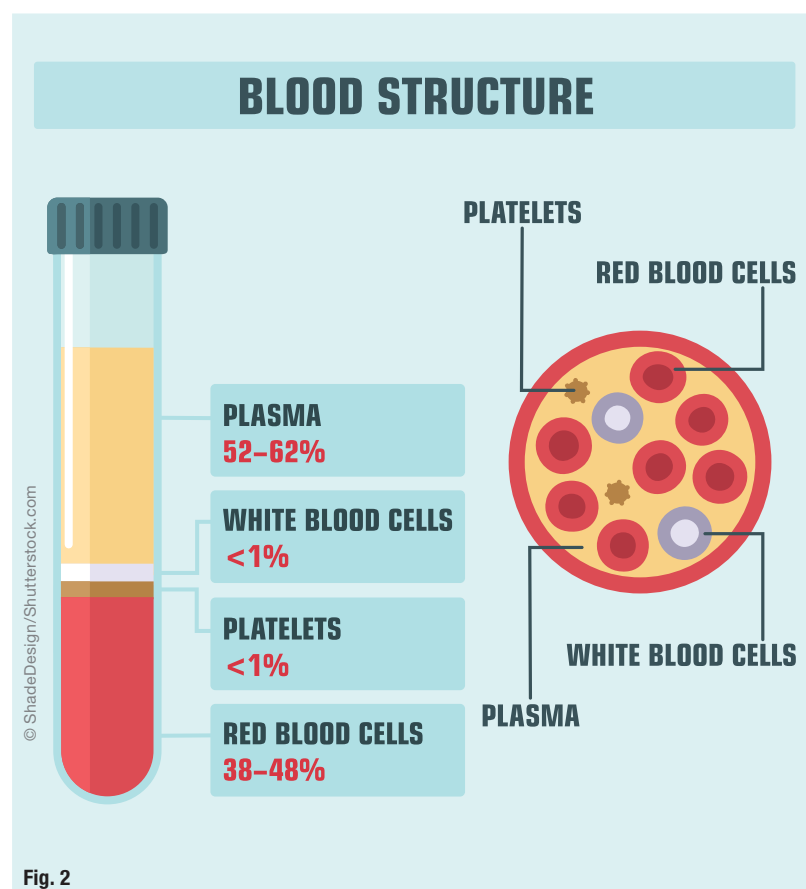


Fig. 2

Fig. 2: Graphic representation of the blood structure.

Fig. 3



**Fig. 3:** Platelet-rich fibrin is used to accelerate wound healing processes and enhance the effectiveness of bone grafting material.

### Is autologous blood concentrate already used in other clinical areas?

Concentrated autologous blood has a significant and elegant effect on patients suffering from temporomandibular joint problems and on patients with refractory fractures. In orthopaedics, PRP, which is nothing other than PRF in a different concentration, is used in the field of joint regeneration. In aesthetic treatment, it is used to treat a range of scar formations, acne and various other skin diseases, and as a hyaluronic acid replacement. Furthermore, we use the patient's own blood concentrate for chronic pain patients. There, we do exclusively autologous blood therapy indicated as pain therapy. Hence, dentistry is rather a niche area. I would like to draw attention to another problem, which will increasingly come up in the future: the number of cases of bisphosphonate-associated bone necrosis and osteogenic and radiogenic bone necrosis is progressively increasing, as bisphosphonates are often administered to ageing patients as part of cancer therapy. The resulting bone necrosis can have serious consequences, such as partial resection of the jaw. In fact, the number of carcinoma patients is generally increasing. Here in Frankfurt am Main, we have already established treatment concepts that achieve great revitalisation with autologous blood concentrates.

The main focus of dentistry is mostly on implantology, although this discipline is a secondary one. Periodontics, for example, is much more important because the focus is on saving the tooth. We have developed treatment concepts to regeneratively support periodontal therapy. However, it is essential that patients assume as much responsibility as possible on a metabolic level. This concerns vitamin D3, proper nutrition, water balance management, etc. One can, for example, enable kidney illnesses to develop, simply by drinking too little water. This is exactly what is meant by "biological dentistry", namely the promotion of the regenerative powers of the patient through a holistic therapy approach. The understanding of this, however, should be conveyed in effective ways in the media, and the media should be committed to doing so because patients are simply unaware of many of these things.

### What are the major challenges associated with establishing autologous blood concentrates?

In order to establish something successfully, it always requires pioneers to drive development forward. But this, of course, also has its downside: something can become excessively used as soon as everyone starts doing it. At present, there are certain things that we simply don't have. For example, we do not yet have a manual on how to use autologous blood concentrates for certain indications in dentistry. There is no such thing—or at least not yet. There are also no online education platforms with full-high-definition videos demonstrating the correct use of certain protocols step by step. We urgently need to make this information publicly available. In addition, we need a systematic series of articles on the respective indications from the perspective of a practice-oriented scientist. There is currently no understanding of what can or cannot be done with autologous blood concentrates. In addition to which, Henry Schein has been causing confusion for several months with so-called L-PRF. This was established around 2007 and was originally obtained by a very high centrifugal force. After the break with Dr Choukroun, Intra-Lock declared the term "L-PRF" and trademarked it for marketing reasons.

Of course, the question then arises: should blood products be allowed to be legally protected through trademarks at all? Intra-Lock's idea was to exclusively establish their own brand along the lines of the name "iPhone", which has come to be used synonymously for smartphones. Intra-Lock also wanted to achieve this with its L-PRF, that is, that the term L-PRF would eventually be used synonymously for blood concentrates. However, this approach contradicts mine. I would like to teach dentists that it is not about a specific product, but only about blood concentrates—pure contributions to wound healing. It would be fatal if companies tried to create even more confusion with more pseudo-product names. There's L-PRF, there's A-PRF, there's I-PRF—and everything has a trademark. We have to rethink our approach towards blood concentrate-based regeneration. Research and clinical application should be at the forefront. I look at this increasing commercialisation and the tendency to plunge obsessively into a product with great concern. There is still a lot of educational work to be done.

### How do you meet these challenges?

We can't generate long-term data with one protocol if new protocols are added every other month. It would be like the film *Groundhog Day*, where the process is constantly repeated anew. There is no scientific evidence because everyone has only pursued their own agendas so far. Dentists work a little with this PRF, a little with that PRGF, a little with this PRP, and when you then look back over ten years, private health insurance companies say: "Yes, there is available data—but it doesn't fit together

at all.” And that’s why they don’t pay. For each of these protocols—be it PRP, PRGF or PRF—you would have to systematically show whether it works or not. Therefore, my goal is to summarise all existing data in one review. This is where our LSCC comes into play—it was developed with the idea that dentists around the world would use the same protocol, so that in ten years’ time, we’d be able to say what the survival rate of certain implants placed with which specific protocol is. At our academy for autologous blood concentrates, which I set up in cooperation with Goethe University in Frankfurt am Main, over 20 clinical trials using the LSCC are currently being conducted. We hope that we will soon be able to describe the corresponding indications for the LSCC and clarify the questions of what can be done with it and how it can be done. None of this is done for fame or to demonstrate greatness. To me, it is just very important that the work that has already been done is not nullified by an uncoordinated series of cases from dentists who are uninformed. My vision is to bring medicine into dentistry and to move away from this pure case observation that we’ve primarily been doing so far. Cases are good for showing what something looks like. However, it would be dangerous to make assessments on what is good and what is bad based on one case.

Lastly, I would not assume to explain to my fellow dentists why PRGF or PRP is bad. What I reject is this dogged attachment to a particular product and the view that everything can be cured with it. One should not get carried away. I successfully use autologous blood concen-

trates to treat chronic or diabetic wounds. We are even able to accelerate hair growth by means of concentrated autologous blood. Before I proclaim this publicly at a congress, however, I must have at least one study that proves that, after autologous blood treatment, the hair is significantly longer than after treatment with, for example, sodium chloride—and not only in one patient, but in 20 others too. This scientific standard should apply to everyone. If Dr Eduardo Anitua thinks that his concept is the best, then he must prove it and point out the indications for which this applies. He has to show for what it works and for what it doesn’t. Talking about problems is important. At the congresses at which I give lectures, I like to encourage the audience to reflect on what can and cannot be done with blood concentrates. As a matter of fact, there are also complications when using autologous blood concentrates. One must not succumb to the mistaken belief that life would be completely care-free because of concentrated autologous blood. I would like also to be able to address these things in the future—openly and together with other experts in this area.

## contact

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## Blood Concentrate Day to be held in September 2020

On 11 September 2020, the first Blood Concentrate Day will be held at Goethe University Frankfurt am Main in Germany. The objective of the conference, hosted by the Blood Concentration Academy (BCA) under the scientific direction of Prof. Shahram Ghanaati and Prof. Robert Sader, will be to further the understanding of autologous blood concentrates and to discuss the numerous application possibilities within the scope of regenerative and general dentistry. Produced from the peripheral blood of patients, today’s autologous blood concentrates are commonly used to improve wound healing and relieve pain in a wide variety of clinical indications. The success of dental implants can also be optimised with the aid of bioactive blood concentrates rich in platelets, fibrin and growth factors. In addition, blood concentrates are successfully used as an aid for tooth preservation, making them an effective tool in periodontology. At the first Blood Concentrate Day, it will be discussed in what ways autologous blood concentrates as adjuncts to dental surgery contribute to the current trend towards a biologisation of bone and soft tissue within the context of modern dentistry. For more information on the event visit [www.abc-day.com](http://www.abc-day.com) or contact [event@oemus-media.de](mailto:event@oemus-media.de).



BEGO Implant Systems

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“Art of Implantology”, held in Amsterdam in 2020 (including flights, accommodation and all fees), an iPad Pro\* 256 GB Wi-Fi, a Bose®\* SoundTouch 30 Series III Wireless Music System, among others. The competition closes 31 December 2019. More information can be found online at [www.bego.com](http://www.bego.com).

\* This is a commercial name/registered trademark of a company not forming part of the BEGO Group.

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MIS

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Dentsply Sirona Implants

## New clinical data on Astra Tech Implant System

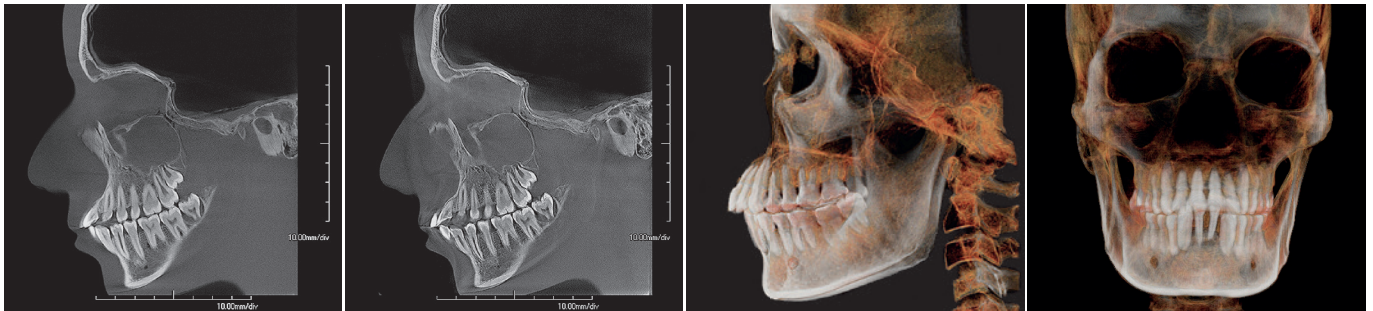
Short implants are a solution for patients with limited bone supply that are unwilling or unable to undergo bone grafting. A recently published randomised clinical multicentre study, led by Professor Christoph Hämmerle from the University of Zurich in Switzerland, compared 6 mm short OsseoSpeed implants (Astra Tech Implant System) with 11 to 15 mm implants and grafting. In the study, significant benefits regarding the use of OsseoSpeed short implants were found: a simplified surgical procedure (no need for grafting), reduced surgical time (of 30 per cent) and reduced surgical cost (of 50 per cent), and higher patient satisfaction. The latter is due to less pain and fewer complications both during surgery and the healing phase, as well as the treatment being more affordable. In both groups, the marginal bone levels were equally well maintained after five years of follow-up (0.12/0.18 mm for 6 mm/11 to 15 mm, respectively).



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presented. The experts were also interested in the ten-year results of the University of Graz on the whiteSKY zirconium implant and the ten-year evaluation by the University of Ulm about immediate restoration of edentulous jaws with the SKY “fast & fixed therapy”. The grand finale of the event was the gala evening that was held in the Summer Palace of the Tsars in Peterhoff, just outside of St. Petersburg. There, participants enjoyed a truly enchanting “White Night” after a high-rate scientific programme.

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Prof. Dr Mutlu Özcan/CH, Dr Pascal Eppe/BE, Dr Sammy Noubissi/US,  
Dr Carolin Stolzer/DE, Dr Karl Ulrich Volz/CH, Dr Dominik Nischwitz/DE  
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# The future of implantology within grasp in Munich

Dr Georg Bach, Germany

“People who have visions should go see a doctor,” former Chancellor of Germany Helmut Schmidt once said. The German Association of Dental Implantology (DGZI) begs to differ: “Our vision for the next two days is to present oral implantology not as it is today, but as it will be.” With this opening statement, DGZI congress chairman Dr Georg Bach kicked off the 49<sup>th</sup> DGZI international annual congress, which was held as the 2<sup>nd</sup> Future Congress for Dental Implantology on 4 and 5 October in Munich. With 50 speakers and an attending audience of about 350, the congress was a great success. It featured 75 table clinics, two live-streamed surgeries, as well as a much-noticed digital poster presentation on the Friday, and 12 lectures by renowned speakers, rounded off with courses for the practice staff and a huge industry exhibition by 26 selected partners, on the Saturday. In its 49<sup>th</sup> year, the dental expert society has continued to break new ground with this annual event in terms of its future orientation, organisational modernity, attractive content and unique structure, and the fresh points of view that are presented. “Our goal is to achieve a reorientation with a

great focus on quality,” said DGZI Vice President Dr Rolf Vollmer. DGZI outgoing President Prof. Herbert Deppe added: “The great feedback from our colleagues shows us that we are on the right track.”

## Future podium

In the three lectures held on Friday morning, a clear picture of prospective implantology was painted. According to Dr Bach, who was appointed new DGZI President at the general meeting held one day ahead of the congress, the objective was to tackle questions like, what will implantology look like in ten years from now, what technologies will be relevant, and what medical and financial challenges will the implant practice have to meet? The invitation of the German left-wing politician Dr Gregor Gysi as a speaker had caused quite a stir in the run-up to the congress. The Bundestag member asserted that “private practices and the free choice of a dentist are precious assets that must be preserved” and said that we are currently in times of upheaval and new approaches to important topics are needed. After Dr Gysi’s address,

Fig. 1: The table clinics were occupied up to the last seat.





Fig. 2

**Fig. 2:** The new executive board of the DGZI (from left): Dr Elmar Erpelding, Dr Uwe Ryguschik, Dr Arzu Tuna, Dr Georg Bach, Dr Rolf Vollmer, Dr Rainer Valentin, Dr Navid Salehi and DT Oliver Beckmann.

Prof. Ralf Smeets spoke about new biomaterials in hard- and soft-tissue management and implant materials and surfaces. He argued that, in dental surgery, xenogeneic, allogeneic and synthetic biomaterials and membranes are becoming increasingly important and that long-term implant success can only be achieved with a treatment concept that takes into account hard and soft tissue, prostheses, and patient- and implant-specific factors. Thereafter, Prof. Werner Götz spoke about how stem cells lead to superior implant osseointegration, even under compromised conditions. In the discussion that followed, the speakers agreed that—especially in implantology, a technically affine discipline susceptible to politically induced disturbances—one needs to stray from familiar paths if one wants to keep pace.

### Live surgeries

Two live surgeries were streamed in high definition to the conference hall and online, allowing DGZI members from abroad who were unable to attend the Munich event to experience a unique insight into the work of prominent surgeons. In his surgery, Dr Conrad Kühnöl convincingly demonstrated that an approach of minimisation does not relate to surgical protocols only but to other areas of the digital workflow as well, such as digital impressions. Afterwards, Prof. Florian Stelzle showcased his concept of “Fixed third teeth in one day” in his live tutorial, placing four implants in the mandible of an 82-year-old with unsalvageable teeth that needed extraction and restoring them with a fixed denture. He explained the surgical





**Fig. 3:** Live surgeries were streamed in high definition to the conference hall and the Internet via multi-channel streaming.

procedure step by step with a focus on its safe application and a long-term stable treatment outcome.

### Table clinics and digital poster presentations

In contrast to the customary seating facing the stage, round tables were provided for the table clinics, at which speakers from the industry partners at the event gave demonstrations on various implantological topics. The subsequent discussions and the interprofessional ex-

change were very informative. This format was once again well received by both the congress participants and the exhibiting companies. Another highlight was the Internet-based and interactive digital poster presentations, which took place on both congress days in the digital poster presentation lounge in the exhibition area directly in front of the conference hall. All posters could also be accessed online via mobile devices. The winners were chosen by DGZI Vice President Dr Arzu Tuna, and the best three were awarded prizes as part of the Saturday morning programme.

### A Saturday dedicated to science

Whereas the first congress day was predominantly practice-oriented, the second one focused on scientific aspects. Renowned speakers from Germany and abroad devoted themselves to the question of what implantology in the future will look like and presented the latest trends and visions for the practice, as well as their clinical relevance. The Saturday programme offered scientific overview lectures on all relevant areas of oral implantology, such as digital implant dentistry and prosthetics, bone and tissue, as well as materials and design.

The Podium 1 talks on Saturday morning were kicked off by Prof. Hans V. Behrbohm, who argued that anyone who plans to place implants in the maxillary posterior region should also inspect the maxillary sinus of the patient in case of suspicion. He presented an endoscope set specially developed for dental and maxillofacial surgery. Afterwards, Prof. Thomas Weischer spoke about immediate implant placement in cases of apical pathology in combination with guided bone regeneration and antimicrobial photodynamic therapy. Subsequently, Prof. Peter Rammelsberg described a modified version of the classic internal sinus lift in which a targeted fracture of the maxillary sinus floor is carried out without any subsequent introduction of bone substitute material, and



**Fig. 4**

**Fig. 4:** From left: Dr Georg Bach (newly elected President of the DGZI), Prof. Ralf Smeets (accepting the Implant Dentistry Award in the name of his colleagues Dr Rico Rutkowski and Dr Peter Gehrke) and Dr Arzu Tuna (Vice President of the DGZI).



Dear authors, **thank you**  
for your contributions in **2019**.

Looking forward to working with you in **2020!**

To publish, please contact:  
Georg Isbaner  
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Phone: +49 341 48474-123





**Fig. 5:** DGZI board members together with international participants of the DGZI/GBOI curricula.

he reported on the implant prognosis and bone gain thereafter. Dr Peer Kämmerer then proved in his lecture on iatrogenic mechanical bioactivation of bone metabolism that implants electrically stimulated at 20–30 Hz show significantly better osseointegration results.

In the first Podium 2 lecture, Prof. Deppe presented his findings on peri-implant health in augmented and distracted bone. He was able to prove that lasting peri-implant health in both local bone and manipulated bone—after augmentation and distraction—can be easily achieved, contrary to common belief. Afterwards, periodontics expert Prof. Adrian Kasaj spoke about soft-tissue management around teeth and implants and how to decide whether to use autologous tissue or tissue replacement material. For him, a combination of replacement materials coated with enamel matrix proteins represents a promising approach to achieving superior results in the future. In his lecture on biologisation of bone and soft tissue in dentistry, Dr Shahram Ghanaati then discussed the use of autologous blood concentrates such as platelet-rich fibrin and platelet-rich plasma in dentistry. In the last lecture of this block, Prof. Nicole B. Arweiler spoke about mastering the balancing act between thorough and gentle professional implant cleaning. According to Prof. Arweiler, the best prevention against today's scourge of peri-implantitis is through efficient prevention at home and professional cleaning and care.

As part of the Podium 3 papers, the ceramic implant pioneer Dr Karl Ulrich Volz shared his insights on zirconia implants and osteogenesis and demonstrated new possibilities with an osteoconductive and attachment-favouring material. Dr Mauro Marincola then spoke about the decision between using short implants or augmentation and provided implantological concepts for insufficient bone volume. He presented a surgical protocol that requires minimised effort and material. In his lecture on the various costs of augmentation, Prof. Dritan Turhani

described the sinus as an excellent option for avoiding augmentation. For Turhani, bone preservation has top priority. Dr Alexandra Stähli presented the results of University of Bern researchers on possibilities and limitations in the correction of soft-tissue defects around teeth and implants. According to Stähli, the absence of keratinised mucosa can promote plaque accumulation and subsequently lead to recession. The tunnel technique and connective tissue grafting, among other things, can help here, but she cautioned that not everything that works around the tooth also works around the implant.

### In summary

At the Munich congress, the participants experienced an outstanding and innovative further education event. A new level of interaction was reached in terms of science, practice, politics and industry. The DGZI broke the mould again by addressing the urgent question of what implant dentistry will look like in five or even ten years from now and what the political and economic framework will be. “We are pleased to have followed this path,” said Dr Bach. Through the successful congress in Munich, the DGZI has once again proved its importance and appeal as the oldest dental expert society in Europe. All eyes are already on the DGZI's 50<sup>th</sup> anniversary, which will be celebrated in the form of the 3<sup>rd</sup> Future Congress on 6 and 7 November 2020 in Bremen in Germany—the city where the society was founded in 1970.

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**Fig. 1:** Don Casey (CEO of Dentsply Sirona) welcomed dental enthusiasts from all over the world to the Dentsply Sirona World 2019 in Las Vegas.

# Dentsply Sirona World 2019 in Las Vegas

**From 3 to 5 October 2019**, several thousand dentists, specialists, hygienists, dental technicians, industry experts, office managers and key opinion leaders from around the world gathered for the Dentsply Sirona World 2019 in Las Vegas, USA. The three-day event featured tons of clinical training sessions, a lot of extensive collegial exchange and a first-rate entertainment programme. At the Ultimate Dental Meeting, participants had access to courses in twelve unique educational tracks including digital dentistry, extra- and intra-oral imaging, implantology, orthodontics, endodontics, restoration and hygiene. Novelties from Dentsply Sirona were also unveiled and presented at the conference. Dentsply Sirona's aim is to give patients healthy smiles by means of cutting-edge therapy concepts and innovative solutions that make a difference in the daily practice. In addition, the company offers continuous clinical education that enables customers to make the most of their dental solutions.

"We appreciate the trust of our customers and are delighted to welcome so many dentists, dental technicians, distributors, industry partners and practice teams to this event," said Eric Bruno, Senior Vice President of the North America Regional Commercial Organization at Dentsply Sirona at the opening of the event. "Our inno-

vations are driven by the needs of our customers. Every day we work together with dentists or dental technicians to develop exactly the products and solutions that clinics and laboratories need to simplify the many routines of everyday life." Dentsply Sirona truly has something for everyone: from digital restorative chairside solutions with CEREC, digital diagnostics with the innovative radiographic Orthophos system and digital impression taking with Primescan to sophisticated endodontic solutions such as WaveOne Gold or the dentine-friendly TruNatomy concept, as well as the orthodontic braces of the SureSmile series—all of these products were presented in Las Vegas. As in previous years, guests had the opportunity to put together their own individual congress plan for the breakout courses in the various dental fields. The 2019 Dentsply Sirona World thus became a customised and individually-tailored advanced training event for everyone.

Dentsply Sirona World attendees experienced lectures, hands-on sessions, classes and workshops from nearly 100 of the brightest minds in dentistry, including Dr Karyn M. Halpern, Dr Todd Ehrlich, Dr Sameer Puri, Jasmin Haley, Dr Tarun Agarwal and Shannon Pace Brinker. Moreover, the Dentsply Sirona World is not only known as "The Ultimate Dental Meeting" for its educa-



Fig. 2

**Fig. 2:** Several thousand participants followed the invitation to Las Vegas at the beginning of October. **Fig. 3:** At the dental exhibition, attendees could learn more about the extensive product portfolio of Dentsply Sirona. **Fig. 4:** Eric Bruno, Senior Vice President of the North America Regional Commercial Organization at Dentsply Sirona, at his opening speech.

tional opportunities, but also for its extraordinary entertainment programme: this year the dental event in Las Vegas featured performances from famous stand-up comedian, actor, director and screenplay writer Jerry Seinfeld, as well as the Grammy Award-winning Zac Brown Band. The grand finale of the event was a pirate party under the theme “Bucca(l)neers’ Bash” at Mandalay Bay Beach. Dentsply Sirona believes that clinical training and further education are key for creating healthy patient smiles, and sustainable growth of dental practices and laboratories. The Las Vegas event at the beginning of October perfectly encapsulated this core philosophy.

Those, who were not able to attend this year’s Ultimate Dental Meeting, can already look forward to next year: from 1 to 3 October, the Dentsply Sirona World 2020 will be held, once again, in Las Vegas—at the world famous Caesars Palace hotel, to be exact. More information on the event and the registration can be found online at [www.dentsplysironaworld.com](http://www.dentsplysironaworld.com).

Photos: © Dentsply Sirona

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Phone: +46 31 3763000  
[www.dentsplysirona.com/implants](http://www.dentsplysirona.com/implants)



Fig. 3



Fig. 4

# The 2020 Oral Reconstruction Global Symposium in **New York City**



**Registration is now open** for the 2020 Oral Reconstruction Global Symposium at the iconic Marriott Marquis hotel in New York to be held from 30 April to 2 May 2020. Under the theme “20/20 Vision”, the internationally renowned line-up of speakers promises to cover a vast range of contemporary issues in implant dentistry and tissue regeneration. A joint European–American scientific committee, consisting of renowned experts Dr Edward P. Allen, Prof. Fernando Guerra, Dr Craig Misch, Dr Myron Nevins, Prof. Robert Sader and Prof. Irena Sailer, are organising the educational offering. The event provides a great opportunity for dental professionals to learn about the latest treatment options from a global perspective while having an enjoyable time with their colleagues and peers in the heart of Manhattan.

## Three-day scientific programme covering numerous topics

The topics of the papers to be presented over the course of the event will emphasise what is important for obtaining 20/20 vision in implant dentistry and its immediate future. The term “20/20 vision” (in the metric system, it translates to “6/6 vision”) is derived from ophthalmology and implies pitch-perfect vision. At our global symposium in 2020, we provide 20/20 vision for a clear view, or perspective, on implant dentistry. Over 40 internationally recognised speakers will cover the most recent developments, among them extraction site management, tissue regeneration and long-term sustainability, and will address digital solutions in great detail. The symposium



will conclude with interactive presentations on challenging clinical cases. A panel of experts will discuss treatment solutions—with participation by the audience—and considerations for optimal functional and aesthetic results. The event will offer the opportunity to benefit from the experiences of lecturers from around the globe who bring different philosophies, approaches and technologies to the table that attendees can take home to their dental practices.

### Breakout sessions and hands-on exercises

The programme will include 16 breakout sessions on numerous dental topics, such as the digital workflow, immediate full-arch treatment, leukocyte- and platelet-rich fibrin applications, hard- and soft-tissue grafting, immediate implant placement and temporisation, and prevention and management of peri-implant diseases. The sessions will be held in English, German and Chinese.

### New York, New York...

It is the city that never sleeps, and most would agree that there is no city quite like it. Also known as the Big Apple, New York is justifiably one of the most popular tourist destinations in the world. It is the mecca of business in the US, and as a melting pot of American culture, there is something for every style, taste and budget.

Register early for the 2020 event, since attendance will be limited to maintain an environment conducive to learning. For more information on the Global Symposium

and the registration possibilities, visit [www.orfoundation.org/globalsymposium](http://www.orfoundation.org/globalsymposium). Also, use the official hashtag #ORGS2020 on social media platforms to stay up to date with the latest news on the event.

The following 45 opinion leaders from around the world will bring their expertise to New York as speakers, moderators or experts in another capacity:

|                       |                         |                         |
|-----------------------|-------------------------|-------------------------|
| Prof. Tara Aghaloo    | Dr Christian Hammächer  | Prof. Marc Quiryren     |
| Dr Edward P. Allen    | Dr Sönke Harder         | Prof. Robert Sader      |
| Dr Michael Block      | Dr Gerhard Iglhaut      | Prof. Irena Sailer      |
| Dr Stephen Chu        | Prof. Ronald Jung       | Prof. Mariano Sanz      |
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| Prof. Fernando Guerra | Prof. Nelson Pinto      | Prof. Hom-Lay Wang      |

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#### Oral Reconstruction Foundation

Margarethenstr. 38  
4053 Basel, Switzerland  
Phone: +41 61 5654151  
[www.orfoundation.org](http://www.orfoundation.org)

Berlin chosen as venue for

## 2020 Annual Meeting of ISMI

Under the guiding theme “Ceramic Implants – State of the Art”, the International Society of Metal Free Implantology (ISMI) invites ceramic implant enthusiasts to its 6<sup>th</sup> International Annual Meeting, to be held on 8 and 9 May 2020 at the Steigenberger Hotel am Kanzleramt in Berlin in Germany. On both congress days, renowned experts and practitioners from Germany and abroad will discuss practical experiences and current trends in the use of ceramic implants, as well as biological aspects of metal-free implantology with the participants. The two-day event begins on Friday with two Pre-Congress Symposia including the online broadcast of a live operation via multi-

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channel streaming. The highlight of the first conference day will be the ISMI White Night, at which participants and speakers alike will be able to wind down after a highly scientific and practice-oriented day in a relaxed atmosphere with wine and music. Saturday will then be dedicated to scientific lectures, which will be simultaneously translated into German and English. More information on the event can be found online at [www.ismi-meeting.com](http://www.ismi-meeting.com).

**Source: ISMI**



ceramic implants

## The international medium for ceramic implant technology

Since 2017, the English-language magazine *ceramic implants—international magazine of ceramic implant technology* has been published with great success. The magazine, which is published twice a year, gives the extremely active international ceramic community a powerful and independent platform. The need for information on evidence-based research findings and the interest in clinical cases dealing with metal-free implants is growing on a constant basis. The magazine has become a must read for implantologists, as it provides orientation at a product and practitioner level on the one hand, and an international overview of thematically relevant further training events and industry cooperations on the other hand. The magazine is published by the German dental publishing house OEMUS MEDIA AG and the next instalment will be out in April 2020. For an annual subscription (€30 plus shipping) as well as a free hard copy, contact [subscribe@oemus-media.de](mailto:subscribe@oemus-media.de).

**Source: OEMUS MEDIA AG**

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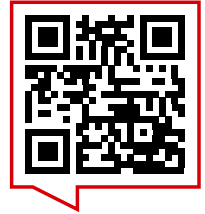


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## Bicon World Congress 2020

### To be held in Prague

On 12 and 13 June 2020, the Bicon World Congress 2020 will take place at the Zofin Palace in Prague, Czech Republic. The two-day event will mark the 35<sup>th</sup> anniversary of the Bicon Dental Implant System. The programme on Friday begins with digital poster presentations—a new concept—where interaction between presenters and attendees is encouraged. During the afternoon, Dr Vincent Morgan—President of Bicon—will teach a master class on the system. After the class, all attendees are encouraged to attend the boat party for a fun filled evening with colleagues from around the world. On Saturday, 13 June, the main podium will consist of academicians presenting on 35 years of publications. Long term studies and research results set the Bicon System apart from other systems on the market and so we look forward to these presentations and discussion on these topics. Prof. Mauro Marincola



and Prof. Rolf Ewers will be in charge of the scientific programme. There is limited availability, so please be sure to sign up soon. Register via e-mail at: [Events\\_Europe@bicon.com](mailto:Events_Europe@bicon.com).

**Source: Bicon Europe**

## From start to start-up

### in 36 hours

The second MIS Makeathon, which was held on 9 and 10 September 2019 at the MIS Implants headquarters in Israel, was the perfect opportunity to discover what it means to build a start-up company from scratch, and what it takes to turn an idea into a product. The 60 participants comprised of dental experts, as well as engineer-



## Dr Georg Bach elected

### New DGZI President

At the 49<sup>th</sup> International Annual Congress of the German Association of Dental Implantology (Deutsche Gesellschaft für Zahnärztliche Implantologie–DGZI), which took place in early October of 2019 in Munich, Germany, Dr Georg Bach was elected new President of the dental expert society. The decision was announced publicly at the DGZI General Meeting, which was held one day ahead of the congress, on 3 October 2019. A long-standing and incredibly active member of DGZI, Dr Georg Bach takes over the position from Prof. Dr Herbert Deppe, who has held the office of DGZI President since 2014. Freiburg-based specialist for oral surgery, implantology and laser dentistry Dr Bach is an experienced member of the DGZI Management Board and, in addition, he is active as further training officer of the expert society. He thus was the perfect choice to become the successor of Prof. Deppe. Electing Dr Georg Bach as new DGZI President is in keeping with the core philosophy of the oldest dental expert society in Europe: being an expert society of practitioners—for practitioners.

**Source: DGZI**

ing and design students, who came from all over Europe, Latin and Central America, the Mid and Far East, and the US. After almost two days of intensive work, the teams presented their plan for solving an issue they had chosen, to a panel of judges and the rest of the eager audience. The teams explained how the issue affects both doctors and patients, laid out their solutions, and demonstrated the feasibility of developing and producing a concrete product. Overall, the second MIS Makeathon was a great experience for the attendants. Dror Sarig, Head of the R&D department at MIS Implants, emphasised the importance of the event by saying “in a place where ideas grow, the future is built”.

**Source: MIS Implants Technologies**



Berlin announced as

## host of 2020 EAO congress

At the closing ceremony of the 28<sup>th</sup> Annual Scientific Meeting of the European Association for Osseointegration (EAO 2019), the focus shifted from this year's extremely successful event to the organisation's plans for next year. Berlin was officially announced as the host city for the 2020 congress. To begin the ceremony, Drs Gil Alcoforado and Susana Noronha, chair and co-chair, respectively, of EAO 2019, thanked the packed auditorium for their participation. "Thank you everyone for coming, whether from nearby or far away, and I hope we met your expectations. I cannot wait to see you in Berlin next year!" Alcoforado said.

EAO President Prof. Henning Schliephake, who is also the chair of next year's congress, explained that the EAO is aiming to break down the divisions that exist not just between dental researchers and practitioners but also between different dental disciplines. "The barriers that exist in our minds must be torn down," Schliephake said. "By aiming to do so in Berlin, hopefully we can provide you with inspiration for your future dental activities.

The 29<sup>th</sup> Annual Scientific Meeting of the EAO will take place from 8 to 10 October 2020. Along with Schliephake assuming the role of congress chair, Profs Florian Beuer and Frank Schwarz have been appointed as co-chairs. In keeping with its theme, the congress will feature the USA and Russia as guest countries.

Source: European Association for Osseointegration (EAO)

# Berlin 2020

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# Congresses, courses and symposia



## AO Annual Meeting

18–20 March 2020  
Seattle, WA, USA  
[www.osseo.org/2020-annual-meeting](http://www.osseo.org/2020-annual-meeting)



## Giornate Veronesi

1–2 May 2020  
Verona, Italy  
[www.giornate-veronesi.info](http://www.giornate-veronesi.info)



## 6th Annual Meeting of ISMI

8–9 May 2020  
Berlin, Germany  
[www.ismi-meeting.com](http://www.ismi-meeting.com)



## ITI World Symposium

14–16 May 2020  
Singapore  
[www.iti.org/worldsymposium2020](http://www.iti.org/worldsymposium2020)



## AAID Annual Conference

11–14 November 2020  
Atlanta, GA, USA  
[www.aid.com/Annual\\_Conference/](http://www.aid.com/Annual_Conference/)

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