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EAO 28th Annual Scientific Meeting Lisbon • 26–28 September 2019

Interview

In preparation for EAO 2019, DTI spoke with congress chair Dr Gil Alcoforado about what is in store for those making the trip to Lisbon.

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Implantology news

Learn about novel techniques, the latest developments, recent studies, and more in implant dentistry.

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Interview

Prof. Neil Meredith, co-inventor of resonance frequency analysis and co-founder of Osstell, gives details about the company's upcoming symposium.

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EAO 2019 builds bridges to future of implantology

28th Annual Scientific Meeting taking place in Lisbon.

■ From 26 to 28 September, the Lisbon Congress Centre will play host to the 28th Annual Scientific Meeting of the European Association for Osseointegration (EAO). The congress promises to deliver an engaging learning atmosphere for attendees through a mix of lectures, hands-on workshops and clinical video sessions.

Under the theme "The bridge to the future", the 2019 EAO congress is set to shine a spotlight on the future directions of implant dentistry. The scientific programme reflects this theme, according to the event's organising committee, by providing dynamic and interactive sessions in which internationally prominent speakers will be discussing topics at the cutting edge of research and innovation.

"Attendees will have a great choice of different sessions with plenty of renowned speakers from all over the world," said Prof. Gil Alcoforado, Chair of the 2019 EAO congress. "The scientific programme was built around questions that many clinicians ask themselves when treating patients."

"Several bridges will be crossed: from analogue to digital, from surgical to microsurgical, and from the staged implant protocol to the immediate placement and loading of implants," Alcoforado continued.

In keeping with this forward-thinking theme, this year's congress will see the debut of a dedicated EAO channel on YouTube. This will make available all the main sessions and debates, allowing for attendees to review the event's scientific content.

Also being featured for the first time this year will be a competition for the best cell biology photograph. A jury, consisting of the EAO's Drs Kathrin Becker and Björn Klinge, will determine which of the submitted implant dentistry-related photographs is worthy of adorning the cover of an upcoming issue of *Clinical Oral Implants Research*, the EAO's official publication.

A clinical video competition will also be held at Lisbon and the best will be presented during a dedicated session on the first afternoon of the congress. The winner will receive the European Prize for Clinical Video on Implant Dentistry, as well as a cash prize of €2,000, and his or her video will be broadcast on the EAO's social media channels.

At this year's congress, Brazil will be featured as the guest country. Brazil currently has the highest number of EAO members of any South American country, and its mutual history with Portugal makes it a natural choice for this year, according to the EAO. A dedicated Brazil and friends session on the topic of "Improved aesthetic outcomes with anterior implants" will be held on the afternoon of 27 September.

Attendees will additionally be able to learn about the latest innovations from the 120 companies present. Ten satellite industry symposia, sponsored by Nobel Biocare, Straumann and Dentsply Sirona, among others, will also highlight the newest clinical solutions that are available.

Since its foundation in Munich in Germany in 1991, the EAO has grown to become one of the leading associations within the discipline of osseointegration. The EAO was created as an international and independent exchange forum for dentists interested in the science of implant dentistry. The first congress was held in Leuven in Belgium in 1992 for fewer than 500 attendees; the 28th instalment is expecting upwards of 3,500.

Though the official language of the EAO congress is English, some sessions will be interpreted into Portuguese.

Further information about the scientific meeting and programme of the 2019 EAO congress is available on the organisation's website and through the EAO Congress 2019 app. ◂◂

“Attendees will have a great choice of different sessions”

An interview with Dr Gil Alcoforado, 2019 EAO congress chair, by Brendan Day, DTI.

■ Though the 28th Annual Scientific Meeting of the EAO will last for just three days, planning and preparation for the meeting dates back to more than a year and a half ago, according to Dr Gil Alcoforado, this year’s congress chair. Dental Tribune International spoke with him about his involvement with the EAO, the amount of work that went into organising this year’s congress, and what is in store for those making the trip to Lisbon.

Dr Alcoforado, could you please provide a little background on your history with the EAO?

I have been a member of the EAO for many years because I’ve always thought it is the association which best represents implant dentistry—not just in Europe but worldwide as well. A few months after I finished my commitment of many years as a member of the board of the European Federation of Periodontology, I was invited by several EAO board members to stand for election, and in October 2016, I became a member of the EAO board.

I very quickly realised the potential for growth in this organisation. The fantastic atmosphere and friendliness that I have encountered in serving on the board has motivated me to better serve our members. After a brainstorming session—something we do annually—the idea arose to create a series of master clinician courses. It was the first and biggest assignment that I carried out by myself as an EAO board member. For several years, I created and organised the first ten master clinician courses, which proved to be extremely successful. Later on, I filled the vacancy of the Chair of the EAO Education Committee—a role that I still occupy.

What was the timeline for organising this year’s congress like? When did preparations for the scientific programme begin?

When the board decided on Lisbon as the venue for this year’s congress, I had to start preparing the scientific programme immediately. To do so, I enlisted the help of all the members of the EAO Scientific Committee. After one and a half years of hard work and careful deliberation, the preliminary programme was presented to the EAO board and eventually approved. Our choice of speakers was based on specific criteria: for example, the speakers were required to put forward topics relevant to our conception of implant dentistry.

Judging by the current statistics, it seems we will have around 3,200 to 3,500 participants, which is an excellent number. I sincerely hope that attendees will enjoy the presentations, the city of Lisbon and the social part of the programme, where they will have a great opportunity to meet up with many of their friends and colleagues.

What can attendees expect from this year’s EAO congress?

Attendees will have a great choice of different sessions with plenty of renowned speakers from all over the world scheduled to present. They will see the latest innovations in implant dentistry and will, in particular, have the opportunity to see how experts overcome clinical challenges that may present difficulties for the majority of clinicians.

The scientific programme of the 2019 EAO congress was built around questions that many clinicians ask themselves when treating patients. Some of the answers to these questions, to be fair, are not yet in the domain of evidence-based dentistry. However, owing to the development of clinical procedures, these problems exist and clinicians want to know how to solve them. Some of the sessions will thus highlight a means of addressing a number of these problems and will have different experts demonstrating how they themselves manage these difficult clinical situations.

The theme of this year’s congress is “The bridge to the future”—the future of implant dentistry, that is. How does the scientific programme reflect this theme?

Broadly speaking, several bridges will be crossed: from analogue to digital, from surgical to microsurgical, and from the staged implant protocol to the immediate placement and loading of implants. These are just some of the areas in which bridges will be crossed by both speakers, as well as attendees.

The EAO congress is known as an event that typically features the latest developments in implantology and periodontics. Are there any particular developments in these fields that you are aiming to highlight at this year’s congress?

One of the things to have heavily impacted the dental field over the last five years has been the advancement of digital technology, which has made inroads into dentistry in many different areas. In the beginning, digital procedures commenced in the dental lab. Nowadays, it is possible to conduct complete rehabilitation digitally from the beginning. From diagnosis and planning to fully guided surgery and even the construction of final restorations—all of these steps can be achieved with the use of digital tools.

With this progression in technology, many obstacles have been surpassed and difficulties overcome. The definition of precision has changed dramatically in the transition from an analogue environment to a digital one. Enormous advancements in intra-oral scanning over the past couple of years have taken place, allowing this technique to now be used in crown and bridge planning, for orthodontic and periodontal reasons, and for impression-taking prior to implant procedures, to name just a few of its many applications. The connection between the clinic and the dental lab is much closer now owing to the optimisation of the digital workflow. The connection between intra-oral scanners, milling machines and 3D printing, for example, is getting better every year. The general feeling that I’ve experienced is that this could be just the beginning of a huge paradigm shift.

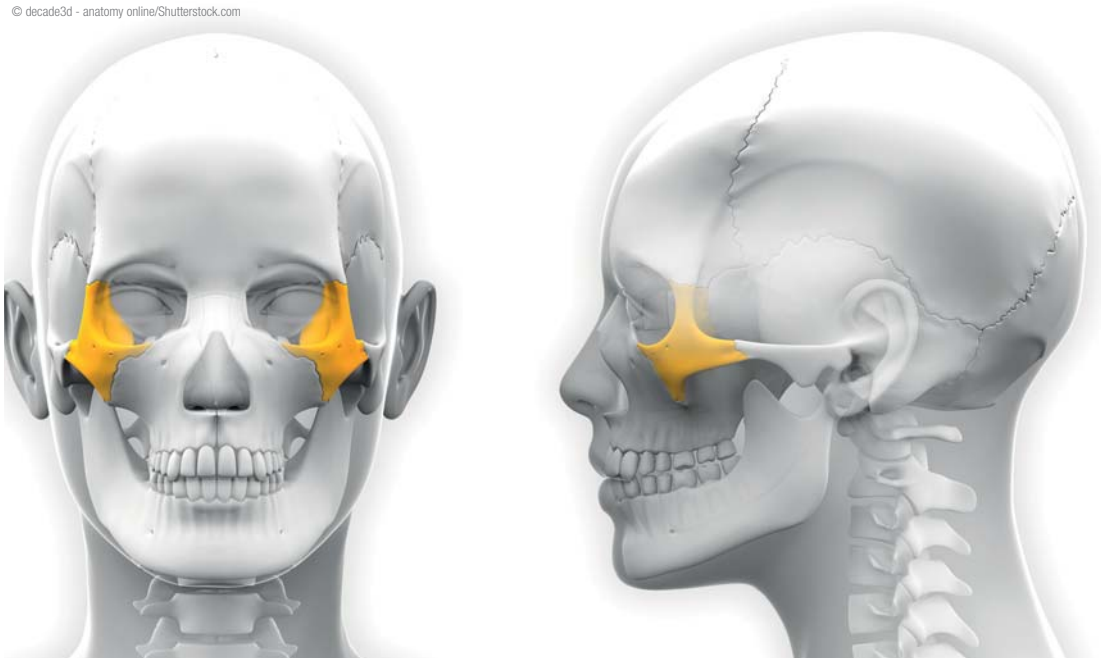
However, the evolution has been happening in all different aspects of dentistry. For example, new microsurgery techniques have been introduced, which have led to the development of micro-instruments that are adapted for those specific techniques. There are also new grafting materials that simplify some surgical procedures, and research is being performed regarding the use of stem cells, which may eventually be the base for a substitute for dental implants at some point in the future. These developments, I’m happy to say, will be in the spotlight at the 2019 EAO congress.

Study introduces new surgical guide for placement of zygomatic implants

■ Dental patients who show a deficiency of bone volume cannot be treated with root-form dental implants. Thus, new treatment modalities were sought for these patients. One of the therapies considered was the placement of zygomatic implants, which were introduced to the market over 20 years ago. A recent study has investigated a novel protocol for the placement of zygomatic implants using a specific surgical guide.

The protocol relied on large field of view CT/CBCT scan for an accurate assessment of the maxillary arch to plan zygomatic implant receptor sites. A CT/CBCT-derived surgical guide of a novel design and an exact replica of the entire maxilla and zygomatic bone were fabricated using 3D printing technology. Four patients with completely edentulous maxillary arches received a total of ten zygomatic implants.

To evaluate whether the actual surgical placement of the zygomatic implants matched the computerised planning and simulation, the preoperative positions were compared with the postoperative positions by merging the pre- and postoperative scan data sets. The degree of accuracy of the superimposition was measured utilising sophisticated software. Apical, coronal and angular deviations were determined for each implant. Deviations from the computerised project to the actual implant positions ranged from 2 to 3 mm, and angular deviations ranged between 1.88 and 4.55°.



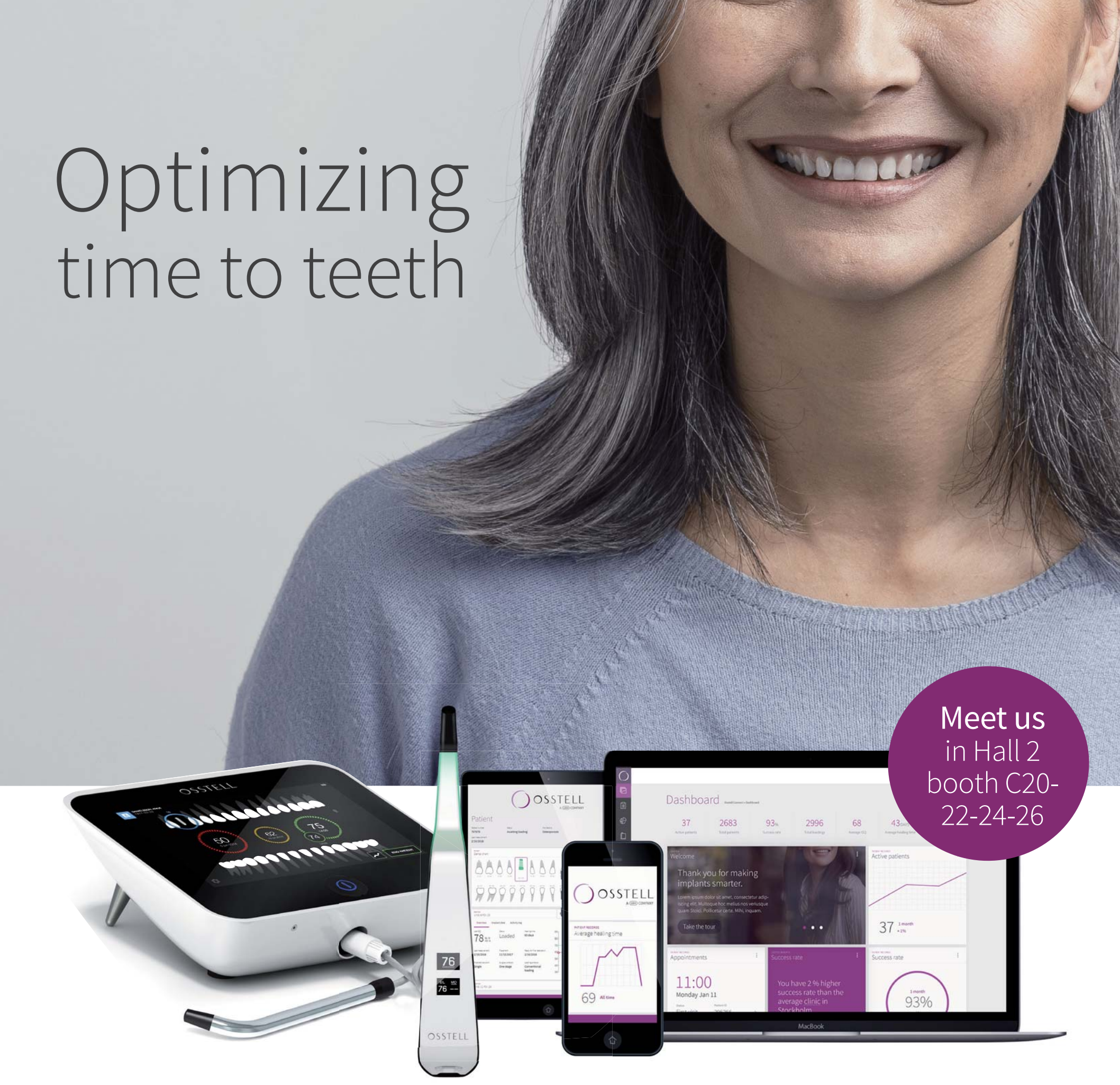
For more than 20 years, the use of zygomatic implants has been demonstrated to be a predictable and safe alternative treatment modality for complex dental restoration in the maxilla and has exhibited a high rate of success.

The study found that the placement of zygomatic implants requires surgical experience owing to the close proximity of vital anatomical structures. It used methods of superimposition that illustrated satisfactory correspondence between inserted implants and the virtual plan. No adjacent vital anatomical structures were damaged. The novel surgical guide design afforded the surgeon visual control of the drilling protocol. Positioning the guide in close proximity to the entry point of the zygomatic body aided control of the drills up to the vicinity of the exit point, significantly limiting problems associated with angular deviation.

The researchers concluded, “Reducing errors and complications is essential for zygomatic implants to remain a viable treatment alternative, and further research on a guided approach to their placement is encouraged.”

The study, titled “Computer-guided approach for placement of zygomatic implants: Novel protocol and surgical guide”, was published in *Compendium*.

Optimizing time to teeth



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Researchers investigate possibility of regrowing teeth

■ For certain animals, the loss of teeth does not always pose a problem: sharks and crocodiles have the ability to regrow their teeth repeatedly. Researchers from the Technische Universität Berlin (TU Berlin) are exploring the possibility that this can be applied to humans and are working on a new method to develop teeth from the human body's own tissue.

"It's true that there are isolated reports of people growing third teeth or even a third complete set of teeth, but why this should be possible for some people and not for others remains unknown," said Prof. Roland Lauster, Head of the Institute of Biotechnology at TU Berlin.

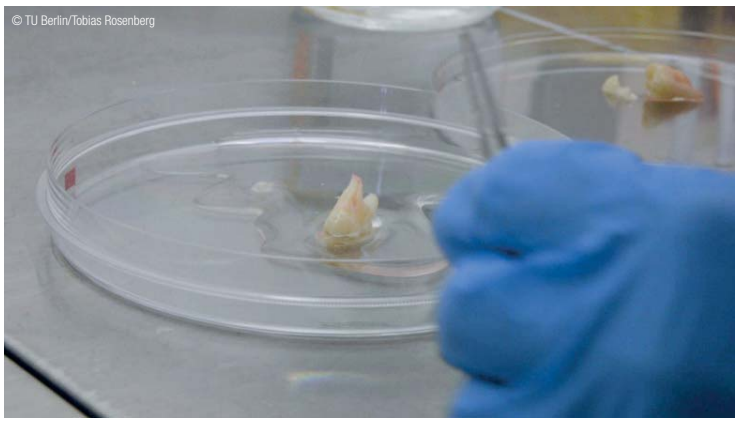
"Essentially science assumes that over the course of a lifetime the human jaw also possesses the information necessary for the growth of new teeth," said Dr Jennifer Rosowski, research assistant to Lauster. The question is what exactly triggers this process.

Under natural conditions, hair, teeth and even nails grow as a result of what is termed mesenchymal condensation. In the case of teeth, certain precursor cells cluster together in the jaw beneath the outer skin layer. These cells condense and form a kind of embryonic tooth germ. As a result of this condensation, the embryonic tooth germ begins to interact with surrounding cell layers in the jaw via specific messengers. "Within the tooth bud created by this process, a differentiation of various cell types occurs: the enamel organ, the dental papilla, and the dental lamina. These tissues continue to differentiate until a complete tooth is formed," said Rosowski.

The approach adopted by the research team for the natural growth of third teeth is as simple as it is ingenious. They remove dental pulp cells from the interior of an extracted tooth, and these are then cultivated and dedifferentiated in such a way as to produce an active embryonic tooth germ. If this embryonic tooth germ were to be implanted into a patient, it would begin to communicate with the surrounding tissue, initiating the process of tooth development.

Competing research groups have already provided conceptual evidence in an animal model system and have demonstrated that an embryonic tooth implanted into the jaw actually develops into a complete tooth.

The TU Berlin research team, however, sees a decisive competitive advantage to their method. All other competing research groups use embryonic stem cells to produce embryonic tooth germs. "This makes a real application of the process impossible as the use of stem cells is ethically highly contentious and not permitted by law in most countries," explained Rosowski. "We would only use cell material taken from the patient's own teeth. This enables us to bypass all ethical and legal considerations, providing us with the decisive advantage that our procedures focus on an actual application of the body's own tissue. Using the body's own tissue means that no rejection reaction will occur."



Embryonic tooth germs are generated from dental pulp cells in a laboratory using a special method of cultivation.

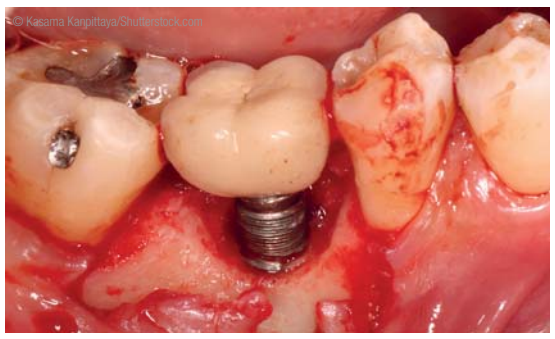
The Department of Oral and Maxillofacial Surgery at Charité–University Medicine provides the researchers with the teeth they require for their research in the form of extracted third molars. The researchers have developed a special cultivation method to allow the adult cells in these teeth to dedifferentiate back into a type of embryonic state and finally form an embryonic tooth germ. The dental pulp cells are isolated, cleansed and then cultivated in microtitre plates whose upper surfaces have been coated with a hydrogel. The hydrogel prevents the cells adhering to the walls of the plates. They float freely in the medium but are actually programmed to achieve a 3D structure. As a result, they condense independently, without external pressure, into a kind of cell ball. This process takes 24 hours and the resulting ball is about 200–500 µm in size.

"We are the only group worldwide who have been able to demonstrate that this process of creating a ball through independent mesenchymal condensation triggers the expression of various genes, thus setting in motion the production of specific messengers. These messengers are required to interact with the surrounding jaw tissue," said Rosowski about the method, which has since been patented globally. In order to prove the validity of this, the researchers co-cultivated the embryonic tooth germs together with gingival cells. During embryonic tooth development, these two cell types interacted, initiating tooth formation. Thus, the researchers were able to prove precisely this interaction.

Now that all the *in vitro* tests have been successfully completed, the embryonic tooth germs are ready for the first preclinical tests.

Study determines reasons for dental implant failure and removal techniques

■ Dental implants have become a great treatment option to replace missing teeth, and various treatment concepts have reported high success rates. Nevertheless, like in every medical procedure, biological complications can occur which may lead to complete implant failure and, consequently, in the worst-case scenario, to the removal of the implant. A recent study by researchers from the University of Zurich has revisited the reasons for implant failure and compared different removal techniques.



According to a recent study, peri-implantitis is currently the main reason for dental implant failure.

A literature search included 28 studies which had been conducted up to 2018. The studies assessed titanium implant failure, removal techniques and the reinsertion of implants in a previously failed site.

The research team identified different categories of factors causing implant failure. Biological factors include peri-implantitis and failure to attain or to maintain osseointegration. Implant fracture is an example of a mechanical factor. Medical errors causing implant failure include bone overheating, site contamination and malpositioning. Functional reasons for implant failure include design of prosthesis and functional overload.

The researchers found that early implant failure is normally caused by the lack of attaining or maintaining osseointegration, or bone overheating or site contamination. Late implant failure is triggered by implant fractures, malpositioned implants and progressive peri-implantitis. The last causes 81.9% of late implant failures. Early implant failure results in implants that are normally mobile and easy to remove. Late implant failure means the implants can be at least partly osseointegrated and, therefore, more difficult to remove.

As options for implant removal, the study determined tooth extraction, trephine burs, piezo-surgery, laser surgery, the counter-torque ratchet technique (CTRT) and electrosurgery. Even though trephine burs seem to be the best-known method for implant removal, the CTRT method, alone or combined, should be the first choice for the clinician because of its low invasiveness.

Furthermore, the research team found that implantation in previously failed sites, irrespective of early or late failure, results in a 71–100% survival rate over five years.

Regarding zirconia implant removal, little data is available. Because of zirconia's physical properties, it is supposed that these implants require a different approach to removal compared with titanium implants.

"If removal is required, interventions should be based on considerations regarding minimally invasive access and management, as well as predictable healing. (Post)Operative considerations should primarily depend on the defect type and the consecutive implantation plans," concluded the authors in their paper.

The study, titled "Removal of failed dental implants revisited: Questions and answers", was published in *Clinical and Experimental Dental Research*.

Long-term study analyses risk factors for short dental implants

■ The use of standard dental implants has become a widely accepted treatment modality for the rehabilitation of complete and partial edentulism. However, in severe alveolar resorption, standard-length implant placement is not possible without additional surgical intervention. For such cases, the use of short implants is considered a major contribution to the field of implant dentistry. Now, a study has determined the risk factors for short dental implant survival.

The study, conducted by the Ankara Yildirim Beyazit University in Ankara, the Cumhuriyet University in Sivas in Turkey and a private dental practice in Ankara, aimed to identify the different implant- and patient-related risk factors for long-term short dental implant success. Through a retrospective chart review of three centres, patient information regarding demographic variables, smoking habits, history of periodontitis and systemic diseases, and medications was collected. In addition, information was gathered relating to the parameters for short implant placement, including implant manufacturer, design, anatomical location, diameter and length, and type of placement.

For the statistical analysis, univariate regression models were used at implant and patient levels. A total of 460 short implants—ranging from 4 to 9 mm in length—placed in 199 patients and followed up for up to nine years were reviewed. Survival rates of the short implants were 95.86% and 92.96% and success rates were 90.00% and 83.41% for implant- and patient-based analysis, respectively. Peri-implantitis was reported as the cause of short dental implant failure in 73.91% of the cases. Univariate regression models revealed that the female sex was strongly related to short implant success. In addition, smoking and a history of periodontitis were found to have a significant negative influence on short implant success at the implant and patient levels.

These results support the use of short implants as a predictable long-term treatment option; however, smoking and a history of periodontitis are suggested to be the potential risk factors for short implant success. According to the researchers, these outcomes are consistent with the findings of other long-term studies.

The study, titled "Risk factors associated with short dental implant success: A long-term retrospective evaluation of patients followed up for up to 9 years", was published in *Brazilian Oral Research*.

In a long-term study, researchers have reported high survival rates for short dental implants.

Review study compares machined and sandblasted dental implant surfaces

■ Previous studies have suggested that surface roughness is one of several key factors that influence the degree of biological integration and success rates of implants. Although attention and utilisation has shifted from machined to sandblasted surfaces, for clinical practice, no sound and strong evidence exists to support the use of sandblasted implants over machined ones. Therefore, researchers from the Semmelweis University in Budapest, Hungary, compared implant failure and marginal bone loss between the two in a systematic review and meta-analysis.

During the blasting process, ceramic particles such as titanium oxide, aluminium oxide or silica are blasted on to the implant surface at high velocity. The size of the sand particles and their speed when they reach the implant surface are the key parameters that influence surface roughness. Sandblasted implants have a rather irregular, rough surface and machined surfaces are smoother with only shallow grooves.

According to the researchers, several *in vitro* studies have demonstrated the positive effects of sandblasted surfaces on osseointegration. However, some preclinical and clinical investigations and reviews have indicated that moderately rough surfaces may not perform better. These studies suggest that a rougher surface may modify the properties of biofilm formation and, therefore, bacteria could attach to the surface more easily. Hence, the marginal bone around rough implants may be less stable and more vulnerable to peri-implantitis.

The systematic review included seven studies, involving 362 sandblasted and 360 machined implants. The results indicated an 80% lower risk ratio among sandblasted compared with machined implants after one year of use and a 74% risk ratio after five years of use, respectively. In contrast, there was no significant difference in marginal bone loss between the two implant surfaces after one and five years of use.

The researchers concluded: "This meta-analysis reveals that sandblasting is superior over machined surface in implant failure but not in marginal bone level in healthy subjects. It also points out the need for further randomised clinical trials with large sample size for objective determination of the clinical benefits of certain implant surface modifications."

The study was conducted in collaboration with the University of Pécs and the University of Szeged, both in Hungary.

The study, titled "Sandblasting reduces dental implant failure rate but not marginal bone level loss: A systematic review and meta-analysis", was published in *PLOS ONE*. ◂◂

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‸ A study found that sandblasted and machined dental implant surfaces differ in survival rates but not in marginal bone loss.

Dental implants are medically advisable for patients with Sjögren's syndrome

■ Up until now it was not known whether dental implants were successful in patients affected by Sjögren's syndrome. In fact, many professionals advise against them, as they believe these patients have a higher risk of implant failure. However, researchers at the universities of Malmö and Gothenburg in Sweden have found that dental implants are a viable option for people with Sjögren's syndrome, even though these patients may experience a higher marginal bone loss around their implants than others.

Sjögren's syndrome is a systemic disease characterised by the progressive destruction of some glands, particularly those around the eyes and mouth. "It is known to reduce the saliva flow, resulting in a dry and very sensitive oral mucosa. Patients may more rapidly lose their teeth caused by caries and periodontitis compared with patients who are not affected by this disease," co-author Dr Ann Wennerberg from the Department of Prosthodontics at Sahlgrenska Academy at the University of Gothenburg told DTI. "The very small amount of saliva results in a lack of necessary lubrication," continued Wennerberg. She explained that this would cause the patient soreness and pain. "For patients with Sjögren's syndrome removable dentures may be impossible to wear," she added. As a result, many affected patients turn to dental implants.

The researchers conducted the study in two parts. First, they reviewed a clinical series of 19 Sjögren's patients who, together, had received 107 dental implants. Second, they conducted a review of published literature and assessed the cases of 186 patients who had received a total of 712 implants, of which 705 were followed up.

Through the clinical series, the researchers found that, out of 19 patients, two patients lost three implants, together, which led to a failure rate of 2.8 %. All failed implants were caused by a lack of osseointegration. The implants were followed for a mean period of ten years. At the last follow-up, the mean marginal bone loss for patients was −2.19 mm. The research team estimated the marginal bone loss after 30 years at 4.39 mm.

A study has found that patients affected by Sjögren's syndrome, in contrast to the general assumption, demonstrate quite a high survival rate of dental implants.

From the literature review, the researchers found that, out of the 705 implants–which were followed up for approximately six years–29 failed, resulting in a failure rate of 4.1 %. After conducting statistical analysis, researchers found that the probability of failure was 2.8 %.

When stratifying patients based on primary or secondary Sjögren's syndrome, the researchers found that those with primary disease had a lower failure rate of implants of 2.5 % compared with patients with secondary Sjögren's syndrome. These patients showed a failure rate of 6.5 %.

"The results show that a treatment with dental implants can be done with a good prognosis, in contrast to what has been feared. However, the results also demonstrate the marginal bone resorption to be higher than for patients without the syndrome. This is indicative for the need for regular control visits to the dentist and short intervals between appointments to a dental hygienist," concluded Wennerberg.

The study, "Dental implants in patients with Sjögren's syndrome: A case series and a systematic review", was published in the *International Journal of Oral and Maxillofacial Surgery*.

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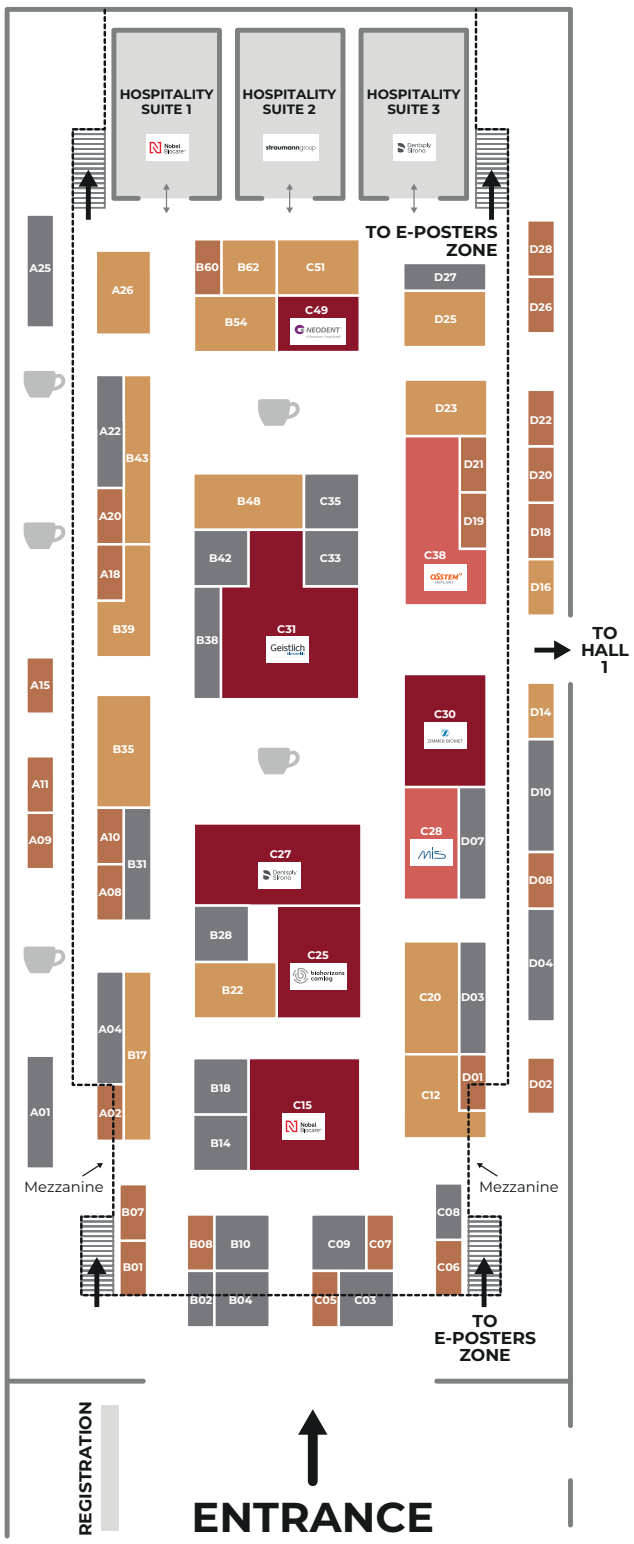
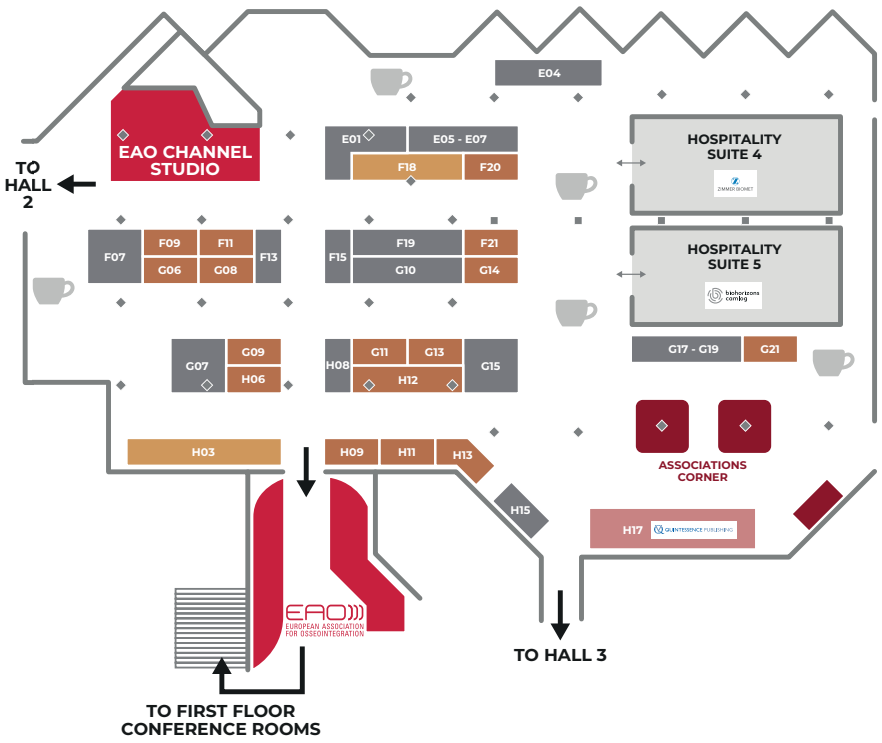
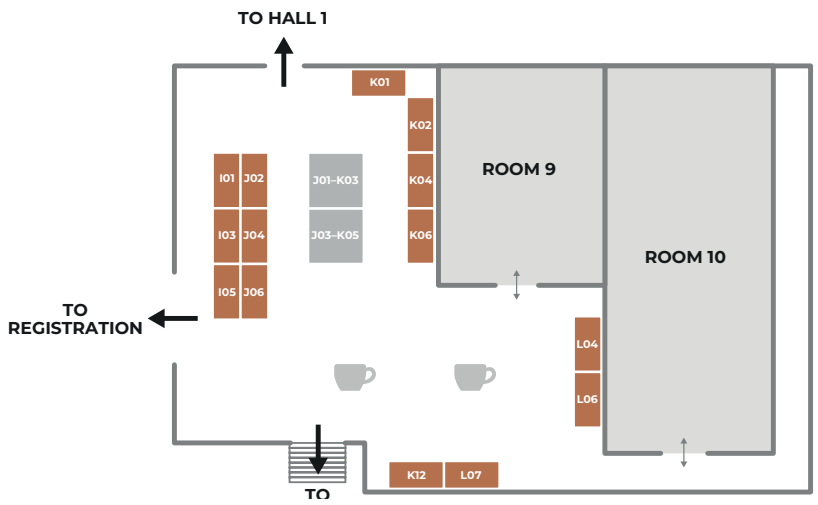
Hall 2

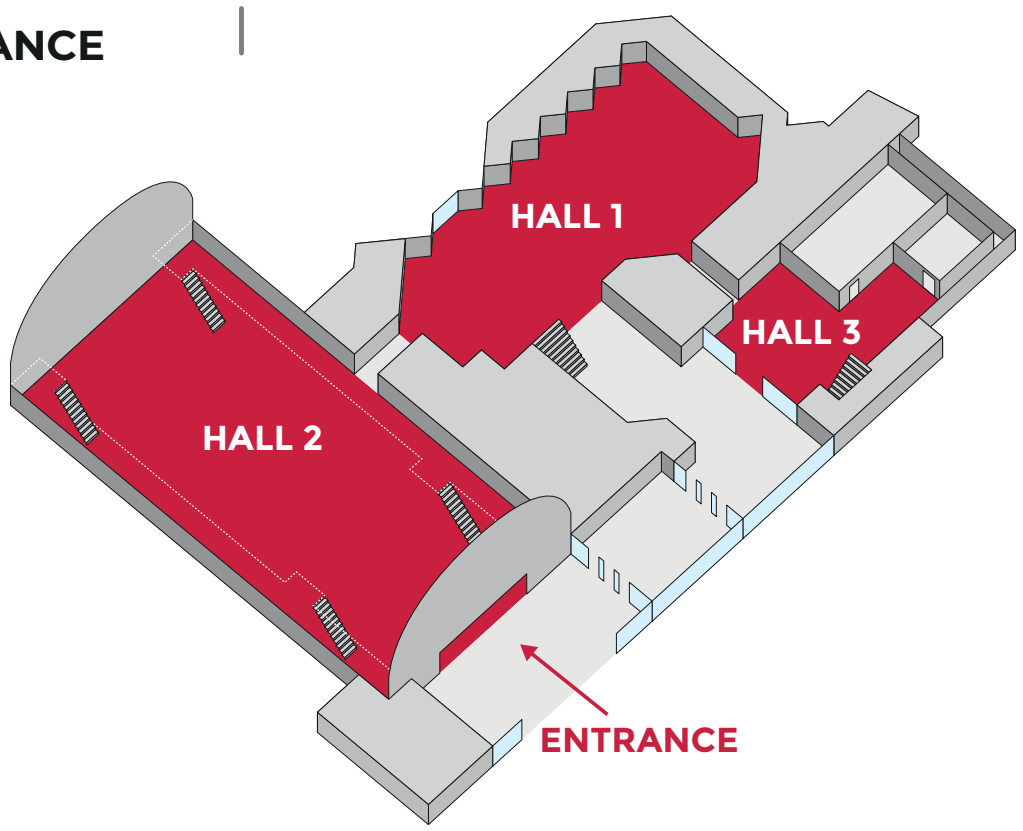


Hall 1



Hall 3





This floor plan is a reproduction of the floor plan by the EAO. Changes or modifications may occur.

Company	Hall/Booth
3	
3SHAPE	2/B35
A	
ACE SURGICAL SUPPLY COMPANY	1/C07
ACTEON GROUP	1/H03
ALFA GATE	3/J01–K03
ALPHA BIOTECH	2/B14
AMERICAN DENTAL SYSTEMS	1/H13
ANTHOGYR	2/D23
ASEPTICO	2/C07
AVINENT IMPLANT SYSTEM	2/D10
B	
B&B DENTAL IMPLANT COMPANY	2/D08
BEGO IMPLANT SYSTEMS	2/B43
BEIJING YHJ SCIENCE AND TRADE CO.	3/I03
BIEN-AIR DENTAL	1/G14
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BIOMEDICAL TISSUES	2/A09
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BIOTECH DENTAL	1/G10
BLUE M	1/G06
BOTISS BIOMATERIALS	2/A15
BREDENT GROUP	2/D14–D16
BRESMEDICAL	1/G13
BTI BIOTECHNOLOGY INSTITUTE	2/B39
C	
CARESTREAM DENTAL	2/C33
CLARONAV	2/C09
CURAPROX	1/F19
D	
DATUM DENTAL	1/G17–G19
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DENTAL RATIO	2/C06
DENTIUM	2/B17
DENTSPLY SIRONA	2/C27
DIO IMPLANT	2/C35
DR-KIM CO.	2/D02
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EMS ELECTRO MEDICAL SYSTEMS	1/F18
EURONDA	2/A18
EXAKTUS	2/B08
EXOCAD	2/A02
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HU-FRIEDY	2/A20
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IBS IMPLANT	2/C51
IMPLACIL DE BORTOLI	1/F15
IMPLANCE DENTAL IMPLANT SYSTEM	2/C08
IMPLANTSWISS I-SYSTEM	2/C12
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KLOCKNER IMPLANT SYSTEM	2/D04
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LIFENET HEALTH	2/B02
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