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Utilization of Zirconium Oxide in Fixed Restorations on Implants and Natural Teeth

_implant market
Implantology still runs the business in 2007

_DGZI events
3rd Arab-German Implantology Meeting of DGZI—Dubai, April 5–6, 2007

DGZI Deutsche Gesellschaft für Zahnärztliche Implantologie e.V.

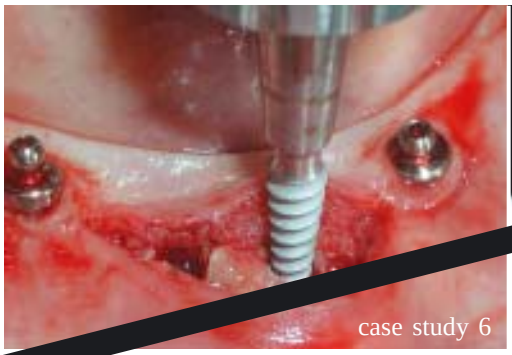
dti] Dental Tribune International

Jürgen Isbaner
Editor-in-chief of the magazine ZWP
Zahnarzt Wirtschaft Praxis, Germany

IDS 2007—
Focus on Implantology

The year 2007 is off to a fresh start and will be an extraordinarily exciting one from an implantological point of view. From March 20th to the 24th, Cologne, Germany, will host the 32nd International Dental Show, the world's largest trade fair for products in the fields of dental technology and dentistry. About 1,600 exhibitors from 50 different countries will present the most innovative products to the fair's approximately 70,000 visitors.
And this year, even more than in the past, implantology will be one of the central themes of the IDS. With its double-digit growth rates and uninterrupted rapid innovation, there is no doubt that implantology has been one of the main engines driving dentistry in recent years.
Whether in the media, at trade fairs or at conferences, the central topic is implantology. Far more than 50 providers of implant systems currently vie for customers' favor in Germany alone—a trend that will continue in 2007 as well, and will be marked by another high point at the International Dental Show in Cologne. The industry is intensifying its efforts and assumes that growth rates will continue to be in the double digits. In its longstanding efforts it continues to focus on innovations in two main directions of development.
The first of these developments is the contined advancement of hard and soft tissue integration of implant-based dental prostheses through improved implant designs and surfaces. The second is the idea of conceptually bringing together surgery and prosthetics with aspects of production technology—in other words, single-source CAD/CAM-based implantology solutions.
Yet with all this progress, there will still not be one "optimum solution" for all situations, even in the future. And there will not really be a "gold standard" in implantology. Implantology is not static, and like other disciplines, a good thing will always have to compete with a better one. The more implants are placed and the greater the amount of experience we have had with them, the more we will know about unsolved problems in dental implantology.
Nonetheless, we must acknowledge that implantology, with its success rate of over 90 percent, already represents one of the most successful, safest dental therapies available. The patient's desire for a dental prosthesis that is optimal from a functional and aesthetic point of view can currently be fulfilled with outstanding clinical results based on implants.
This means that implantology as an offered therapy truly does belong in every practice, and it does not matter whether dentists decide to do the implantological work themselves or work together with specialists. Being successful with implantology depends on having the necessary specialized expertise in every case, and in view of the rapid developments taking place, that means ongoing specialized training. To sum it all up ... *If you don't do implants yet, start now!*

Sincerely,
Jürgen Isbaner



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Research of antimicrobial photodynamic therapy (aPDT) according to the HELBO principle

In vitro as well as in vivo aspects, clinical applications and preliminary evaluation

author_ Georg Bach*, Peter Stoll**, Wolfgang Bähr***, Klaus Pelz****, Christian Bogdan****, and Heiner Nagursky*****/Germany

Although Paul Ehrlich had already discovered and described the principle of photodynamic therapy by 1900, it took almost a century before medical science recognized the use of this form of therapy and attempted to integrate it into its treatment procedures.

_ **Today, antimicrobial** photodynamic therapy is used alongside general medical treatments (including the treatment of tumors) and also increasingly in dentistry. At almost the same time in the early 90's, but independently of one another, both Wilson and Dörtbudak described uses of photodynamic therapy (PT) in dentistry. Here, periodontal treatments and periimplantitis are the primary interest. An onset of research and publication activity followed in the field of PT, whereby numerous photosensitizers, laser wavelengths and parameters as well as clinical procedures were indicated as suitable. Substantially responsible for a constantly increasing number of those using the PT principle is a laser manufacturer who simultaneously takes on distribution and training: the Austrian company HELBO not only produces a low-level laser used for PT, at HELBO referred to as "aPDT" (antimicrobial photodynamic therapy), but also offers the photosensitizer also needed. HELBO goes even one step further and offers the aPDT as a "complete module" for the integration of this concept into dental practice.

_The Idea and foundation of the PT principle

In photodynamic therapy, there is an interaction between the photosensitizer (PS), oxygen, and laser light. The PS absorbs photons, and the result is an unstable state in which reactive oxygen molecules develop, and these in turn are able to kill (pathogen) bacteria. From evidence-based periodontic basic data, biofilm became the focus of interest in periodontology (and periimplantitis), and correspondingly also defines the PT. Compared with conventional therapy approaches for the removal of and/or damage to the biofilms, the HELBO company (and/or PT advisers) has demonstrated a rather sobering conclusion: Even partially highly invasive therapy forms, which are encountering lower acceptance on the part of the patients anyhow, failed to manage the biofilm

Fig. 1–6_ The Helbo principle, step by step.

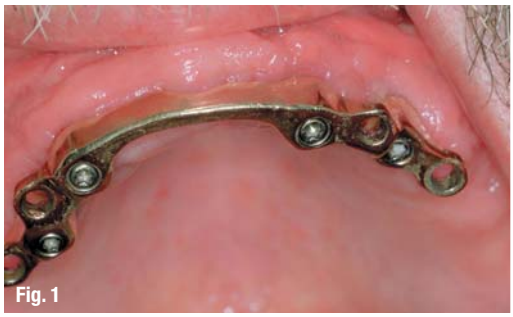
Fig. 1


Fig. 2

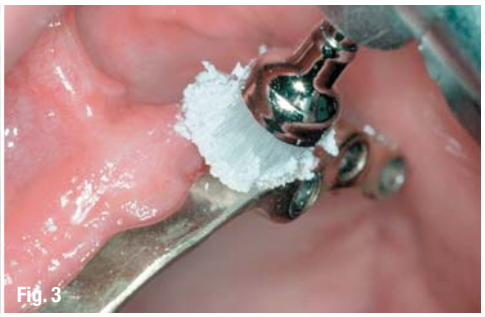
Fig. 3

on a permanent basis and with constant success according to the evaluation. Here is where the idea of the PT and/or HELBO aPDT comes in: Pathogens (mostly gram-negative anaerobic) bacteria are tinged with a special photosensitizer (phenotiazine chloride, which has replaced the formerly used toluidine blue). A laser is then applied in the low-level area (soft laser with 670 nm), and the released singlet oxygen damages the bacteria membranes to the extent that this is not compatible with the germ's survival. These findings led to the definition of the "HELBO practice concept" for patients with periodontal diseases and/or for patients with periimplantitis at the artificial tooth root: the "HELBO practice concept" fundamentally represents a "protocol," similar to those in implantology. It includes the following partial stages:

a) Depuration and instruction
b) Findings, precision cleaning, and aPDT.
c) Check-up after seven days (with persistent bleeding on probing: rep. of the aPDT)
d) Recall (first after six to eight weeks, and then quarterly).

The procedure described has been approved since 2003.

_Previous long-term observations

The active principle of aPDT in dentistry has been described, beginning in the early '90s, by Prof. Dörtbudak (Universität Wien) in numerous publications (at the time, with the toluidine blue photosensitizer). With the aPDT renaissance, this procedure has been applied in dentistry more frequently. Naturally, additional long-term data has been reported, most of all from the developer country of Austria. Here, the study by Ms Schütze-Gössner (Pilot practice by the HELBO company in the Salzkammergut region) is to be mentioned, first and foremost: She presented a contingent of 20 male and female patients who underwent an aPDT and the subsequent recall within a period of 29 to 54 months. Teeth not worth preserving were extracted prior to therapy; germ tests were made with only eleven of the 20 patients, however. Two patients required flap operations despite aPDT. In summary, Schütze-Gössner reported positive clinical parameters after aPDT conclusion without formations of secretions in the pockets and only 1.7% persistent BOP. However, it must be qualitatively established that there were variations with the clinical procedure for this re-examination among the contingent of patients. Further recent data from papers from Germany are also to be listed, though these survey rather shorter observation periods (four weeks up to half a year). In these reports, the emphasis is on the procedure's highly clinical quality rating, which leads to a clear improvement in the clinical reaction (inflammation).

_The aPDT's effectiveness and progress

The goal is to approach the biofilm with a diode laser equipped with a wavelength of 670 nm and to interrupt the quorum sensing (cell-to-cell communication of bacteria beginning with a certain number). According to many periodontolgists, the prevention of this last procedure is of particular importance, since the bacteria cells divide every 20 minutes. According to the aPDT inaugurator, the Austrian microbiologist Dörtbudak, this represents a light-induced deactivation of cells and microorganisms. This effect has also allowed for the first beginnings of aPDT in therapy for tumors and in dentistry, in addition to the established "Periodontitis and Periimplantitis" treatments, as well as in endodontology. The bacteria are tinted with the photosensitizer, sensitized, and destroyed with the laser light; this only affects the bacteria membrane. However, the patient is to be notified beforehand that the tongue and soft tissues will be discolored blue from the photosensitizer for about 24 hours. Also to be considered are unsealed edges of fillings, since these are colored blue for a long time. This also applies to avital tissue. The discoloration effect is increased by the use of H_2O_2. HELBO sees great advantages for patients in the minimally invasive procedures and the possibility of completely doing away with (local antibiotics) and thus in the complete absence of a development of resistance, as reported with the use of antibiotics. A goal of the present research is to test the protocol provided by HELBO for an aPDT in an in vitro trial (microbiological aspects/findings for treated surfaces) and to test in some in vivo applications and make a preliminary assessment.


Fig. 4

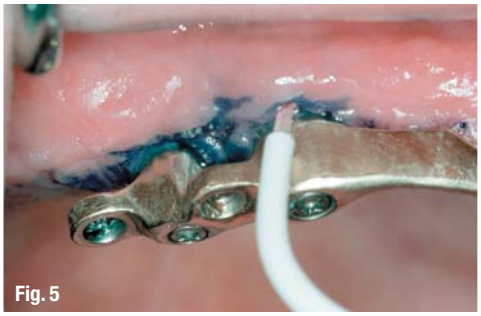
Fig. 5

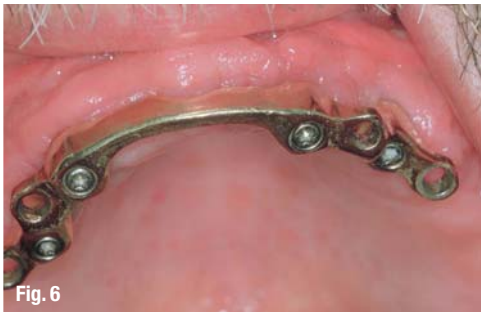
Fig. 6

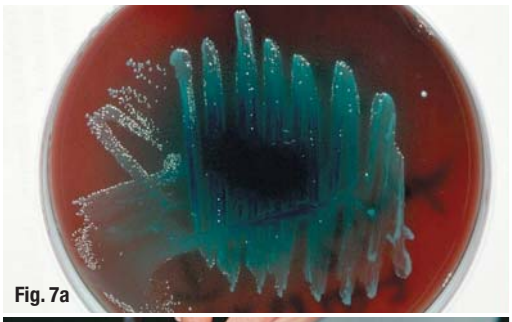
Fig. 7a

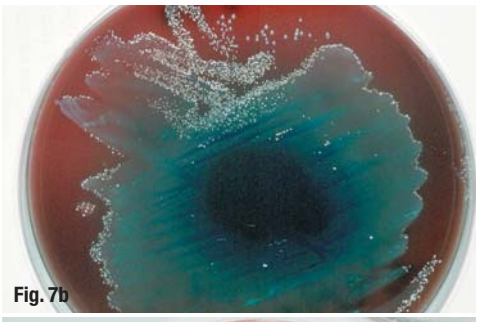
Fig. 7b

Fig. 8a

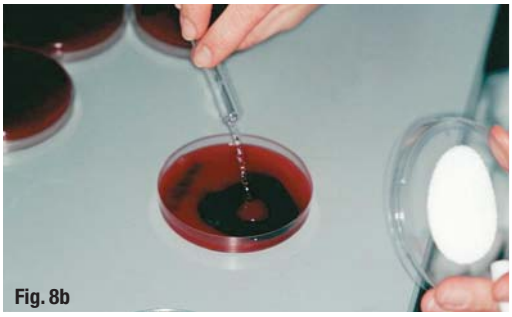
Fig. 8b

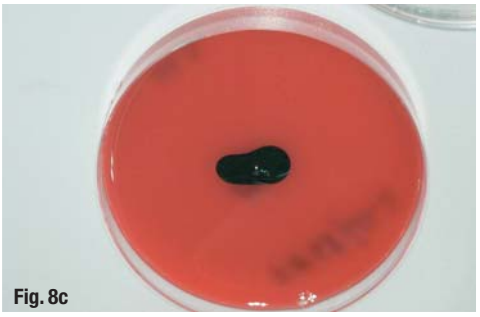
Fig. 8c


Fig. 9a

Fig. 7a/b_ Reading of the inhibition zones from a microbiological growth preparation (with/without laser application).

Fig. 8 –10_ Procedure for the microbiological growth tests.

_Material and Methodology

I In vitro tests

I-1 Microbiological tests

At the Institut für Hygiene und Mikrobiologie der Universitätsklinik Freiburg im Breisgau (Institute for Hygiene and Microbiology of the University Clinic of Freiburg/Breisgau), three periodontal pathogenic germs were grown. These were

a) *Actinobacillus actinomycetem comitans* (FR68/27-7)
b) *Porphyromonas gingivalis* (W381)
c) *Prevotella intermedia* (016/16-2).

These germs were introduced into fresh mediums (HCB, with *A. a.* also on two BST) in three eyelet smear procedures. Half of the plates were additionally sprinkled in the middle with HELBO Blue photosensitizer and rinsed after the prescribed working time (one minute) with sterile NaCl solution (0.9% buffered), then finally dried/aspirated. Afterwards, the therapy light was applied in the prescribed way (one minute). The other half of the plates, however, was used in the procedure up to the stage where the diluted photosensitizer solution was sucked off; there was no laser light application for these. In control tests, inspection samples were made in inoculated plates, and no further measures were taken. The A. a. was incubated at 36 °C and 5–10% CO_2 for 24 to 48 hours, whereas the anaerobes (*P. g.* und *P. i.*) were incubated under anaerobic conditions for at least 48 hours.

I-2 Scanning electron microscope tests from aPDT-treated surfaces

Unsavable teeth (n = 4, for two patients) found not desirable to keep in the context of profound periodontitis and irrecoverable implants (n = 2, with one patient) and also in the context of a profound periimplantitis were treated in the described manner (wetting with HELBO Blue, rinsing, soft laser light application). After 48 hours, the removal of the teeth/implants took place. The patients had given their consent to this procedure and documented this in writing. The removed implants and extracted teeth were stored directly in physiological saline solution and afterwards brought to the clinical chemical laboratory at the dental clinic at the University of Freiburg, where they were prepared and then examined in the scanning electron microscope.

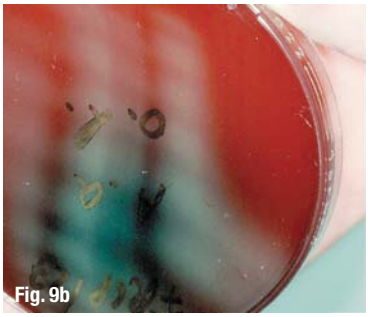
Fig. 9b


Fig. 9c

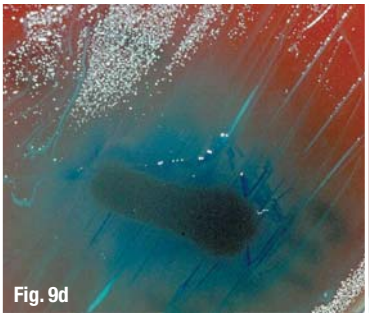
Fig. 9d

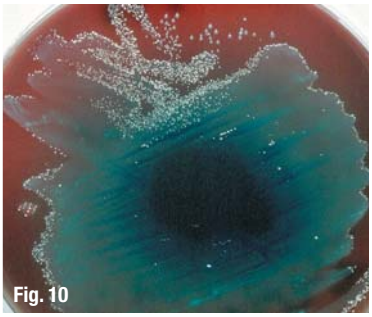
Fig. 10

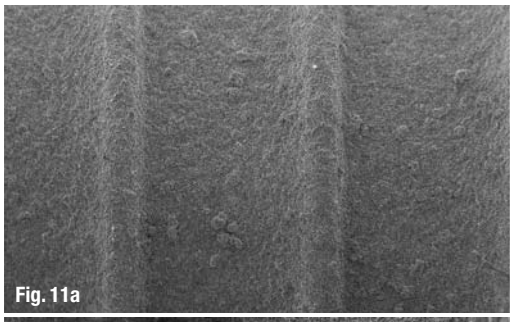
Fig. 11a

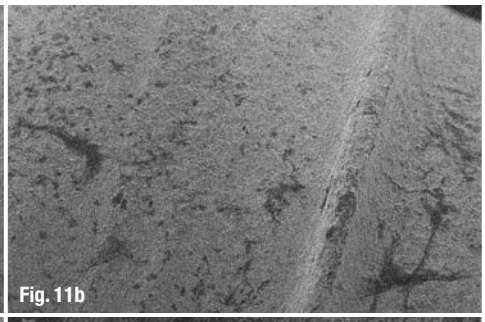
Fig. 11b

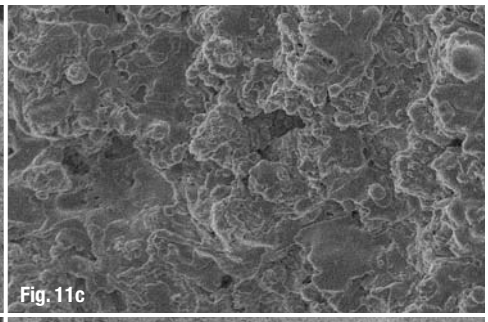
Fig. 11c

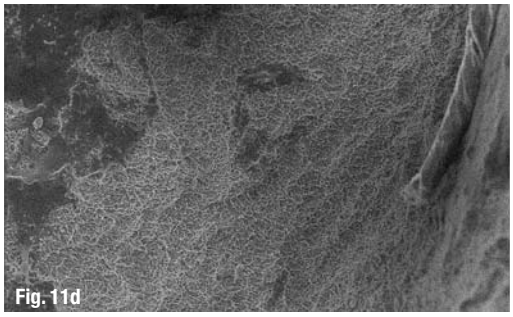
Fig. 11d

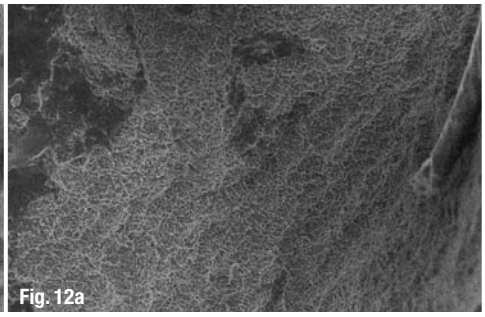
Fig. 12a

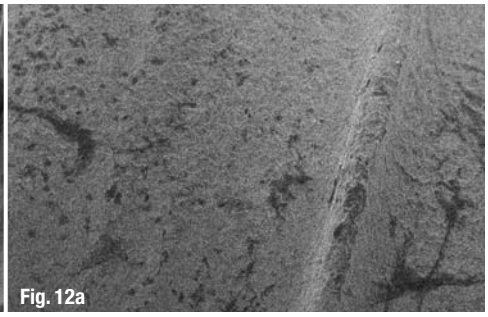
Fig. 12a

Fig. 11–12_ Sensitizer residue for implants with aPDT for profound bony defects.

II Clinical application

II-1: Treatment of patients

Altogether, five patients were treated using the HELBO method, three of whom suffered from periimplantitis

- at a shaped continuous beam in the upper jaw (four full screws, Straumann company)
- at one clean implant-bearing bridge in the lower jaw two hollow screws, Straumann company)
- at a prefabricated continuous beam in the lower jaw (four FRIADENT full screws) and two patients with periodontal diseases
- at the abutment of a telescoping prosthesis
- at the teeth of a denture gap supplied with a prosthesis.

The clinical procedure corresponded to the manufacturer's guidelines.

II-2: Evaluation of microbiological rapid test

Before the aPDT was carried out, germs were removed (microbial test by the GABA, Lörrach company. This procedure was repeated two days following the conclusion of the aPDT and after four weeks. The rapid test involved what is known as a hybridizing test in which the genetic makeup of the germs taken out (whether they are alive or dead) is determined. The qualification as "no evidence of germs/low/average/high" can also give information about the prospective risk of supporting tissue loss.

_Results

I In vitro tests

I-1 Microbiological tests

After 24/48 hours, the germ samples that had been grown were read. All evaluated data was written down in a protocol for the Institute for Hygiene and Mikrobiology, University of Freiburg/Breisgau. The results of the corresponding evaluation:

A. a.: on the photosensitizer-applied surfaces, there was no growth, and a difference of the inhibition zones (only PS/PS and Laser) is not recognizable.

P. g.: on the photosensitizer-applied surfaces, there was no evidence of growth, and a difference of the inhibition zones (only PS/PS and Laser) is not recognizable.

P. i.: likewise, no bacteria growth on the photosensitizer-applied surfaces, though a slightly larger inhibition zone with the laser-supported samples (inhibition zone of 2.0 mm)

In summary, it can be stated that the inhibition zones of the plates with cleaner photosensitizer applications were practically equal to the samples with sensitizer and laser light applications. Only with the anaerobic *Prevotella intermedia* was there a "discrete increase" in the laser group.

However, there was no significant difference for the laser-supported group.

I-2 Scanning electron microscopic tests of aPDT-treated surfaces

Both with teeth and implants the sensitizers remained on the surface in the SEM image; these are spread like lacuna across the treated surface. With the implants, the number of HELBO Blue islands is greater than with the natural teeth. In the natural teeth, the surface area of the HELBO Blue islands is greater than in the implants. The determined residue is therefore remarkable, since before the sputtering, the samples (covered with a thin layer of silver) had to be stored in alcohol and this usually dissolves and removes comparable buildup.

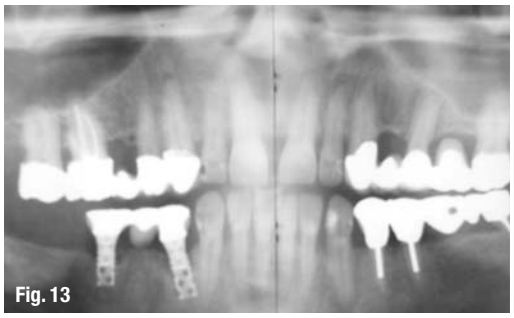
Fig. 13


Fig. 14a


Fig. 14b

Fig. 13–17_ Periimplantitis case study.

II Clinical Use

II-1: Treatment of Patients

With all five patients who were treated using the HELBO method, an improvement of the clinical inflammation indicators could be achieved.

This outcome was likewise present seven days after the operation as well as after four weeks (Recall, germ removal). Bleeding on probing (in implants with a pressure-calibrated probe with plastic tips) decreased significantly in teeth in which a "WHO" (World Health Organization) probe of the Aesculap company was carried out. With the implants, however, no significant improvement in the firmness of the soft tissue seal at the implant neck could be established, whereas reattachment of the researched teeth could be determined in the four-week follow-up.

II-2: Evaluation of microbiological

The marker germ values for the periimplantitis group before the aPDT remained in the middle to high range and for the periodontitis group in the low-middle range, and then in the seven-day follow-up removal and after four weeks, marker germs could be established in the low range in the event of hollow cylinder screws.

_Discussion

Bactericidal component

From the findings made available to us, especially the microbiological data, it can be assumed that the photosensitizer used does in fact have a bacteria-killing effect. With the growth plates which were exclusively covered with the PS, corresponding inhibition zones were recorded. However, under no circumstances should this lead to the conclusion that this bactericidal effect is the only cause of germ death, particularly in light of the fact that the inhibition zones of the periodontal pathogenic germs were virtually the same size with the laser-treated growths as with those treated with the photosensitizers. Here, the following aspects should be taken into consideration:

a) Results from microbiological tests cannot always be transferred on a 1:1 basis to a clinical situation.

b) The dosage rate of the PS was made in the smallest possible quantity to the growth plates, but here it was not possible to have a defined, exactly equal amount, especially due to the viscosity of the PS.

c) It was possible, however, to adequately judge the smallest possible quantity on the plate as being too large for the laser light effect within this system.

d) In addition, with anaerobe samples for a periodontal pathogenic germ *(P. i.)*, there was a slightly higher, but not significant effect than with the laser-treated samples.

We feel that the corresponding literature studies support us in our results of the PS used, which is called HELBO Blue: this is a phenotiazine chloride, technically a medicine used for treating psychosomatic illnesses, but in current studies is also used for tuberculosis therapy. In their study, the American microbiologists Yano, Weinstein and colleagues describe the successful use of this medication for the fight against TB "Inhibitory Action of Antitubercular Phenotiazines on mycobacterium tuberculosis." The bactericidal effect of the photosensitizers was confirmed, upon a corresponding request by the authors of this study, also by the German distribution company in Walldorf,

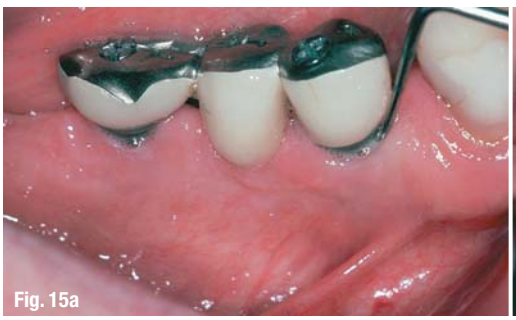
Fig. 15a


Fig. 15b

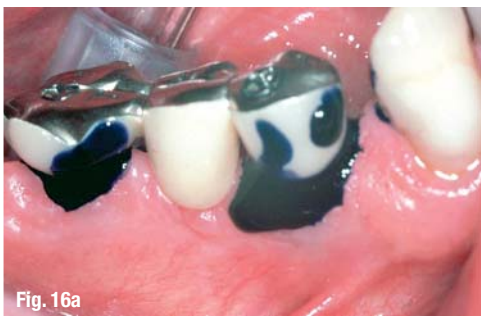
Fig. 16a

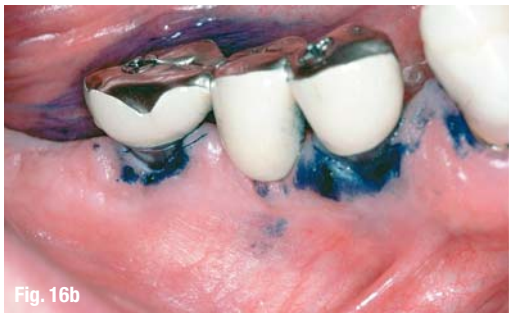
Fig. 16b

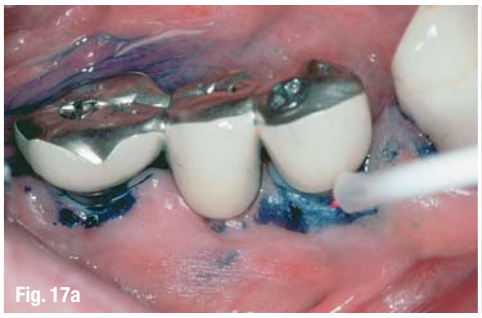
Fig. 17a

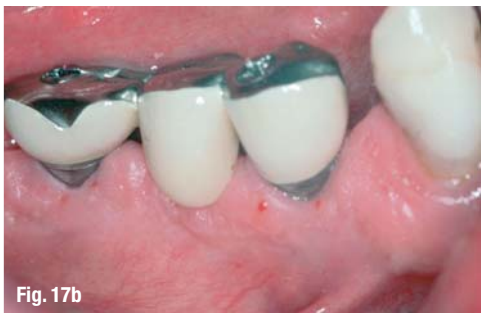
Fig. 17b

whereby around "10% of the cumulative effect" was indicated. This value is in agreement with the findings made by Haas et. al., who did not work with precisely the same photosensitizer that is sold today as HELBO Blue, but with a PS with a similar chemical structure ("same type"). Based on our experience, the HELBO Company's "approximate estimate of 10% of the cumulative effect" cannot be clearly verified and quantified. We are proceeding based on a substantially higher germ-killing efficiency from the phenotiazine plus low-level laser light. It is our opinion that there is a corresponding bactericidal effect of the PS, especially in view of the application of the procedure "and all this without chemistry," "no (local) antibiosis—a less aggressive procedure without the risk of developing resistance" as helpful and enlightening for users.

_Treated surfaces

The "lacuna-like structure" of the tooth and implant surfaces (unsavable implants and teeth uncovered as far as possible from the bone) in the scanning electron image is not always in accordance with the HELBO company's statement that the photosensitizer is completely rinsed off and removed. Even three days after removal from the body and extraction, sensitizer residue could be found adhering to the natural and artificial teeth abutments, both clinically and using the scanning electron microscope.

Here, it is to be noted that the samples prior to the REM research were stored in alcohol and the sensitizer residue could still be detected.

Such a "layer" may not be beneficial to the re-osseointegration of an implant and/ or the fitting of a reattachment. The metabolic activity in the pockets and/or in the periimplant soft tissues is considerably responsible for the resorption and the evacuation of the PS. With our tests, the teeth and implants demonstrated extreme disintegration of the supporting tissue and were located in inflamed, infected environments. Naturally, under such conditions only extremely reduced metabolism may occur, and a concomitant significantly lower absorption for a previously applied PS. Thus the results, determined with extreme conditions (PS residue) cannot be transferred to the normal treatment situation. However, our results may lead to the formulation of a preference for an open procedure in the instance of severe tooth socket disease and periimplant situations. This demand is also in accordance with the assessments made by the work group formed by Neugebauer and colleagues, who also treat profound bone defects in a combination of aPDT and open procedures. Likewise, a certain limitation of the procedure can be deduced from our results. The aPDT can undoubtedly lead to an improvement in clinical situations, even with advance periodontal disease and periimplantitis, though it is not a "universal remedy" for hopeless cases. When an open procedure (plus aPDT) is chosen in the event of severe supportive tissue loss, then the "minimally invasive" effect is abandoned where the aPDT certainly has the greatest advantage in comparison to conventional procedures. Here, the aPDT must then be set apart from the established procedures, including the laser light (Diode/CO_2/Er:Yag/Er,Cr:YSG). It must also be pointed out that, to some extent, there is very extensive long-term documentation (Diode 12 years/ CO_2 seven years) for the treatment of periimplantitis using these (hard laser) procedures.

Fig. 18–23_ Periodontal disease case study.

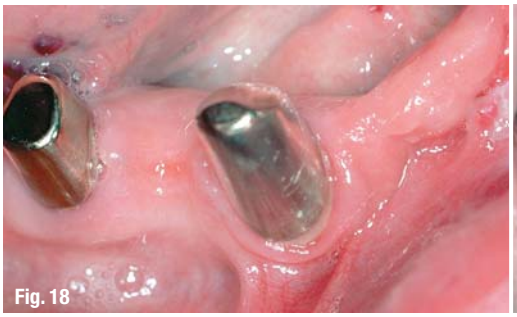
Fig. 18

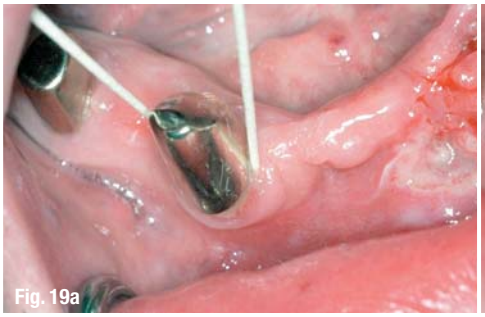
Fig. 19a

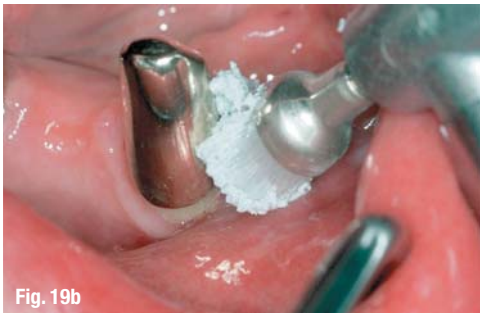
Fig. 19b

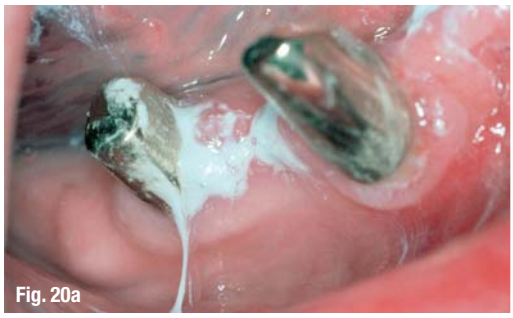
Fig. 20a

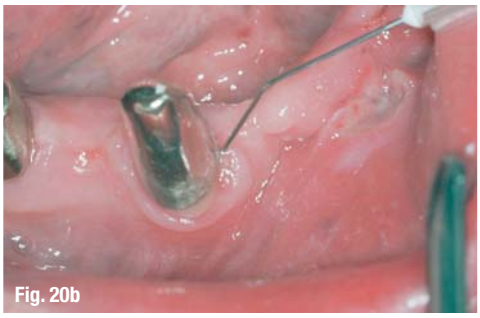
Fig. 20b

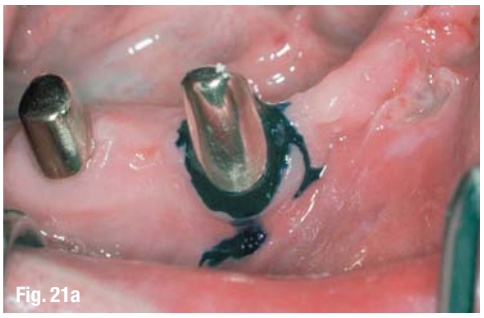
Fig. 21a

_Clinical effectiveness of aPDT

It is undisputed that the aPDT procedure achieves a bactericidal effect.

In this regard, there were a great number of publications first published at the beginning of the 1990s. The duration of the germ-killing effect and/or the stability of the improvement of the periodontal cumulative situation and/or of the treated periimplant defects have not to date been proven in any long-term studies. Much of the data in the available literature is limited a priori by an observation period of between four and twelve weeks. Some data reports on a longer period (two years and more), but it does not meet the usual demands in terms of material and methodology for such a study.

The long-term study, for an extremely noteworthy period of 54 months, by the inaugurator of the aPDT procedure, Ms. Schütze-Gössner, can be rated as a "long-term study" at best, since the patient constituency was not homogeneous and was treated with different methods (with/without AB open/closed) and, in addition, failed to address important parameters and indices. Also, our clinical application supplied a clear improvement of the intra-oral situation, both with patients treated with an aPDT for periodontal disease, as well as with patients who underwent aPDT treatment for periimplantitis. The marker germ values (before the treatment and at seven days, as well as four weeks after the conclusion of the aPDT samples taken) supplied a significant decrease in the problem germ values (anaerobic) for this period. Of course, at this time we cannot (yet) make conclusive statements concerning the long-term effect.

_Further evaluations/questions

It is absolutely without question that there is a great fascination for the aPDT procedure, which possibly results from the firmly anchored demand for minimally invasive procedures in dental practices, even for the diseases that are the most difficult to tackle, "Periodontitis and periimplantitis."

Especially in geriatric dentistry, where dentists are confronted with a great number of people who are unable or unwilling to undergo open procedures (reduced state of health), the procedure would have an enormous treatment range. However, there remain-irrespective of the HELBO method—questions open about photodynamic therapy, which we have judged as important. Some concern all procedures which would be carried out according to the principle of photodynamic therapy, and some also concern the HELBO procedure.

General questions and preliminary valuations for photodynamic therapy:

a) The question about the interplay of some new PS with tissues

Almost every month, we receive a new publication with a "new" photosensitizer, most notably with the "Malachitgrün" presented by the Yamada Group at the ISLD Congress in Berlin as a PS for the fight against *staphyloccus aureus.* At the same congress, Hashimoto et al. presented "Rhodamine B acid" as a PS (here as a PS in the battle against tooth decay with the PT). There are no statements and/or tests for some of these new and some of the established photosensitizers, which affect the assessment of photody-

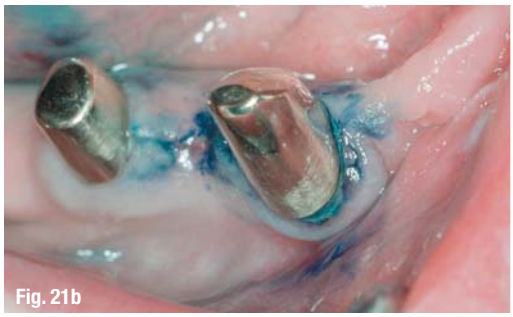
Fig. 21b

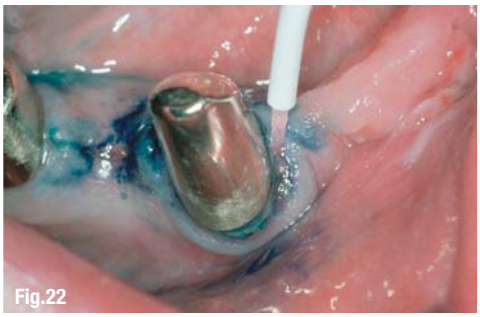
Fig.22

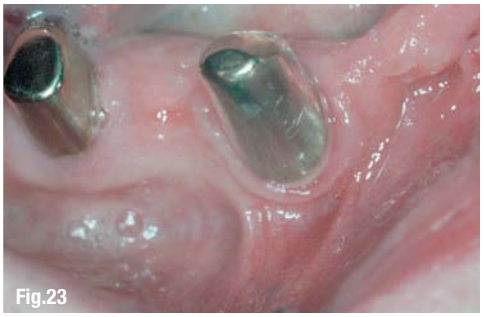
Fig.23

namic therapy with these as well on the effect on the periodontal and bone tissues. The fact that there are extremely complicated and valuable structures (supporting tissue) is undisputed!

b) The question about the sensitizer and the wavelength and the laser parameters to be used

For the user, the number of photosensitizers that can be used can be overwhelming, as well as the difference between the wavelengths and the corresponding results. Also, some authors fail to formulate a clear protocol for the clinical procedure. This "multiplicity" of possibilities can be seen in a positive light, on the one hand, but there is nonetheless a clear argument for active, global research work in the aPDT sector. At the same time, this lack of uniformity and the absence of protocols accepted by all currently make it impossible for the procedure to be used on a massive scale. Here, the HELBO procedure clearly shows advantages—it has elements that are coordinated with one another and a technical protocol.

c) The question about the evaluation of the procedure as an alternative to proven therapies

The authors of this study believe that the implementation of comprehensive further testing is indispensable prior to making a final evaluation of the PT. Here, it is not so much a brief clinical application (evaluation of a short-term effect to be obtained) that should be foregrounded, but rather to study the long-term effect indicated for this procedure. Whether the PT will become generally accepted on a long-term basis depends on the findings of these long-term data and the implementation of a certain "standardization" of the procedure. Finally, the results to be obtained in the long term for photodynamic therapy must be measured against those that have been obtained with established procedures and their corresponding documentation. The "special" laser light procedure is above all to be compared to the results from the established hard laser procedures. In the PT, in general, and in the HELBO procedure, in particular, we see an extremely interesting and promising beginning, however. The treatments recognized today represent only a fraction of the possibilities of the PT and will continue to expand in the future. The use of the HELBO procedure will not be so much in searching for treatments of the more severe of tooth socket diseases and periimplantitis (the lowered absorption rate of the HELBO Blue sensitizers will make it necessary for open procedures). We see the main employment of the aPDT using the HELBO principle rather in the realm of dental prophylaxis, in the prevention of post-operation pain and in the treatment of initial periimplant and periodontal lesions. Here, the procedure shows its advantages as a "minimally invasive" procedure. Through the use of components coordinated for each other and clear definitions for the clinical procedure, the untrained user has a high degree of treatment security._

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Utilization of Zirconium Oxide in Fixed Restorations on Implants and Natural Teeth—a Case Report

author_Axel Zöllner, Claus Diemer, Germany

After the development of veneering ceramics, glass ceramics, and glass infiltration ceramics had, for the most part, decided what kind of veneering material would be used, eg for inlays or minor fixed restoration work, the discussion about dental ceramics has no doubt been revived by the introduction of zirconium oxide (Kappert 1999). As a result, there still are many open questions regarding zirconium oxide, among others those pertaining to its preparation, processing techniques and applicability for implant prosthetics.

_The following documented case involves the restoration of a maxilla (teeth 17–25) with the listed variations in full ceramic. This detailed documentation regarding the work that was done allows the reader, on the one hand, to follow the planning and procedural process used but also to critically evaluate the dental and prosthetic implementation on the other. The materials, instruments and procedures used by the authors have been listed so that the reader can also use them for similar work.

_Case presentation

Clinical Information

The documented case involves common baseline findings often encountered in everyday practice.

The 66-year-old female patient presented with the question if the aesthetic image of the crowns on her front teeth could not be improved. Irrespective of this esthetic concern, we also noticed, from a clinical perspective, that some of the crowns has loosened, some of the ceramic veneers had chipped and that there were caries lesions at crown margins, so that the current condition had to be deemed insufficient (Fig. 1). We made photographs and constructed models in order make a detailed analysis or modification recommendations, respectively.

Laboratory Work—Wax-up /production of temporary restorations, braces and preparatory devices

The mounted models and photographs we provided, gave the dental technician the first opportunity to assess the situation, possible problems and feasible results. In the present case, we created a wax-up of the front teeth (Fig. 2) to produce a planning device by using a doubling and a flexible brace (Copyplast/Scheu-Dental), which was stabilized with a plaster key to be inserted in the palate (Fig. 3a/b).

At this point, the aesthetic challenges had become quite clear, especially due to the severely re-

Fig. 1_Initial situation, aesthetically and functionally insufficient dental prosthesis..
Fig. 2a/b_Wax-up on situational models to simulate possible future treatment results.
Fig. 3a/b_Transfer of the wax-up into a vacuum-formed template to create temporary devices.

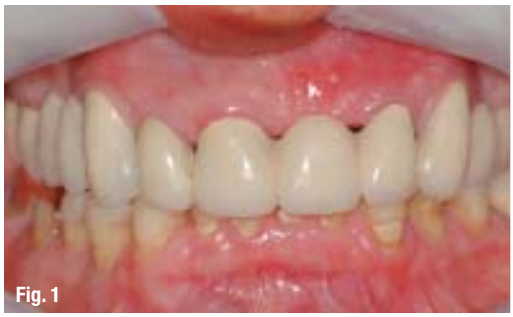
Fig. 1

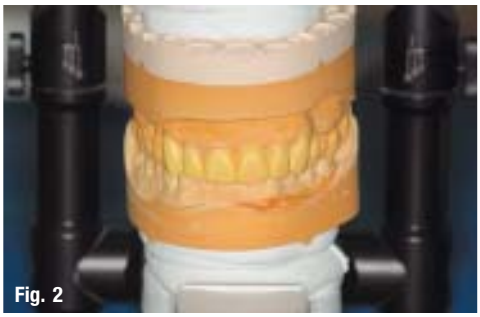
Fig. 2

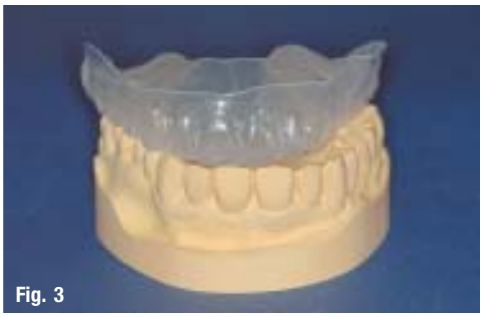
Fig. 3

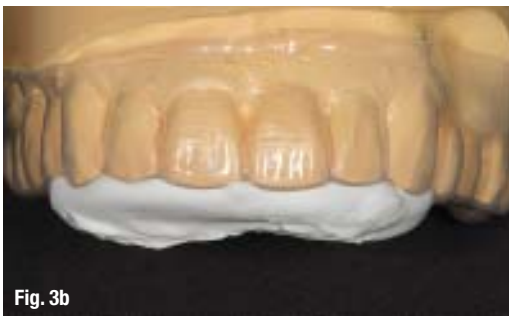
Fig. 3b

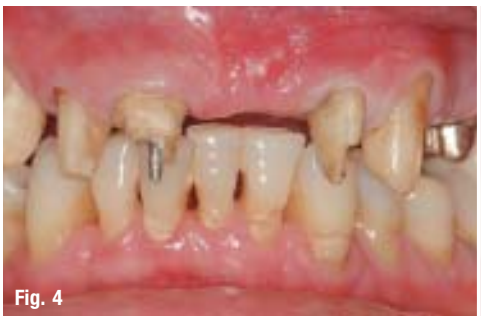
Fig. 4

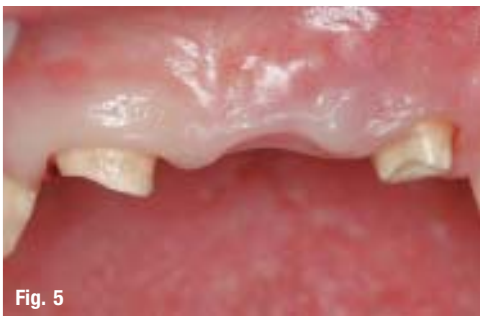
Fig. 5

ceded gingiva and papillae loss. The chair-side created temporary device created with the help of the braces allowed for a first joint examination of the "can restoration". In the present case, the cutting edges of the old restoration were used as the fixation point – sagittal and transversal overbite – with maintained geometry but severely altered tooth shape – elongation of the mesial and distal ridges in order to achieve a harmonious and cosmetically appealing overall picture.

Clinical Information—Ceramic posts

After removing the old crowns and bridges, we filled the existing caries lesions (Multicore, Ivoclar Vivadent). We then removed the metal posts of teeth 11 and 22 (Fig. 4) and prepared the teeth for the ceramic posts (CosmoPost, Ivoclar Vivadent) (Fig. 5). Part of the preparations for completely ceramic post / stump superstructures included an intracanalicular anchoring process using a CosmoPost post (Ivaoclar Vivadent). The post has a parallel conic shape and is made of zirconium oxide ceramic. It is available in two different sizes (1.4 mm in diameter for lateral upper front teeth and lower jaw incisors, 1.7 mm in diameter for all other front teeth). Completely ceramic posts cannot not be honed, tapered or have retentions, since these could present a predetermined breaking point. The pressed on IPS Empress Cosmo ingot (Ivoclar Vivadent) is made of zirconium oxide reinforced IPS Empress glass ceramic.

During the preparatory work, we made sure that

- the length of the post in the canal equals at least the coronal length of the prosthetic restoration,
- the post had sufficient mechanical friction in the canal, and
- the superstructure had a sufficiently large contact surface around the canal entry.

We fixed the posts in the usual manner by using an adhesive. We recommend a dually cured luting cement (eg Variolink II, Ivoclar Vivadent). In order to prevent subgingival sticking (subgingival margin) of the luting cement, we would recommend using a retraction thread (Fig. 6).

This procedure should be used for the aesthetically important front teeth area of the upper and lower jaw, but not for patients with bruxism and/or suspected bruxism, an occlusion/overbite, a supragingival hard tooth structure of less than 2–3 mm, a circular equigingival destruction or an allergic reaction to components used for this procedure.

Laboratory Work—Construction of the completely ceramic posts

A non-segmented model was produced in the labs. The stumps were sealed with a clear gloss. We used a silver gloss (silver spacer/SW-Dental) as a die spacer.

After insulation of the stumps, (Die Lube by Ney) the superstructures were cast on the zirconium oxide post (CosmoPost/Ivoclar) with an organically stained wax. For orientation purposes, we used a vacuum-formed template of the wax-up, which was found to be very helpful. With these helpful devices, we were able to model the superstructure. It is important to note, however, that the template was perforated in the area of the post, because the post must maintain its entire length for the pressing process. After embedding and heating the muffle, the CosmoPost post was pressed with the special Cosmo ingot by Ivoclar, a procedure quite sim-

Fig. 4_Status post removal of the bridge at the front teeth of the upper jaw, metal posts still in situ.
Fig. 5_Preparation for insertion of full-ceramic posts.

Fig. 6_Fixation of the full-ceramic posts with a dually cured luting cement. To protect the gingival from excess cement, threads were applied.
Fig. 7 a/b_Clinical, pre-implantation situation.
Fig. 8_Try-on of the drilling template with the titanium sleeve.

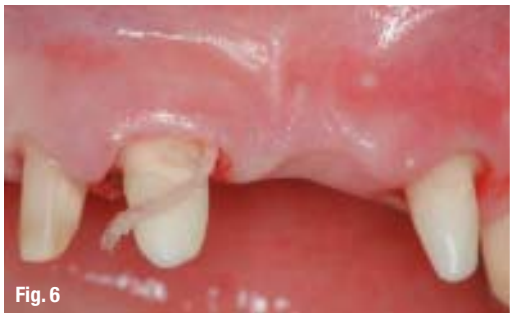
Fig. 6

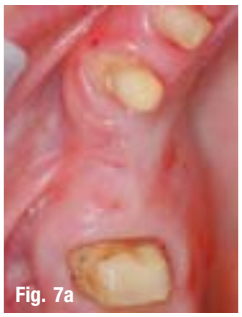
Fig. 7a

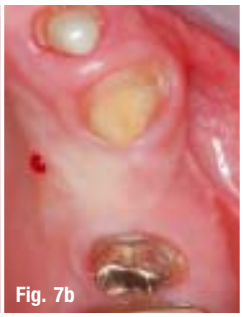
Fig. 7b

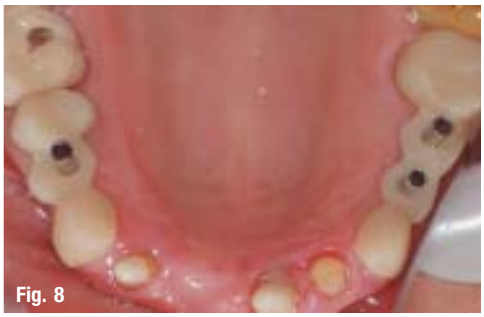
Fig. 8

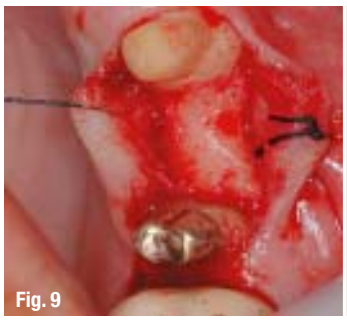
Fig. 9

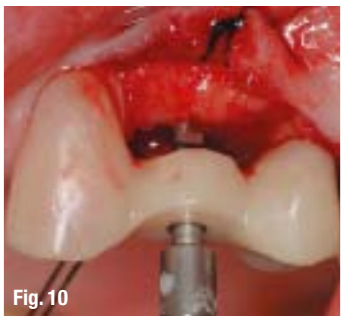
Fig. 10

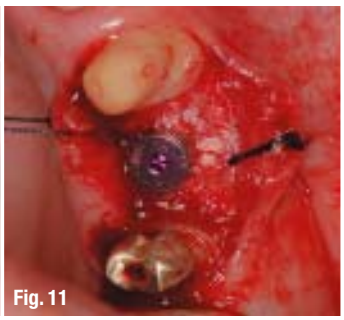
Fig. 11

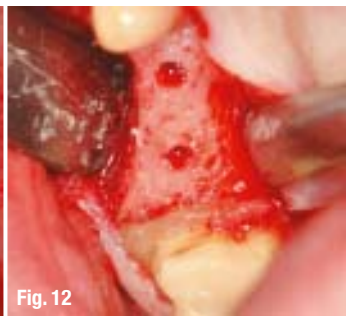
Fig. 12

Fig 9_Presentation of the alveolar process in quadrant II after mobilization of the mucoperiosteal flap.
Fig. 10_Marking of the implantation location and axis.
Fig. 11_Inserted implant with local augmentation.
Fig. 12_Implant channel in quadrant I.

ilar to other common pressing procedures for crowns and inlays. After embedding and adjusting the post, it was then shortened to its desired length by using water as a coolant. The superstructure was then slightly revised.

Clinical Information—Implantation: Planning, execution, impression

After fixing the posts, we constructed a temporary structure (Luxatemp, DMG) in accordance with the wax-up and built up the pontic 21 with a connective tissue graft. This thus ideally established tooth position, which has also been transferred to the temporary structure, also serves as orientation for the creation of the drilling template. The temporary structures with inbuilt guide sleeves (titanium sleeves for drill ∅ 2 mm, CAMLOG) fulfill all the necessary requirements such as very good template stability and sufficient space for mobilization of the mucoperiosteal flap (Fig. 7 a/b, 8). During the surgery, we inserted an implant with a length of 13 mm (∅ 4.3 mm, Screwline, CAMLOG) after preparation of the Proc. alveolaris regio 24 and 11 mm long implants into regio 14, 15 respectively (∅ 3.8 mm, Screwline, CAMLOG). In regio 14, the slight buccal bone deficit was filled in with bone splinters from the implant channel (Fig. 9–11). In quadrant II (Fig. 12), we used some Bio-Oss Spongiosa (particle size 1–2 mm, Geistlich Pharma), and covered the augmentation with a biodegradable membrane (Bio-Gide, Geistlich Pharma). 10 weeks after the insertion of the implant, we added the prosthetic. The molding was done using an individual impression tray and Impregum (3M ESPE). We used bolted impression posts for the open tray impression.

Laboratory Work—Production of full-ceramic abutments and zirconium structures

Over the years, we have worked very effectively with non-segmented models that do not allow for any tolerances. As a result, the rate of interproximal and occlusal corrections, which are always very unsatisfactory procedures for the dentist, have been reduced to a minimum. With regard to implants, we prepared gingival masks analogously to this procedure. The stumps were protected with Erkoskin by Erkodent® in preparation for the making of the model (Fig. 13). As a second step, we then prepared the individual stumps needed to form the edge.

First, we reduced the zirconium oxide sleeves produced by CAMLOG (Fig. 14). They come in three parts, the titanium base part, the zirconium oxide sleeve and the abutment screw. We honed the sleeve prior to affixing it to the base part by using water as a coolant and by using forms previously prepared for the desired situation. We always took the sleeve off the model and screwed it during the honing process onto the plastic holder by CAMLOG (Fig. 15). We also attached a guide rail to keep the zirconium superstructures from twisting, making sure that this area also had a minimum thickness of 0.5 mm. After the completion of this procedure, we glued both parts with Panavia F 2.0 by Kuraray Dental (Fig. 16a/b and 17).

We made the framework with the manual system by Zirkonzahn which, in our opinion, is ideally suited to create an optimum supporting framework that can be formed and set up in accordance with our experience. The modeling was done with light curing plastic. Subsequently, the individual elements were clamped into special frames and transferred with the drill unit by Zirkonzahn (three-

Fig. 13_Non-segmented master model with protective film.
Fig. 14_Zirconium oxide sleeves in their raw form.
Fig. 15_Zirconium oxide sleeves on the plastic holder, ready to be honed.

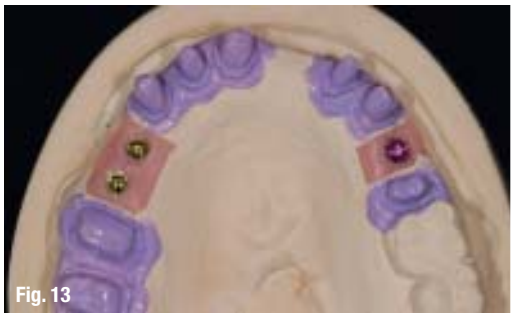
Fig. 13


Fig. 14


Fig. 15


Fig. 16a


Fig. 16b

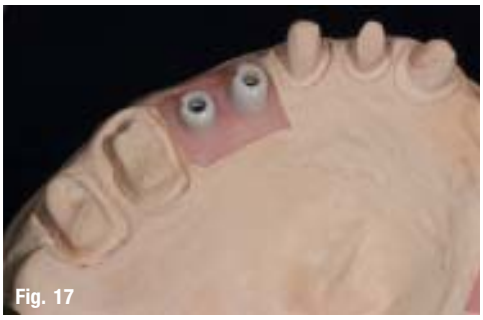
Fig. 17

Fig. 16 a/b_Gluing of zirconium oxide sleeve to the titanium base.
Fig. 17_Finished superstructure on the master model.

dimensional pantograph) into a pre-sintered zirconium oxide block. Prior to the sintering process, the frameworks were color stained. After the sintering process, we fitted the crowns to the separate individual stumps, tapered and reduced the edges with a water-cooled turbine and compared the structures to the master model (Fig. 18). We had prepared an insertion device to assist with the adaptation of the abutment. In this device, each abutment together with its guide rail can be locked in place to protect it from twisting. These devices were made from light cured tray material, reduced at the transition to the abutment and lined with Pattern Resin LS by GC and marked with abbreviations for region and direction. The crowns were provided with occlusal stops made of Pattern Resin LS in order to prepare for the occlusal adjustment and/or occlusion check on the fitting day.

Clinical Information—Try-on of the abutments and zirconium structures

The ceramic superstructures (CAMLOG) were inserted with the transfer device. This allowed a quick and controlled transfer of several individualized superstructures (Fig. 19). The frameworks were fitted to the abutments (Fig. 20 a/b) as well as the abutment teeth (Fig. 21) and the exact fit was checked by the fit checker in black color. The color modification makes for a contrast rich image of imprinted areas within the ceramic framework. The occlusion was also subsequently checked with Pattern Resin (Fig. 22).

Laboratory Work—Ceramic veneers

After this process, the lower jaw model was remounted and the zirconium oxide framework veneered with ceramic by Zirkonzahn®. Using the wax-up, the temporary device as well as the subsequently prepared and transferred silicone key as a reference, we had optimum design and shaping conditions that should allow us to provide the patient with a result that bears no surprises and that provided everyone involved with a great amount of measurements and planning security with regard to tooth shape, size and position. Good preparation and planning only pays off weeks later or, as in this case, months later (Fig. 23–25).

Clinical Information—Integration

After another fitting, checking of the framework fit and the occlusion, the prepared teeth were then cleaned (polish paste, polish brush), the crowns and bridges cleaned and fixated with RelyX Unicem (3M ESPE).

The final pictures document the results of this treatment, which is harmonious and satisfactory for everyone involved (Fig. 26 a/b).

_Discussion

Thanks to the fast developments in the area of high-performing ceramics in the dental industry, dentists as well as dental laboratories are faced with the exciting challenge to perform restoration work by using this effective material and by trying different ways to use it. While only very few labs used this material years ago, because the investment was so difficult to calculate today, most laboratories are able to use it. Dentists, however, have become so experienced with this zirconium oxide that it is now being used for many different procedures.

Fig. 18_Zirconium oxide structures for insertion / veneer prepared.
Fig. 19_Insertion of the fulll-ceramic superstructure with a try-in device fitting of the framework of the front tooth bridge.
Fig. 20 a/b_Tried-in full-ceramic superstructure.

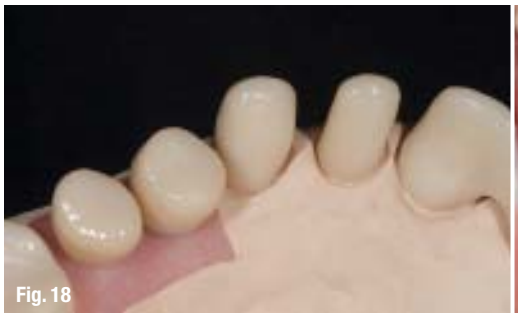
Fig. 18

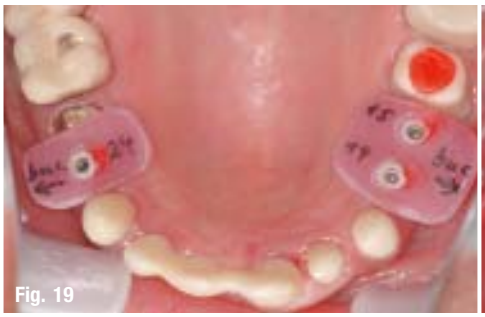
Fig. 19

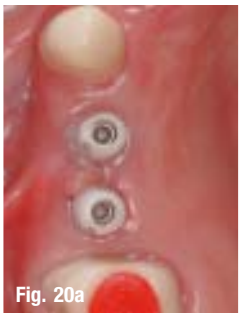
Fig. 20a

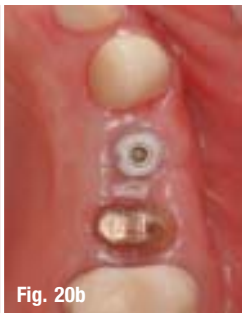
Fig. 20b

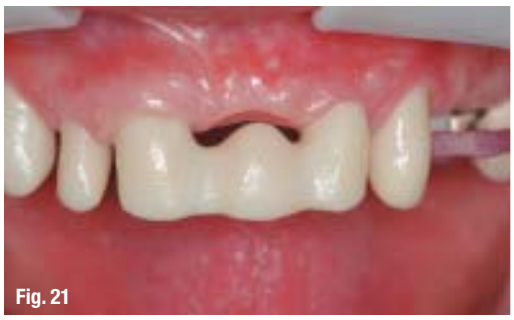
Fig. 21


Fig. 22


Fig. 23


Fig. 24

Fig. 21_Fitting of the framework for the front tooth bridge.
Fig. 22_Fitting of the zirconium caps in the area of the posterior teeth and Remounting record.
Fig. 23_Zirconium oxide superstructure.
Fig. 24_Zirconium oxide crown with the distinctly visible guide rail.

Biological aspects of ceramic implant superstructures

The morphology of the periimplant soft tissue around the titanium abutment is well documented (Berglundh et al. 1991). Animal studies showed that abutments made of aluminum oxide and/or zirconium oxide have a mucosal morphology similar to titanium, i.e. these materials seem to be comparable for this indication from a biological perspective.

Effects of posts on tooth coloration

It has been said that posts, which have a different color than teeth, make teeth and the marginal gingiva appear grayer when implanted in a tooth and thus have a negative aesthetic effect. In a study with the post materials titanium, carbon fiber, glass fiber and zirconium oxide (crown: ProCAD, Cerec) this effect could not be proven with regard to the root area. The results with regard to the color of the crown are significantly different! With a ceramic layer of <1.5 mm, the crown looks significantly darker when carbon fiber and titanium superstructures are used (Hämmerle et al. 2005).

Clinical survival rates of full-ceramic restorations

In a systematic overview of German and English literature, Hämmerle et al. (2005) found that glass ceramics show an annual failure rate of 2.1% when used as crowns in the front and posterior tooth areas. In contrast, glass infiltrated ceramics show a failure rate of 0.8% and densely sintered Al_2O_3 crowns a rate of 0.6%. In comparison, Kerschbaum (1991) demonstrated in an older publication with the same criteria for VMC crowns a failure rate of 2.9%. Zirconium oxide ceramics are very promising with respect to durability–but it will still take many more years and even decades until studies can show comparable long-term results for metallic or metal ceramic restorations._

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implants

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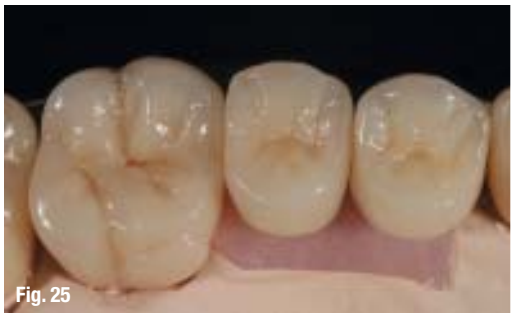
Fig. 25


Fig. 26a


Fig. 26b

Fig. 25_Occlusive view of the finished right quadrant.
Fig. 26 a/b_Final picture after cementing.

Balloon-Lift-Control (BLC): a minimal-invasive system for the elevation of the sinus floor mucosa

Part 1

author_Klaus-U. Benner, Florian JM Bauer and Karl-H. Heuckmann, Germany

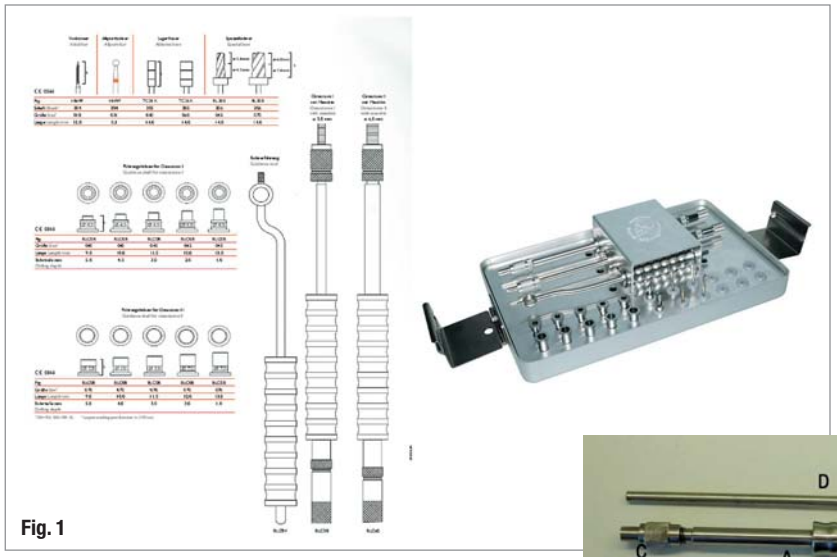

Fig. 1

Fig. 1_BLC System. Left (from above): Set of different drills and distance tubes. Middle (from left): Lunette (distance tube guide) and two osteotome instruments with apical diameters 3.8 and 6 mm). Right: Surgical tray containing the instruments (drafted on the left hand side).

Fig. 2_Components of an osteotome: Guidance instrument (a) with ergonomic handle (b) and adaptive apex (c). Above it the "mandrin" consisting of a bar (d); literally the osteotome) and an adjustable handle (given in more detail in Fig. 4). The mandrin fits into the tube of the guidance instrument.

Fig. 3_Apex of the osteotome: (b) Shaft with its (b) intraosseous tip (graduated in mm). (c) Security screw (to support the instrument by screwing it to gingiva level when the instrument is inserted into the osseous bore hole).

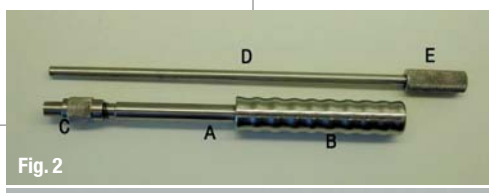

Fig. 2

Fig. 3

_**Within the last 30 years** implantology has become more and more a standard treatment in daily dental practices. Endosteal implants have proved to be not only the basis of tightly fixed dentures, they obviously are capable, but also to prevent alveolar bone resorption. The materials, shapes and macro- as well as micro-designs of surface structures were the subject of a constant process of further development.

Also, surgical techniques were created and published to improve the quality and quantity of the bony recipient layer. These advancements are proven in that in former days implants had to follow the available target layer in size and shape while nowadays we obviously have the materials and techniques on hand to correct local bone deficiencies and to install a sufficient implant construction.

A special problem of deterioration of the osseous implant layer takes place when the teeth in the side region of the upper jaw are getting lost. Then, atrophy of the alveolar ridge takes place in centrifugal as well as centripetal direction. The result, after a relatively short time, is a maximum loss of vertical height of the alveolar process. The upper jaw side region, however, is of superior importance for dental implantology since it is subject of particularly high axial and lateral stresses.

Basically, the resorbed bone in this area can be fortified with two techniques:

_ First, a buckle—preferably taken from the hip bone—is attached to the alveolar ridge as a so-called onlay-augmentation.

_ Second, the bony sinus floor is strengthened by the insertion of bone construction materials (bone defect fillers, BDF) into a room, which is prepared by elevating the interior lining of the maxillary sinus floor.

Clinicall, the latter procedure is used first and foremost.

To begin with, the maxillary sinus lining mucosa—the so-called Schneiderian membrane—must be elevated without a macro- or micro-trauma. Granular augmentation material could penetrate the membrane rupture, and thus arrive at the non-resorptive epithelial layer of the membrane. In the past, two different techniques have been described for access to the maxillary sinus and the elevation of the sinus floor membrane:

_ The direct sinus-lift.[10] A bone window (the so-called Tatum window) is milled into the vestibular wall of the maxillary sinus and the window, together with the attached sinus membrane, is separated from the neighbouring bone with special sharp instruments. This method is also called the "open sinus-lift".

_ The indirect sinus-lift. The alveolar ridge, together with the sinus membrane, is pushed forward into the sinus by the use of an osteotome. This technique, the "osteotome sinus floor elevation" (OSFE), was first described by Summers.[9] The OSFE recently has also been referred to as a "closed sinus-lift".

At first glance, both techniques have their pros and cons.

_ Advantages of open sinus-lift

_ The operation site can easily be studied with the naked eye.

_ The sinus membrane can be elevated without restriction.

_ Unevenness of the sinus floor (eg, Underwood septa) as well as ruptures of the Schneiderian membrane during the elevation can be recognized and taken into consideration.

_ Easy control of bone graft placement is possible.

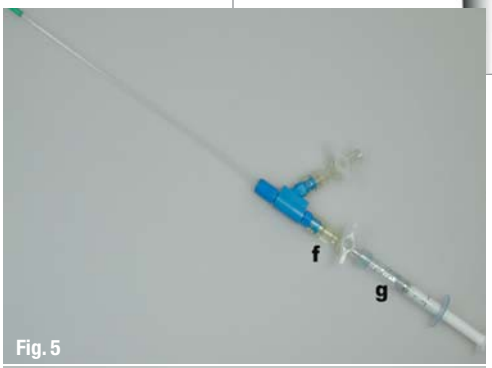

Fig. 5

Fig. 6

_Disadvantages of open sinus lift

_ The operation lasts considerably longer combined with the extended trauma of soft and hard tissue.

_ Thus, the longer exposition of the wound bears a higher risk of bacterial and viral contaminations.

_ Expanded postoperative swelling and high levels of pain are inevitable.

_ Advantages of closed sinus-lift.

_ The operation is minimal invasive.

_ The operation usually is of shorter duration.

_ The danger of contamination and the postoperative complaints are less likely.

_Disadvantages of closed sinus-lift

_ The operation site can only be controlled by using a sinus endoscope.

_ Ruptures of the Schneiderian membrane can only be detected indirectly by means of the Valsalva manoeuvre (nose blowing test).

_ This technique is significantly limited because the sinus membrane, in order to remain on the safe side, can only be raised by approximately 3 mm at the maximum (recommendation of Summers[5]).

_ The repeated beats on the osteotome are a very unpleasant experience for the patient due to the anatomical proximity to the central and interior ear.

_ Several patients undergoing the indirect elevation procedure suffered from disturbances of equilibrium postoperatively.

Common for both methods is that the Schneiderian membrane is elevated by use of rigid and sharp instruments. These are the problems of the "classical" sinus-lift:

_ The above mentioned Underwood septa, which often come across and run through the whole sinus medio-laterally, represent a reasonable obstacle when applying the open sinus-lift during the preparation of the sinus membrane. Regularly, a major rupture of the sinus membrane at the ridge of the septum takes place.

_ The closed sinus-lift includes the danger of a perforation of the Schneiderian membrane by the osteotome itself or by a bone fragment pushed forward by more than 3–4 mm in order to avoid provoking large pointed loads on the sinus membrane.

More than 15 years ago we discussed the possibility of employing a balloon to elevate the sinus membrane. This technique is, in particular (in the form of skin expansion) already in long-time use by

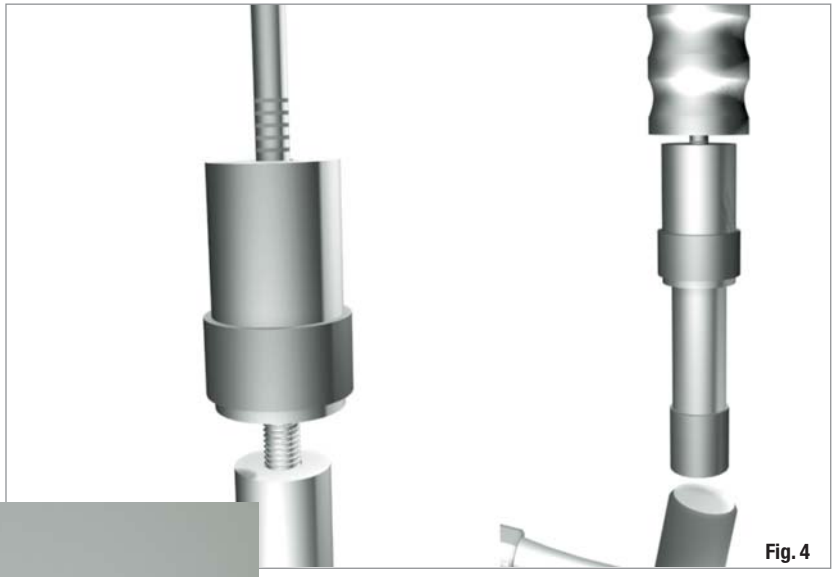
Fig. 4

Fig. 4_Adjustable handle of the mandrin. Left: Screw to determine its overtopping length when totally inserted in the tube of the guidance instrument. Right: Mandrin inserted into the tube of the guidance instrument; when introduced into the osseous bore hole the apical protrusion of the mandrin (in the range of 1 to 2 mm) is achieved by two to three mild beats upon the mandrin grip, thus infracturing the residual bone into the sinus.

Fig. 5_Balloon catheter connected via Luer-lock and valve to a syringe (f). The syringe, filled with fluidity (either saline or a radio-opaque solution) serves to ventilate the double channel-catheter and to block up the balloon in situ. The free Luer-lock (with valve) connection is designed to ventilate the catheter and to attach a pressure monitoring system (strain gauge).

Fig. 6_Tip of the osteotome instrument (b). The mandrin is replaced by the balloon catheter. (a) The overlooking balloon is insufflated.

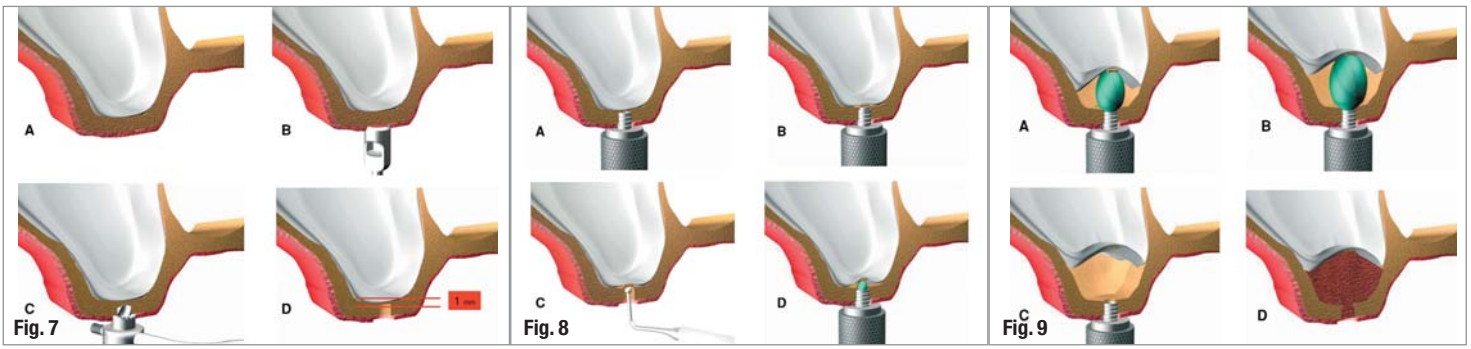

Fig. 7_Procedure of balloon-assisted sinus-mucosa-lift (schematic drawing showing a frontal cut through the distal region of the maxillary sinus with resorbed alveolar process). (a) Initial situation. (b) Removal of the attached gingiva using a punch. (c) Inception of the distance tube (tied into the lunette) and milling the alveolar process to a residual thickness of around 1 mm (d).

Fig. 8_Procedure of balloon-assisted sinus-mucosa-lift (same view as in Fig. 7). (a) Insertion of the osteotome instrument into the osseous bore hole and fitting the security screw to gingiva level. (b) Impressing the residual sinus floor bone (with Schneiderian membrane) approx. 1 mm into the sinus. (c) Mobility test (very necessary) of infracturized bone (and membrane). With a positive result the osteotome is reinserted, the mandrin replaced by the ventilated balloon-catheter.

Fig. 9_Procedure of balloon-assisted sinus-mucosa-lift (same view as in Figs. 7, 8). (a) and (b): Repeated blocking-up of the balloon is necessary to separate the Schneiderian membrane from the sinus floor. (c) The fluidity should discretely be pressed into the balloon (at least 5 times) with increasing volume (up to a maximum of 2 cc; the relation between balloon filling volume and extent of mucosa elevation is given in the text). (d) Situation after filling the submucosal space with appropriate bone defect fillers.

dermatologists to gain reserve cutis in anticipation to cover larger defects of the integument. Our first "in vitro" experiments with the balloon-assisted technique were performed in 1996 on human cadavers (head preparations) using PVC-tubes, on one side of which a condome had been tightly glued. These studies[6] showed that the formaldehyde-fixed Schneiderian membrane could be lifted from the bone much more homogenous than with a sharp instrument (eg, a new scalpel or brand new "elevators" currently available on the market).

Together with the Rüsch Company (manufacturer of the balloon catheter; Willy Rüsch GmbH, Willy-Rüsch-Straße 4–19; FRG - 71394 Kernen) and the Hager & Meisinger Company (producer of the instrumentation set; Hansemannstr. 10, FRG - 41468 Neuss), the Balloon-Lift-Control System was designed and produced step-by-step.

This paper presents the BLC System and its application on the basis of pre-clinical results and a typical case report.

_Material & methods

The BLC System (the operation set and surgical tray are depicted in Fig. 1) primarily consists of three components (Figs. 2–6),

1. a guidance instrument (A; Fig. 2) with an ergonomic handle (B) and an adaptive apex (C),
2. a mandrin (D) (literally, the osteotome) with an adjustable handle (E, Fig. 2), and
3. a balloon catheter (Fig. 5).

The guidance instrument uses a special apical design (Fig. 3). The shaft (B) terminates in an intraosseous tip (b, with a distance graduation in mm). The security or distance screw (C) is designed to underpin the instrument with the gingiva.

The adaptive apex of the guidance instrument permits optimal positioning of the BLC System in the bore hole of the alveolar ridge. This instrument serves as the guider and protection channel for the mandrin as well as the balloon catheter.

The mandrin (literally the osteotome of the BLC System) has a special adjustment system on its handle (Fig. 4) with which the tip surpassing the apex of the guidance instrument (ie, the penetration depth of the mandarin into the sinus in situ) can be adjusted. In Figure 3, the tip of the mandrin (D) extends 1 mm over the guidance instrument.

The balloon catheter (Fig. 5) consists of a double-channel PVC catheter. Proximally, a latex balloon (max. filling volume 3 cc) is tightly fixed. Distally, the catheter is connected with two Luer-lock connections, each one closable by a valve. Thus it is possible to prefill and ventilate the system with an incompressible fluidity.

Especially for the beginner it is recommended to use a radio-opaque solution (eg, Ultravist® 240, Schering AG, FRG, Berlin) as ventilation and blocking-up fluidity. However, since this marker fluid (usually employed for angiography) contains iodine, one must query the patient about earlier immunological hyperreactions against this substance or thyroid gland dysfunctions.

Figure 6 shows the apical part of the guidance instrument; the mandrin is replaced by a balloon catheter and the balloon is inflated.

_Basic application of the BLC System

In Figures 7 to 9 the typical use of the BLC System is depicted step-by-step in schematic drawings.

In Figure 7a the initial situation is presented: frontal cut through the right corpus maxillae. The floor of the maxillary sinus comes down into the alveolar process (forming a subantral space by centrifugal resorption); simultaneously and due to the loss of the molars, the alveolar ridge is reduced (by centripetal resorption). Both processes have resulted in a significant reduction of vertical bone height.

Figure 7b shows the removal of the attached gingiva. The mucosa is drilled up to the compacta of the sinus floor by means of a twist or a trephine drill, whose external diameter corresponds to that of the implant to be inserted. The mucosa punch is kept in a sterile compress soaked with physiological saline for the ex vivo preservation of its vitality.

In Figure 7c the lunette or distance tube guide armed with a distance tube is positioned to the denudated bone and an appropriate drill reduces the alveolar ridge to a remaining bone height of ap-

proximately 1 mm (Fig. 7d). The bone chips obtained by the milling should be kept in a sterile moist chamber to be added later to the augmentation material.

The distance tube and drill in Figure 8a have been replaced by the osteotome guidance instrument, the security (distance) screw of which has been screwed to gingiva level. Thus the guidance instrument is protected against involuntary penetration into the maxillary sinus. Figure 8b gives the impression of the remaining bone by the tip of the mandrin, to the handle of which two soft beats had been performed.

In Figure 8c, a very necessary procedure in this phase of balloon-assisted sinus lift is presented: the mobility test of the infractured bone (with the attached sinus mucosa) using a probe. If the remaining bone is still immovable, a second impression procedure with a mandrin extending over the tip of the guidance instrument more than 1 mm should be attempted. Again, most important is that the impressed bone and the attached membrane are freely movable.

If this is true the osteotome guidance instrument is reinserted into the bore hole and the mandrin is replaced by the ventilated balloon catheter. Figure 8d gives the first blocking-up procedure of the balloon. In this phase the resistance against the blocking-up is relatively high (preliminary experiments indicate that the pressure necessary to, (a) unfold the balloon and, (b) separate the Schneiderian membrane from the adjacent bone (initially amounts to more than 600 mm Hg).

Figure 9a and 9b show that the balloon in situ has to be blocked-up repeatedly (approx. 5 times), each time with increasing volume. The elasticity of the resistance system (balloon plus Schneiderian membrane) brings about that the piston of the syringe is pushed back after each blocking-up-procedure. In Figure 9 (a–c) it can be recognized that the space gained by the blocking-up of the balloon significantly is higher (around 20%) than the balloon-volume itself. After the removal of the BLC system the newly created space under the Schneiderian embrane is subsequently filled up with the augmentation material through the borehole (Fig. 9d). Finally the mucous punch is replaced and fixed with a button suture.

All surgical treatments with the patient were executed under local anaesthesia (Ultracain DS forte; Aventis, FRG, München GmbH). The patient was informed about the operation procedure and the complications one week in advance with special reference to the clinical problems of using an iodine substance as the contrast medium. A mix of β-tricalciumphosphate (Cerasorb®) with autogenous bone (from the milling) and autogenous venous blood was accepted by the patient as augmentation material._

This article is to be continued in issue 2/2207 of implants, international magazine of oral implantology.

The literature list can be requested from the author.

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Implantology still runs the business in 2007 Surfaces, zirconoxide-coated implant components and CAD/CAM-systems are the big topics

author_ Jürgen Isbaner/Germany

With two-digit rates of growth and an unstoppable speed of innovation in 2006 implantology was, without a doubt, the motor of dentistry. Whether in the media or at trade fairs or congresses—the central topic of 2007 remains "implantology".

_Today, there are more than 50 providers of implant systems in Germany, and we are also facing a vast number of implant configurations. As in 2006, numerous new or modified implant systems will be introduced during this 2007 IDS-year. Furthermore, national and international providers of implant systems and implantology complement products will increasingly search for opportunities on the German market.

There is no other specialty field that has a comparable media presence such as implantology. Thus, all high-volume dental publications dedicate at least one issue per year to the subject of implantology, next to a number of about ten implantology specialized magazines published in Germany. With the International Dental Show in Cologne, this trend is going to experience an even higher level. The branch rearms and increases with two-digit rates of growth while yet again relying on innovations where two different directions of development are looming.

First, improved hard- and soft-tissue integration of implant-assisted dentures shall be achieved by increased optimization of implant surfaces and designs, as well as the insert of a new generation of osteoanagenesis materials. Simultaneously, zircon as an alternative implant material, gains importance according to the aesthetic point of view and particularly with regard to a perio-integration that will positively influence the long-term effects of implants.

In the future, almost all well-known implant providers will include metal-free solutions within their product series. In this context, for the IDS we may expect a "high tech" zirconoxide-coating therapy for implant components developed by a German/Swiss group. This therapy shall associate the known advantages of titanium with the tissue friendliness of zirconoxide on behalf of an optimized perio-integration.

The second trend especially implies the idea of a conceptual connection between surgery and prosthodontics with aspects of fabrication, that is, the implantology solution at least with regard to the chain of added value. In times where the bosses of internationally operating enterprises proclaim that the implants being provided on the dental market are substitutable, a differentiated competition can only be realized by offering ideal dental solutions within which the implant is finally a module on the way to "beautiful teeth".

This is at least the philosophy of a global market leader who does not necessarily consider himself to be a provider of implants. Instead, he wants to give back a beautiful and resplendent smile to his patients—whether implant assisted or conventional. Accordingly, the current navigation systems play a central role within this concept due to the fact that they allow the exact planning of an implant's position and of the prosthetic supply so that a surgical operation as well as the prosthetic supply can be realized within one session. Nevertheless, opinions are drifting apart in regards to the question of whether an implant should be inserted where natural bone material already exists or whether artificial bone material should be added instead in order to place the implant in the most optimal way.

However, an "ideal solution" for all indications does not exist and there is no "gold standard". But a vast number of factors characterize the individual search for an ideal solution. Accordingly, next to limiting factors concerning the patients, such as time, money, individual demands, the physical and psychological ability to cope with strain, there are also limiting factors concerning the therapists which should also be taken into consideration.

For one patient an overlay prosthesis in the lower jaw being assisted by two ball-head attachments might be the "ideal" supply, but for another patient the solid implant-assisted or removable high-end-dentures, including expensive augmentative measures as well as gingiva-remodelling, might be the ultimate solution. After all, most modern techniques as well as ingenious and optimized implant systems are nothing without a dentist's specialized skills_

55th Annual Scientific Meeting American Academy of Implant Dentistry

Dental implants increasingly are becoming the preferred option vs. bridgework and dentures

_The main topic of the 55th American Academy of Implant Dentistry (AAID) was "Achieve the Ultimate Makeover with Implant Dentistry." It was held Oct. 25-29 in Chicago. Some 1,500 implant dentists and staff members attended, amongst them the board of the German Society of Dental Implantologie(DGZI). Below are news highlights from selected plenary talks and other sessions.

Established in 1951, AAID is the oldest implant organization in the world and the only one offering implant credentials protected by federal court decisions. Its membership exceeds 3,200 and includes general dentists, oral surgeons, periodontists and prosthodontists from the United States and 40 other countries.

AAID News Highlights

Get the picture for implant precision

Advanced, highly precise computer-guided dental implant surgery has made the procedure faster, highly predicable and long-lasting with a success rate of 97 percent, according to several presenters at the AAID Annual Scientific Meeting.

At a news briefing on site, AAID President Kim Gowey, DDS reported that 3-D imaging is changing the practice of implant dentistry and helping many patients regain a healthy and confident smile, as well as improve oral function and overall quality of life.

"With state-of-the art digital imaging, we can analyze the anatomy of the patient's jaw without surgery, which saves time and money and shortens implant recovery time," Gowey said. "It's like having the patient's jaw on the computer screen and helps make implants the most predictable procedure in dentistry today. Unlike dentures and bridgework, titanium implants are stable, long-lasting and as close as we can get to restoring natural roots in the jaw."

Gowey said life-like 3-D images enable the dentist to assess bone density and locate nerves, blood vessels and sinuses before surgery, thereby eliminating uncertainty about which spots in the jawbone are the right sites for implant placement. "The precision of the CT scan and implant surgical planning software give the dentist a vivid map of the patient's mouth to pinpoint potential problems and plan the entire implant procedure in advance," Gowey explained.

He added that the superb clarity of the image allows precise insertion of the implant through the gum tissue with limited need to make surgical incisions in the tissue. This promotes faster healing because gum tissue is preserved. Once the implants are secured, prosthetic teeth are attached. For some, the entire procedure may take no more than an hour for implant surgery.

"Implants are a win-win for patients and dentists," said Gowey. "Implants do not decay or involve root canals. Further, they are 97 percent successful, which significantly exceeds the success rates of three-unit bridges or dentures, which require filing down or removing adjacent healthy teeth."

Implants' success superior to high risk periodontal surgery

Jaime L Lozada, DDS of Loma Linda University, one of the nation's leading implant dentistry centers, told AAID attendees that technology advances, such as cone beam CT imaging, have made the surgical procedure more precise and successful. As a result, implants have become a preferred alternative to high-risk periodontal surgery.

Nonetheless some patients will choose periodontal procedures in an attempt to save their natural teeth.

According to Lozada, in some cases that decision could mean prolonged, multiple procedures that may or may not prevent tooth loss. "How much periodontal treatment is enough? High-risk endodontic procedures have questionable value because the outcome predictability is better with implants," said


AMERICAN ACADEMY OF IMPLANT DENTISTRY
55th Annual Meeting



Lozada. He added that many periodontal surgery patients eventually lose teeth they were trying to save due to extensive bone loss from periodontal disease. In these cases, implants would be a better alternative to surgical procedures to save teeth severely compromised by periodontal disease.

When celebrities flash their perfect smiles, they reap the benefits of their substantial investments in cosmetic dental care. Mass media exposure and promotions for teeth whitening and other services have elevated patient expectations regardless of how much money can be spent on dental care.

"Most patients want to look like movie stars but don't want to pay for it," said Jack A. Hahn, DDS in his presentation at the AAID meeting. Hahn practices in Cincinnati and strongly believes implant dentists can follow simple surgical techniques to achieve excellent esthetic outcomes. "Bone sets the tone but tissue is the issue," he joked, meaning that bone foundation is critical for implant success but how the gum tissue bonds with the implant influences the ultimate cosmetic outcome.

"Everyone has a different opinion of what's esthetically acceptable," said Hahn. "Some patients want whiter than white teeth while others prefer a more natural look. We have to let our patients tell us what they want and condition their expectations accordingly," said Hahn. He added that before any procedure is approved, the dentist can design a smile on a computer and make wax models to give patients a visual of the end result before agreeing to implant surgery.

Bone up for implants

It's all about bone. Successful implant treatment requires sufficient bone mass in the jaw. In the past, bone loss caused by severe periodontal disease or tooth loss prevented many willing patients from getting implants.

At the AAID meeting, leading bone grafting experts reported on new technology and techniques that are helping to assure both functional and esthetic success through precise bone augmentation.

Michael Pikos, DDS, Pikos Implant Institute, Miami, and the University of Florida School of Dentistry, reported in a plenary session that cone beam CT scanning "has revolutionized the way I look at things" when assessing bone deficiency in implant patients. Pikos said the scans can be done in the office, take about 20 seconds, and produce lifelike 3-D images in four minutes. "Cone beam CT gives the anatomic truth on exact bone deficiency," Pikos explained. Once the exact bone deficiency is determined from the 3-D image, the implant surgeon can decide how much autogenous, donor or synthetic bone material will be needed for a successful implant.

Former AAID President O. Hilt Tatum, Jr., DDS, an internationally renowned implant dentistry pioneer, told the AAID audience most bone deficiencies for one tooth to a full arch can be restored by manipulating the patient's own alveolar bone that underlie and support teeth. This approach reduces risk, morbidity and expense compared to autogenous bone harvesting and grafting. Dentists can replace or manipulate underlying bone using bone excised from other areas in the mouth. "Alveolar bone is unique and can be manipulated with pressure and released to avoid tension," said Tatum. He added that alveolar bone manipulation permits implants and crowns to be placed in natural positions for maximum functional and esthetic benefit.

Why is bone manipulation superior to bone grafting? Tatum explained that manipulated alveolar bone is more stable and consistent, reduces risk for complications, costs less, and shortens treatment time._

_contact implants

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Nobel Biocare World Tour 2006 Wrap-up: Beautiful Teeth Now™ and Always!

_Fifty-one days and seventeen cities later, Nobel Biocare has completed its successful, dynamic and often exhilarating World Tour 2006. The Tour began on the 9th of March in Frankfurt/Main, Germany, and wrapped up the 18th of November in Barcelona, Spain. The statistics from the tour are impressive: attendance in excess of 20,000, more than 125 live surgeries and over 250 hands-on training and focus sessions.

The idea for the World Tour came to Heliane Canepa, President and CEO of Nobel Biocare, following Nobel Biocare's highly successfully World Conference 2005, 5–9 June 2005 in Las Vegas. "I was standing 10 meters up in the air, on a large stage in the MGM Grand arena at the close of our second World Conference in Las Vegas when I looked around at 6,000 attendees; then and there I decided that we should take this out to the world...a world tour—just like the Rolling Stones, I thought," stated Heliane. "Everyone should get the same opportunity as those here have had, to hear how their profession is evolving."

So it was—the dental industry's first world tour was born. Nobel Biocare's first step was to create a Global Scientific Committee tasked with bringing together the world's leaders in esthetic/prosthetic dentistry. Under the guidance of Dr. Brien Lang, a world leader within the prosthodontics field, this committee searched the globe for the best of the best. In each host city, the committee was able to build a team of extremely knowledgeable, experienced speakers to demonstrate the core concepts of Easy Esthetics™, Soft Tissue Integration™, and Immediate Function™ from the basis of Nobel Biocare's theme of Beautiful Teeth Now™.

Brien Lang states, "The scientific faculty represents both local and global speakers with exceptional credentials. Included are researchers, dental specialists, general dentists, technicians, hygienists, dental assistants, office staff and colleagues from other areas and disciplines related to dentistry. Their scientific knowledge, experience in the management of patients, clinical skills involving implant placement and prosthetic rehabilitations, and most importantly their ability to teach are the reasons they have been assembled. Their collective knowledge is outstanding!"

Each conference was held over three days and included a General Program, Focus Group Sessions, Workshops and Hands-on Programs. Programs were offered in English, plus several other languages depending on the location and attendees of the conference.

The General Program focused on live surgeries, presentations on available and future solutions, audience interaction and lively expert panel discussions. Topics within the General Program included: the Procera System in patient rehabilitation, Platform switching (new procedure), rhBMP-2 (new technology, see sidebar), and the long-span Procera Implant Bridge Zirconia for missing teeth. One star performance at all conference general programs was Nobel Biocare's revolutionary NobelGuide™ treatment concept (see sidebar).

NobelGuide™ Concept

NobelGuide allows dental professionals to offer their patients beautiful, natural-looking new teeth in as little as one hour. The procedure is not overly complicated: using information gathered from a CT scan of the patient and the latest in Procera® CAD/CAM dentistry software. Using Nobel Guide, the dental clinician is able to realize and plan the perfect placement of implants in a virtual world. Once the placement location is determined, the implant length required and positioning angle is established and a guide (or pattern) is created. This guide is what is used in the patient's mouth and guides the Flapless Surgery™. Often the surgery is completed within an hour and a final or provisional prosthetic solution is placed. The patient often receives immediate function with his or her new teeth.

"The World Tour Conference in Maastricht, Holland was a wonderful opportunity for me to meet and discuss face-to-face, treatment solutions with fellow Procera providers in a very professional yet relaxed atmosphere."

Marc Van Camp, dentist

rhBMP-2

Recombinant human Bone Morphogenetic Protein-2 (rhBMP-2, or dibotermin alfa) is a version of a naturally occurring human protein that enhances bone growth. Experimental research has shown that it is possible to make new bone at dental implants with a technology that combines rhBMP-2 and Nobel Biocare's unique implant surface TiUnite®.

This breakthrough technology is expected to replace today's invasive, painful and time-consuming surgical procedures involving membranes and other grafting techniques for patients who do not have sufficient quantities of bone.

"The bone inductive implant will revolutionize dental implantology", says Heliane Canepa, CEO of Nobel Biocare. "We are very proud to be the first company in our industry to exploit this promising research field, which will eventually provide patients suffering from bone loss with fast, painless minimal-invasive solutions."

Focus sessions explored select important areas from the general program in intense detail. These sessions offered an unparalleled opportunity for attendees to expand their knowledge and enhance both their professional and business skills. Some focus sessions included: developing implant solutions in your practice, modern concepts in the dental laboratory, managing complex surgical situations with implants and Procera restorations, and many other fascinating topics all focusing on improving the oral health care of patients.

"Commitment to patients is the watchword of the future. It was made clear at the conference what we mean by this and how we can achieve it."

Hans Geiselhöringer, CDT

Training and education, of course, remained the cornerstones of each Nobel Biocare's World Tour stops. Besides the general program and focus sessions, each conference offered a variety of hands-on programs and workshops all designed to educate and train the attendees of the benefits of "Beautiful Teeth Now".

"Dentists and dental technicians worked together very constructively in my hands-on workshop. This atmosphere of cooperation was evident throughout the whole conference and also reflects how NobelGuide can be used effectively for the benefit of the patient."

Dr. Melanie Grebe, dentist

Last, but certainly not least, it should be mentioned that Nobel Biocare also knows how to celebrate—seventeen host cities meant seventeen tour parties held at seventeen exotic locales. Each party featured a fantastic variety of delicious food dishes, live and DJ-provided music, huge dance floors and lots of opportunities for socialization.

"I gained a lot of insight into abutment use and implant procedures. I plan to use this newly acquired knowledge to offer my patients better abutment alternatives. I also attended the tour party and thought it was a fantastic way to relax and network.
Dr. Daniel Tafur Elbaz

Where next for Nobel Biocare's "Beautiful Teeth Now"? Well, back to where it all started. The date has been set for their third world gathering of professionals—World Conference 2007, 20–24 May in Las Vegas. Guaranteed to be "bigger and better," involving some amazing new learning techniques and fully focused on evidenced based education, Nobel Biocare promises that World Conference 2007 will be dentistry's most educational and personalized forum ever._

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Continuing education with a certificate of excellence…

BIOMET *3i* Continuing Education for German practitioners in sunny Florida

author_Torsten Hartmann, Germany

Continuing education programs outside of Germany have always had a particular allure. Even though the number of these programs has shrunk considerably due to the increasingly altered economic landscape in dental medicine, foreign continuing education programs have retained their special appeal.

_The conferences of renowned implant manufacturer BIOMET *3i* Implant Innovations in south Florida, where the company is headquartered, are now of nearly historic import. These conferences have been and continue to be an integral part of the continuing education program for many European dentists.

This January a small group of European dentists (most of them from Germany) embarked for sunny Key Biscayne, Florida, in order to participate in the continuing education program at the renowned Pankey Institute. The program, entitled "Planning treatment for a challenging patient," augured a stimulating and exciting training session for the participants, and one bathed in Floridian sunshine.

The goal of this four-day seminar for advanced implantologists was to facilitate creative and comprehensive thinking about alternatives of treatment planning for the most challenging dental implant procedures. An interesting aspect of this event was the fact that the Pankey lecturers not only had their own expertise at their fingertips—and were ready to convey it to their audience—but also, throughout the entire seminar they placed a great deal of emphasis on discussion with the participants and on exchanges eliciting the experiences of each individual dentist attending the program.

The sessions included discussions moderated by the faculty in the course of which models and procedures recorded on video were used to demonstrate advanced techniques. The participants were invited to present difficult cases for discussion with other experienced members of unique discussion groups and their discussion leaders. The course, actively supported by BIOMET *3i*, was attended by 21 implant dentists from Germany, France, Spain, Denmark, Switzerland and Romania who talked about the latest tech-

nologies and techniques of implant-supported restorations in the most difficult cases and discussed them extensively.

Renowned surgeons Michael Block and Harold Baumgarten, and dental prosthetics specialist George Priest, along with Pankey Institute faculty members Steve Ratcliff, Lee Ann Brady, and Irwin Becker discussed surgical and restoration parameters with their European guests. On the fourth day participants visited the BIOMET *3i* headquarters and the production site in West Palm Beach, Florida. Although participants encountered rather European weather with rain and chilly temperatures, it was nonetheless an exciting and productive day.

Dr Carsten Blecker, Director of Marketing, Europe, gave a vivid presentation in which he outlined the history and strategy of the company from the day of its founding by Dr Lazarra to the present. It was interesting for the participants to see how an originally small but excellent idea could assume greater dimensions and eventually become the basis for an enterprise with worldwide operations.

A presentation about NanoTite™ by Dr Jim Kenealy was delivered in a riveting style and relaxed atmosphere; this was followed by a presentation from Matt Powell, Director, Technical Marketing of BIOMET *3i*. His topic was "CT Guidance and Next Generation DIEM." The program concluded with a product presentation and an inspection of BIOMET *3i* products production site.

This continuing education program met with a very positive response from the participants. One of the things that they especially emphasized was the relaxed and yet efficient atmosphere conveyed by the Pankey Institute and its lecturers. It is for precisely this reason, as well as because of the excellent organization by the BIOMET *3i* team on-site, that once again this spring seminar sponsored by the renowned implant manufacturer will be a very positive memory for all participants._

Manufacturer News

Nobel Biocare

Procera Laminate: Unparalleled strength and beauty, combined!

Due to an astounding 700 MPa flexural strength, Procera Laminate withstands the rigors of both professional handling and patient use. The layered NobelRondo™ porcelain ensures beautiful esthetic results and patient satisfaction.

The 0.25 mm Procera Laminate core of densely sintered aluminum oxide (alumina) is biocompatible, effectively masks underlying discoloration and minimizes staining issues during bonding. Also translucent, Procera Laminate preserves the tooth's luminescence. Nobel Biocare's industry-leading production facilities create Procera Laminate within 48 hours; this translates into significantly less labor time than traditional techniques.

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BEGO

BEGO Implant Systems to present 8 new products at IDS

BEGO Implant Systems is looking to maintain its steep growth curve in 2007 and close the gap on the top 5 suppliers even further. The past year saw the establishment and expansion of cooperations with Artoss GmbH, Rostock (NanoBone bone augmentation material); RESORBA Wundversorgung GmbH & Co. KG, Nuremberg (GENTA-COLL resorb foil wound dressing); and IZI (Institute of Dental Implantology), an implantology training institute based in Limburg, which, with Dr Dr Ronald Streckbein at its head, will provide postgraduate training for BEGO Implantology users and be responsible for knowledge transfer from the market to the development department at BEGO Implants. Now the company is concentrating on the launch of attractive new products and services for all aspects of implantology.

By the time IDS 2007 comes round, the market launch of 8 important new products will be complete, according to the head of the Product Marketing department, Dr med. dent. Nina Chuchracky. In addition to the current launch of precision abutments and bar restorations made from the BEGO non-precious alloy Wirobond® MI, the company is devoting special attention to a completely new implant system bearing the name BEGO Semados® RI. The fabrication of precision components made from the non-precious alloy Wirobond MI is a world first. Although non-precious alloys are already in successful use for casting prosthetic components in the dental laboratory, their tendency to porosity has meant that up to now machining was virtually impossible. The BEGO development team has solved this problem, thereby heralding in a new era in the use of non-precious alloys in the production of precision components for prosthetic implants. The new root-shaped implant, BEGO Semados RI, offers a combination of benefits as the system of the future. The implant system employs an external contour developed and patented by Dr Dr Streckbein, in which a special compression thread is combined with a crestal fine thread. The implant bed can be prepared according to the bone quality. A suitable, non-ablative thread former is available for the often rather soft bone (D3, D4) of the maxilla, which compresses the cancellous bone. For the often cortical mandible (D1, D2), there is an ablative screw tapper. Furthermore, these instruments used in combination allow even the most difficult bony bed conditions to be safely prepared. The implant permits the use of the complete prosthetic components of the successful BEGO Semados S line, including the all-ceramic abutments. With the launch of the new implant line, which like all BEGO implantology components is manufactured entirely in Germany, we will also be able to offer users a new, modular surgical instrument set. This gives the user a wide range of advantages because investment in the required insert tools can be significantly optimized. Visit us at IDS 2007 in Cologne and let us guide you through the fascinating world of BEGO implantology solutions. Bremen-based BEGO Implant Systems GmbH & Co. KG is a thriving, growth-oriented company in the dental implant industry. The company has been developing and manufacturing dental implants and accessories for the implant-based treatment of patients around the world since 1990. Dental implants "Made by BEGO" are top-quality German products at a fair price, which offer the perfect combination of safety, durability, aesthetics and reliability. BEGO Implant Systems GmbH & Co. KG has patented many of its developments.

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Camlog

The Logfit™ Prosthetic System for CAMLOG® Implants—Making Implant Prosthetics Easier and More Efficient

The Logfit prosthetic system now makes CAMLOG implant prosthetics even easier and more efficient through its use of prefabricated components. The standardized clinical and technical procedure means lower cost in time and money for both dentist and dental technician. Fabrication of the prosthesis is similar to that for conventional crowns and bridges. Since the system works on the principle of modularity, it comes with a minimum of components. These include color-coded abutments, impression caps, laboratory analogs and burn-out plastic copings for crowns and bridges. Abutments are available in two gingival heights (0.8 mm and 1.5 mm) for implant diameters 3.8 mm, 4.3 mm, 5.0 mm, and 6.0 mm. The single-unit Logfit impression cap is simply snapped onto the screwed abutment in the mouth and ensures a precise transfer. The snap-on mechanism holds the analog firmly in position for the wax-up. An o-ring on the analog provides an excellent grip for the burn-out plastic copings for crowns and bridges during the wax-up. The three surfaces on the abutment permit the plastic coping, crown and the final restoration to be centered exactly in position and provide antirotational stability. Because of the precision fit between the Logfit plastic copings and the analogs, no corrections of the inside configuration and the margin are required after casting. The precisely prepared plastic copings allow for a defined cementation gap and thereby ensure the exact seating of the reconstruction.

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J.Morita

First European Accuitomo Forum in Cologne

J. Morita will be launching the International Dental Show (IDS), taking place in Cologne from 20–24 March 2007, with an international panel discussion on 3-D volume tomography. Six well-known experts from the academic world and dental practice have been invited to Cologne by Morita to report on their experience with 3-D volume tomography in general, and with Morita's 3-D Accuitomo in particular, on 20 March 2007. The presentations are intended to cover all key points of interest in dentistry and ENT treatment. It is likely that 3-D volume tomography will be one of the hot topics during the IDS. Other manufacturers will be presenting their systems alongside Morita, so it would certainly be beneficial to attend the Morita forum to make a direct comparison, exchange views with experts and form your own opinion.

According to Morita, the Accuitomo was the first effective 3-D volume tomography system with high-resolution cone-beam computer technology (CBCT), and is now the gold standard for resolution and image quality. The 3-D Accuitomo works with an image enhancer, which captures the cumulative images generated by x-ray, and stores them as they are taken. A computer transforms this raw data into very high-resolution 3-D records, which can be cut along any spatial plane and viewed in real time. The 60 mm x 60 mm flat-panel detector generates images of outstanding quality with visibly improved contrast resolution, which cannot be achieved with other imaging techniques such as computer tomography (CT). All consultants will be giving their presentations in English. The conference hall in the Dorint Sofitel congress hotel is directly opposite the trade fair site, and is easy to get to.

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Oraltronics

Easy access with Pitt-Easy — The small surgical tray for all cases! Safety and efficiency for implant surgery: PITT-EASY complies.

The Pitt-Easy cylindrical screw implant offers a concept for minimum-invasive therapy that can be easily applied by saving maximum bone quantity and optimum initial retention in bone. Pitt-Easy features an approved body design and ensures excellent long-term success. In addition to the large surgical tray containing the complete set of simultaneous drills, an alternative is now available for the diameters 3.25/3.75/4.00 and 4.90 mm. The small surgical tray contains all components required for a quick and rational insertion. An instruction booklet is supplied as an active orientation aid for your assistant personnel. The surgical tray (size 195 mm x 147 mm x 45 mm) is available with complete components under order No. 90204.

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curasan

Guided Tissue Regeneration in Dentistry

Improved: The resorbable Epi-Guide, membrane

Curasan is now selling an improved Epi-Guide membrane that is more malleable than its predecessor and unilaterally embossed, thus facilitating the orientation of the membrane in the defect. The proven 3-dimensional membrane structure, however, remains unchanged. US surgeons and European surgeons have responded very positively to the new, optimized Epi-Guide. Epi-Guide is a resorbable membrane fabricated from polylactide and used for the coverage of various defects and extraction sockets. A section of the patented three-layer matrix is designed to prevent the migration of epithelial cells and serves as a space holder for the development of bone and periodontal supporting tissue. Cavernous spaces form a scaffold for the accumulation and stabilization of cellular connective tissue that actively support the healing process. A uniform blood clot forms at the border between gingiva, barrier matrix and tooth.

Functionality

The barrier's three-layer construction is designed to attract, trap and retain fibroblasts and epithelial cells. At the same time, it maintains space around the bony defect for the regeneration of bone as well as periodontal supporting tissue. Epi-Guide aligns fibroblasts and epithelial cells in a way that blocks the epithelial migration during the ensuing healing phase.

Clinical studies

A multi-center study in 40 patients (bilateral defects) in the US researched the influence of the differing architecture of three-dimensional polylactide barriers (Epi-Guide und Guidor) as to the degree of hard tissue regeneration in the treatment of grade II furcations in humans. The evaluation of the findings in all three centers regarding the reduction of the vertical component showed significantly better results for Epi-Guide as compared to Guidor.

Biocompatibility

Epi-Guide consists of a polymer of lactic acid metabolite. The polymer structure of D, D-L, D-polylactic acid is broken down into carbon dioxide (CO_2) and water (H_2O). This polymer has a long history of medical efficacy and safety.

Resorption behaviour

Histologies document an inflammation-free collagen formation in the Epi-Guide Matrix within six weeks. Bioresorption begins after three months, while the matrix continues to fulfill its function. After twelve months the Epi-Guide membrane is completely resorbed, making a second surgical procedure obsolete. Tissue regeneration occurs even in the case of flap recession if a primary closure is lacking.

Handling advantages

The optimized Epi-Guide membrane offers the surgeon distinct handling advantages. It is soft and malleable. It can be trimmed with scissors or a scalpel to fit any defect, ie, a membrane of 18 x 30 mm can be used to treat several defects. It is embossed on one side, which eases the orientation in the defect (see illustration). Once saturated with defect blood, the membrane is easily adapted to the defect site. The barrier matrix abuts with the tooth, which makes suture unnecessary in most cases.

Evaluation

In 1999 in an investigation of 600 dental products, Clinical Research Associates, an independent institute, rated Epi-Guide the fifth-best dental product (Clinical Research Ass. Newsletter, 1999, Vol. 23-1). The study is based on a survey of more than 20,000 users in the USA. And 96% of the users rated Epi-Guide from "good" to "excellent". Since 2001 curasan AG has owned the distribution rights for the CE-approved Epi-Guide membrane by Kensey Nash Corporation for Europe, the USA, and a number of other countries. In the US the product has been used successfully for eleven years.

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Selected Events 2007

		Location	information
	MARCH 2007		
March 8–10	*Academy of Osseointegration Annual Meeting*	San Antonio, U.S.A.	E-mail: academy@osseo.org Web: www.koelnmesse.de
March 20–24	*IDS International Dental Show*	Cologne, Germany	Web: www.koelnmesse.de
	APRIL 2007		
April 6–7	*3rd Arab-German Implantolgy Meeting*	Dubai, U.A.E.	E-mail: office@dgzi-info.de
	MAY 2007		
May 11–12	*14. IEC/8. ESI*	Berlin, Germany	Phone: +49-3 41/4 84 74-3 08 Fax: +49-3 41/4 84 74-3 90 Web: www.oemus.com
	JUNE 2007		
June 15–16	*"Esthetics follows Function" – International Conference for Orofacial Surgery*	Vienna, Austria	Phone: +49-3 41/4 84 74-3 08 Fax: +49-3 41/4 84 74-3 90 Web: www.oemus.com
	SEPTEMBER 2007		
September 7–8	*4. Forum of Innovations in Dentistry*	Leipzig, Germany	Phone: +49-3 41/4 84 74-3 08 Fax: +49-3 41/4 84 74-3 90 Web: www.oemus.com
	OCTOBER 2007		
Oktober 5–6	*37th International Congress of DGZI*	Düsseldorf, Germany	Phone: +49-3 41/4 84 74-3 08 Fax: +49-3 41/4 84 74-3 90 Web: www.oemus.com
	NOVEMBER 2007		
November 7–11	*AAID 56th Annual Meeting*	Las Vegas, U.S.A.	Web: www.aaid.com
November 23–28	*The 2007 Greater New Yorker Dental Meeting*	New York, U.S.A.	E-mail: info@gnydm.com

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international magazine of oral implantology

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