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cosmetic dentistry _ beauty & science

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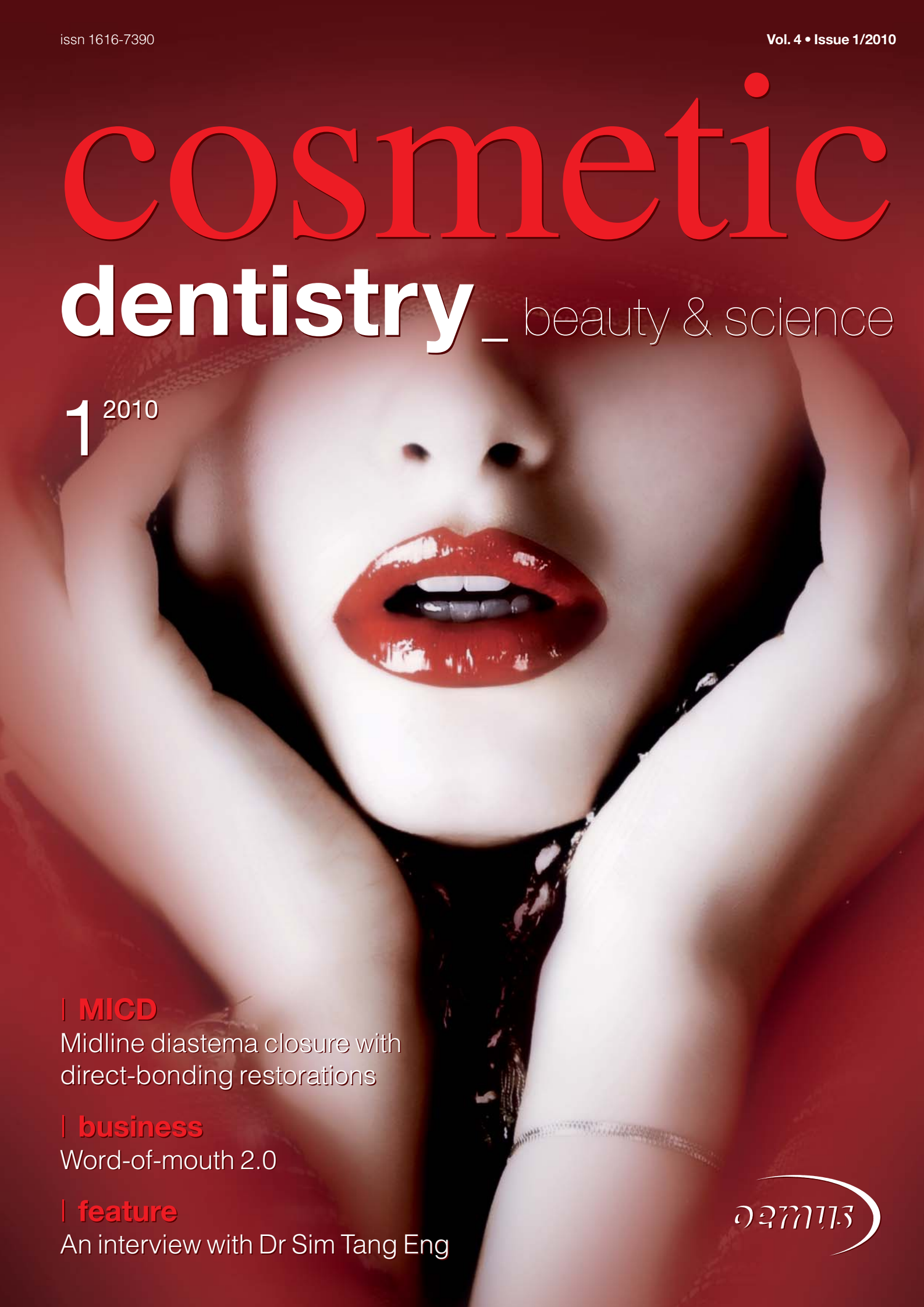

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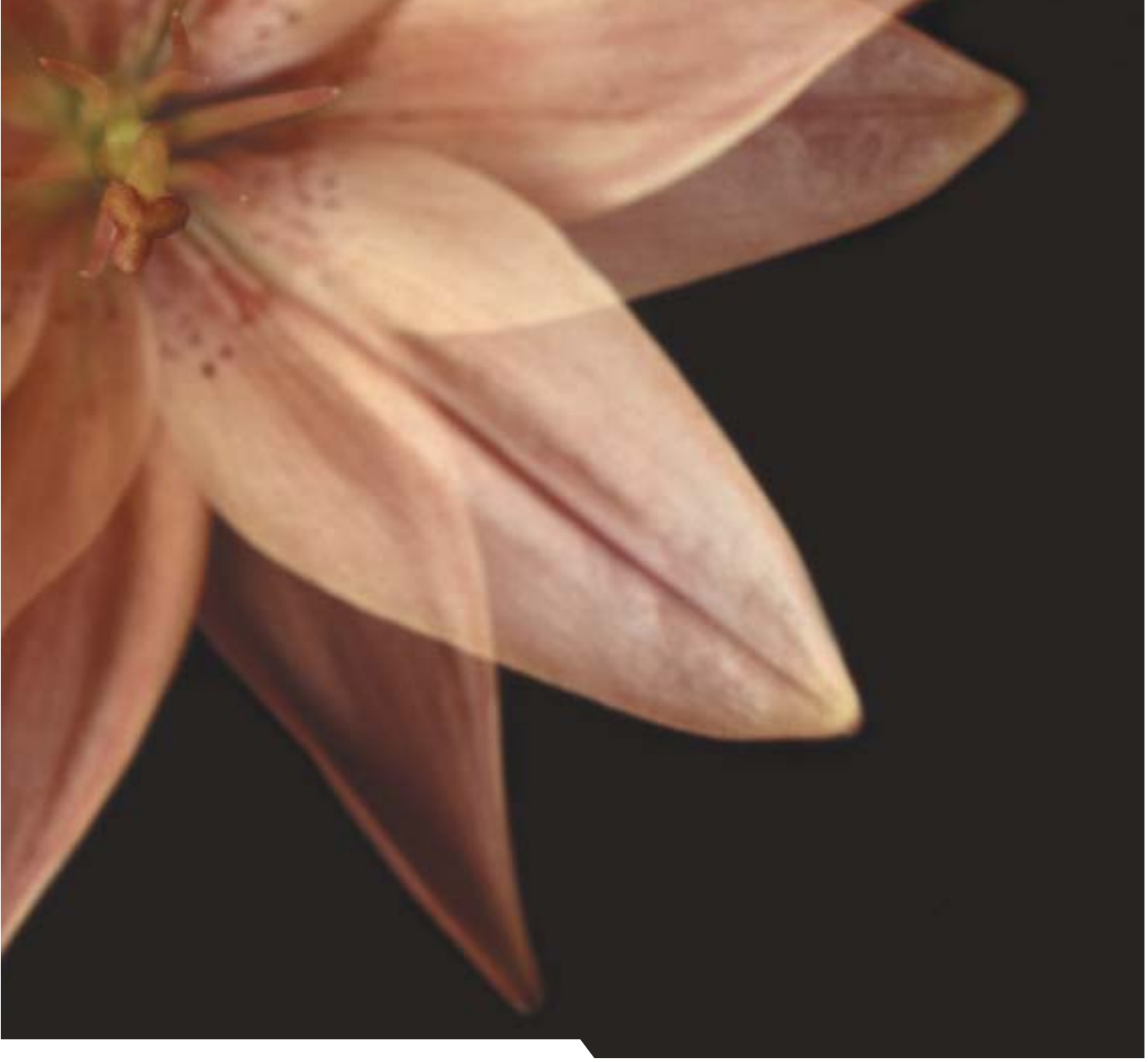

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Dear Reader,

Dr Sushil Koirala
Editor-in-Chief

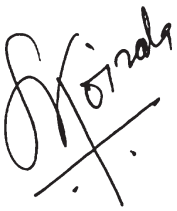
_Welcome to this year's first edition of cosmetic **dentistry**! With great pride, we are able to look back at a successful year in 2009. cosmetic **dentistry** is now one of the most popular aesthetic dental magazines in the Asia Pacific region. This success was greatly due to the high standard of both printing and article selection. We were able to offer free accessibility to the electronic version of the magazine on www.dental-tribune.com and the official websites of the South Asian Academy of Aesthetic Dentistry (SAAAD) and Asian Academy of Aesthetic Dentistry. Furthermore, various aesthetic continuing education (CE) institutions have approached cosmetic **dentistry** in order to establish a professional relationship for the promotion of the art and science of aesthetic dentistry in the Asia Pacific region.

In my editorial in edition 1/2009, I discussed the scope of the minimally invasive concept in cosmetic dentistry. In edition 4/2009, we published an article proposing the minimally invasive cosmetic dentistry (MICD) concept and its treatment protocol. The concept, which is now widely recognised, was tremendously well received. Various aesthetic and national dental organisations have since invited me to lecture on the concept and its clinical application. It is my pleasure to mention that aesthetic academies now officially endorse the MICD concept and its treatment protocol, introducing it at their scientific meetings and in their CE programmes. For the past six months, I have lectured at the scientific meetings of the Nepalese Academy of Cosmetic and Aesthetic Dentistry, SAAAD, Philippine Dental Association (PDA) and Malaysian Dental Association. Owing to the great response at the PDA conference and at the special request of the Philippine Academy of Esthetic Dentistry, we were encouraged to organise the first exclusive MICD symposium, offering six CE credit points, in Asia on 21 February 2010. With six international speakers and nearly 400 attendees, the symposium was a great success.

Within a short period, the MICD movement has gained popularity and is being accepted by clinicians globally. Keeping this recent trend in mind, we have created a section dedicated to MICD-related clinical cases, with the first in this issue.

I would like to express my gratitude to our valued readers, authors, advertisers and everyone that has directly and indirectly supported cosmetic **dentistry** and thus helped to bring the magazine to its current place. I hope you will enjoy this edition of cosmetic **dentistry** and invite you to send your valuable feedback and ideas.

Sincerely yours,



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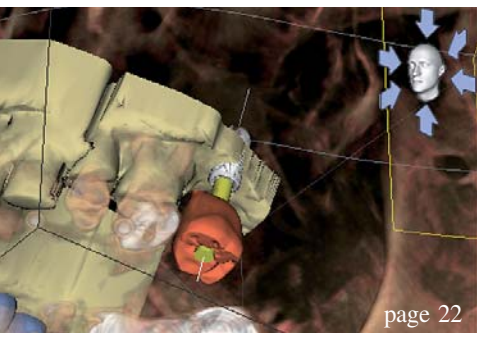
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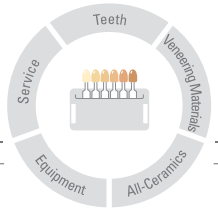

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Midline diastema closure with direct-bonding restorations

Author_ Dr Sushil Koirala, Nepal

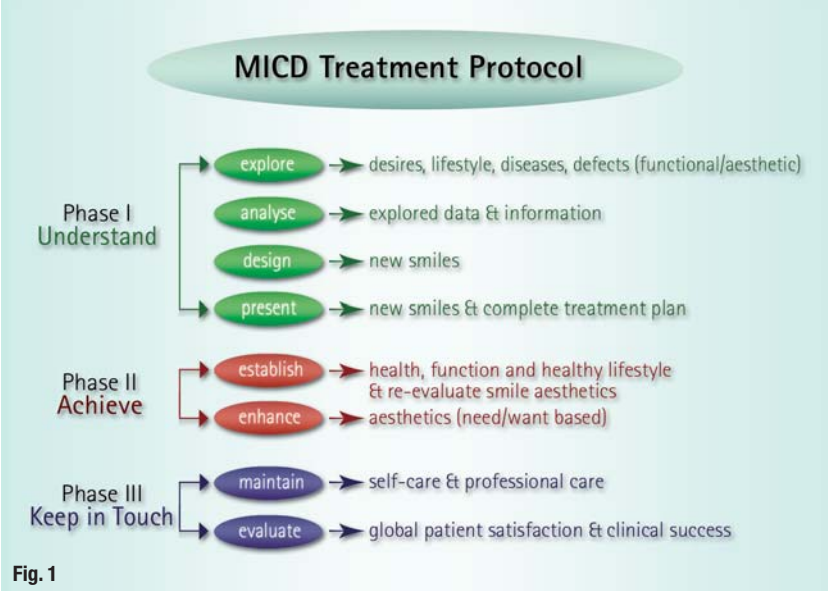

Fig. 1

Fig. 1_MICD TP.

_Midline diastemata (MD) are spaces of varying magnitude between the crowns of fully erupted maxillary and mandibular central incisors. Keene describes MD as anterior midline spacing greater than 0.5 mm between the proximal surfaces of adjacent teeth. Incidences of maxillary and mandibular MD are 14.8 and 1.6 %, respectively.[1]

MD can occur in temporary, mixed or permanent dentition and may be considered normal for many children during the eruption of the permanent maxillary central incisors. When incisors first erupt, they may be separated by bone and the crowns incline distally because of the crowding of the roots. With the eruption of the laterals and permanent canines, the MD reduces or even closes completely.

Etiological factors

The etiological factors of MD are described by various researchers. Angle concludes the presence of an abnormal frenum to be the cause of MD,[2] a view that has been supported by other researchers.[3-5] According to Tait, the frenum is the effect and not the cause of the incidence of diastemata.[6] He reports causes such as ankylosed central incisors, flared or rotated central incisors, anodontia, macroglossia, dento-alvolar disproportion, localised spacing, closed bite, facial type, ethnic and genetic characteristics, inter-premaxillary suture and midline pathology. Weber lists the causes for spacing between maxillary incisors as the result of high frenum attachment, microdontia, macrognathia, supernumerary teeth, peg laterals, missing lateral incisors, midline cysts, habits such as thumb-sucking, mouth breathing and tongue thrusting.[7] Therefore, the etiological factors can be summarised as follows:

1. developmental: microdontia, missing laterals, mesiodens, macroglossia, macro-hypertrophic fibrous frenum;
2. pathological: midline cysts, tumours and periodontitis;
3. neuromuscular: oral habits, such as tongue thrusting during speech, swallowing or abnormal pressure during rest.

Fig. 2

Fig. 3

Fig. 2_Placement of plastic strip.
Fig. 3_Plastic strip is supported with index finger.

Fig. 4


Fig. 5

Fig. 4_Injection of flowable resin to create frame.
Fig. 5_Flowable resin ready for light curing.

Clinicians must be prepared for patients visiting the dental office with the aim of having their diastema closed in order to fulfil their psychological (aesthetic and beauty enhancement), functional (pronunciation of 'f' and 's' sounds and cutting foods with anterior teeth) and/or health (oral-health maintenance) problems.

_Treatment options for diastema closure

Treatment modalities depend on the etiological factors and complexity of the MD. It is suggested that treatment of a MD should be delayed until the eruption of the permanent canines. However, the pathological causes should be ruled out and treated at an early stage, for example extraction of supernumerary teeth (mesiodens) and surgical treatment for the removal of midline cyst, tumour and periodontal pathologies. Surgical, orthodontic (comprehensive/short term), periodontal, direct-bonding and indirect restorations are the treatment modalities that can be used alone or in combination to achieve harmony in terms of a patient's aesthetics, function and health.

MICD by definition is "a holistic approach that explores the smile defects and aesthetic desires of a patient at an early stage and treats them using the least intervention options in diagnosis, treatment and maintenance technology by considering the psychology, health, function and aesthetics of the patient."[8] The MICD concept as the professional movement that encourages all clinicians to select diagnosis, treatment and maintenance modalities that are the least invasive in order to preserve healthy oral tissues while still achieving the natural aesthetics outcome in the best interests of the patient's health and happiness.

Following, I will demonstrate the clinical use of MICD TP (minimally invasive cosmetic dentistry treatment protocol) to close or reduce the diastema in clinical practice (Fig. 1).[8] The direct-bonding procedure with the application of the Flowable Frame Technique (FFT) is presented here as a special technique.[9]

_Case presentation

A 20-year-old female patient presented with the complaint that she did not like her smile because of the large gap between her upper front teeth. The patient was very concerned about her smile aesthetics and also aware of her speech difficulties.

Phase I: Understand

In the first step of Phase I, the patient's perception, lifestyle, personality, and desires were explored in a personal interview and through completion of the *MICD self smile-evaluation form*. The patient,


Fig. 6


Fig. 7

Fig. 6_Plastic strip is removed after light curing; note beautiful lingual frame.
Fig. 7_Lips at rest; note MD is clearly visible.


Fig. 8


Fig. 9

Fig. 8_MD in close-up view.
Fig. 9_Teeth #12 and 21 after isolation with gingival retraction cords.

who exhibited a high dental IQ, evaluated her smile as below satisfactory.

After the interview, the disease, force element and aesthetic defects of her smile were explored clinically. Necessary digital photographs were taken, along with diagnostic study models for further exploration of existing diseases, force elements and aesthetic defects. The patient had good oral health, normal function and no para-functional or other destructive oral habits.

The collected clinical and diagnostic information, such as extra and intra-oral digital photographs, study models and X-rays, was further analysed to determine her smile aesthetic grading in terms of her health, function and aesthetics, as well as to gain an overview of the clinical problems and the macro-, mini- and micro-smile defects. We found a high frenum attachment and the space analysis of the study model revealed a MD of 3.5 mm between teeth #12 and 21. The tooth-size ratio of the centrals was nearly 65 % and lacked central dominance.

In the design step, a new smile with a closed gap was designed. It is to be noted that the upper central incisors are considered key to a smile[10,11] and must be given sufficient prominence.[12] The aesthetically acceptable width of the centrals is between 75 % and 80 % of their length.[12] In the presented case, it was logical to close the diastema completely by increasing the width of the centrals. The types of treatment involved, complexity, possible risk factors, complications and treatment limitation were evaluated, and the tentative costs calculated and presented to the patient.

The new smile was proposed through the modified digital photographs and aesthetic mock-up of the study model. In order to correct her MD, a frenectomy with non-invasive indirect partial veneers was proposed as the first option and a direct-bonding restoration without frenectomy as the second option. However, because of financial constraints, the patient preferred the second option.

All patient queries related to the proposed new smile and treatment modalities were addressed in detail. The informed consent form was signed prior to proceeding to Phase II.

Phase II: Achieve

In the first step, the patient's health, function and a healthy lifestyle were established. The patient's smile was graded as Grade B.[8] The established parameters of her oral health and function were within normal limits, the aesthetic parameters were below the accepted level and enhancement treatment was to improve her aesthetic parameters further. Hence,

Fig. 10_Light touch upon the enamel surface of tooth #12 with diamond point to enhance bonding process.
Fig. 11_Enamel etching with phosphoric acid (FL-Bond Etchant) for 20 seconds.


Fig. 10


Fig. 11


Fig. 12


Fig. 13

Fig. 12_Uniform layer of bonding (FL-Bond) application.
Fig. 13_Placement of plastic strip for FFT.

in this case, it was not necessary to undergo establishment treatment (like orthodontic, periodontal, occlusal adjustment, etc.) before proceeding to the aesthetic enhancement step. According to MICD TP, the desire of the patient in this case was need-based or naturo-mimetic smile enhancement.

_Direct-bonding restoration

The direct-bonding restoration technique represents the preferred therapeutic option in MICD. It preserves maximal tooth structure and helps to restore function and aesthetics in only a few clinical visits. In addition, the technique is economical and the possible need for sophisticated indirect restoration can be postponed. Direct-bonding restorations demand excellent clinical skills. The clinician is required to incorporate various clinical techniques, tips and tricks. Following, I would like to demonstrate a simple technique that I have applied since 2005 in various clinical scenarios and find helpful for the upgrade of clinicians' restorative skills.

The Flowable Frame Technique

The FFT is a simple restorative technique developed to speed up the placement and simplified confinement of material when restoring challenging anterior aesthetic cases such as large Class IV or Class III defects and diastema closure or reduction. As the name suggests, this technique requires flowable composite resin as frame material, a plastic strip, composite brush and other usual instruments for direct resin restorations.

Clinical steps in the Flowable Frame Technique

The following steps are to be taken:

_Step 1—After the completion of etching, priming and bonding of the tooth surfaces, insert a simple plastic strip to the level of gingival sulcus of the tooth to be restored (Fig. 2).
_Step 2—Support the plastic matrix strip lingually with your index finger to create a lingual contour (Fig. 3).
_Step 3—Inject the flowable composite resin of desired shade (either opacious or translucent) and smooth it to a thin layer with a hand instrument or a composite brush if necessary (Fig. 4).
_Step 4—Light cure the flowable composite and remove the plastic strip. A flowable frame is now ready (Figs. 5 & 6). The length, shape and thickness of the flowable frame can be adjusted using the sharp edge of the hand instrument or a diamond point if required.

The advantages of the FFT are:

_time and cost saving (no direct or indirect mock-up required);
_thickness of the layer of restoring materials


Fig. 14


Fig. 15

Fig. 14_Injection of flowable resin (Beautifil Flow shade A3T).
Fig. 15_Adjustment of lingual frame with sharp hand instrument.


Fig. 16


Fig. 17

Fig. 16_Application of Beautifil II dentine shade A1.
Fig. 17_Dentine layer is smoothed with a brush and light cured.

(dentine, enamel and opacious group) can be predicted;
_as with the silicone template method, an opaque halo, mamelons, and translucent areas in the proximal and incisal areas can be created;
_smooth palatal surface is achieved with minimal finishing;
_smooth adaptation of the restorations can be achieved even in the gingival sulcus; and
_it is the most suitable lingual frame creation technique for diastema reduction or closure.

_Material selection and clinical steps for diastema closure

Material selection for diastema closure should be guided by optical properties (light transmission and diffusion characteristics) and tissue responses of the materials (restoration in diastema closure normally touches the gingival tissue and sulcus). Amongst the various materials available, Giomers are amongst the latest category of micro-hybrid light-cured restorative materials and are touted as the true hybridisation of glass ionomers and composite resins, as they have the fluoride release and recharge of glass ionomers and the aesthetics (shade, polish and optical properties), handling and physical properties of composite resins. Giomer restorative and adhesive systems have good bio-compatibility[13] and have been reported not to result in long-term post operative sensitivity.[14] They have also been found to possess anti-plaque formation properties.[15] Hence, giomer direct-restorative materials and adhesive systems were selected to close the MD in this case.

Fig. 18_Application of enamel layer in Beautifil II shade Inc.
Fig. 19_Tooth #12 after final restoration.
Fig. 20_Lingual frame created on tooth #21.
Fig. 21_Teeth #12 and 21 after finishing and polishing.


Fig. 18


Fig. 19


Fig. 20


Fig. 21

Beautifil Flow Shade #A3T with giomer adhesive system FL-Bond II (SHOFU Inc.) were used in FFT to create the lingual frame. Beautifil II (SHOFU Inc.) dentine shade A1 and enamel shade Inc. were used to restore the defects using the bi-layered shading technique to achieve the desired aesthetics with an invisible restoration. The Direct Cosmetic Restoration Kit and the Super-Snap Rainbow Technique Kit (both SHOFU Inc.) were used to prepare the teeth and to finish and polish the final restorations (Figs. 7–22).


Fig. 22

Fig. 22_Final smile.

Phase III: Keep in touch

After completion of the treatment, the importance and role of the keep-in-touch concept to the long-term success of aesthetic enhancement procedures were briefly explained to the patient. She was advised to continue her normal oral hygiene procedures and shown how to keep the interdental space of the closed diastema clean. In the final step of MICD TP, the patient was requested to fill out the *MICD clinical evaluation form*. The patient evaluated her new smile as excellent and mentioned that she was fully satisfied with the overall clinical services at our centre. The *MICD summary ten* (Table I →) helps to evaluate the overall success of the case.

_Conclusion

Diastema closure or reduction in clinical practice requires detailed case analysis. The successful treatment of diastemata depends on etiological factors, size and extent of the diastema, and the patient's affordability in terms of treatment time and costs involved. The MICD TP guides the clinician and the patient and helps both to understand, plan and complete the clinical case using diagnosis and treatment modalities that are the least invasive in order to preserve sound tooth structure and achieve natural aesthetics, considering the patient's best interests._

Table I

MICD summary ten
1. SMILE SELF-EVALUATION: BELOW SATISFACTORY
2. SMILE GRADE: B
3. TREATMENT CATEGORY: TYPE I
4. TREATMENT COMPLEXITY: GRADE I
5. PROPOSED TREATMENT: ACCEPTED
6. ESTABLISHMENT OUTCOME: NOT APPLICABLE (N/A)
7. SMILE RE-EVALUATION: N/A
8. ENHANCEMENT CATEGORY: NATURO-MIMETIC (NEED-BASED)
9. EXIT REMARKS: EXCELLENT
10. CLINICAL SUCCESS: SATISFACTORY

Editorial note: A complete list of references and the MICD forms are available from the publisher.

_about the author

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Dr Sushil Koirala is the founding president of the Vedic Institute of Smile Aesthetics and the chief instructor of Comprehensive Aesthetic Dentistry, a two-year training programme based upon Vedic philosophy of beauty and aesthetics. He maintains a private practice focusing primarily on MI cosmetic dentistry (MICD). Based on more than 17 years of clinical experience in aesthetic dentistry, Dr Koirala developed the Vedic Smile Concept, the Smile Design Wheel, the MICD TP, and various clinical techniques for direct aesthetic restorations. He is the founding president of the Nepalese Academy of Cosmetic and Aesthetic Dentistry and South Asian Academy of Aesthetic Dentistry.

He has published numerous clinical articles in aesthetic dentistry and authored *A clinical guide to Direct Cosmetic Restorations with Giomer*, published by Dental Tribune International GmbH. In addition, Dr Koirala serves as Editor-in-Chief of cosmetic **dentistry**_beauty & science. He frequently conducts hands-on programmes and delivers lectures globally on smile aesthetics. He can be contacted at skoirala@wlink.com.np.

Hemisection of a front tooth

Authors_ Dr Steffen Hohl, Germany & Dr Anne Sofie Brandt Petersen, Denmark

_A 14-year-old girl greeted us in the treatment room with a friendly smile. Her aesthetically unpleasing tooth #21 was immediately apparent. It appeared twisted and too wide. The mother's comment highlighted the severity of the situation: "My daughter generally does not smile like that. She is embarrassed and avoids smiling."

_Case report

The patient presented with two deformed teeth in the region of tooth #21 that were fused together, a deformity that occurs in 0.01 % of the population. The central and lateral incisors in the maxilla are most frequently affected. One can distinguish between the fusion of the tooth surface and the whole tooth with a joint pulp chamber (partial versus complete fusion). Fusions in milk teeth are more frequent than those in permanent dentition are. Fusions in milk teeth are not determinants of fusion in the permanent dentition.

The following treatment was planned for the patient:

1. X-ray diagnosis to determine whether the fusion was partial or complete;
2. hemisection of the teeth along the root separation line;
3. direct capping with calcium hydroxide, if necessary, to retain the vitality of tooth #21;
4. temporary crowns; and
5. orthodontic integration of the tooth into the dental arch.

_Summary

The fusion of two teeth occurs in the nascent period of the teeth. There are various courses of action in therapy that address either partial (only the tooth enamel) or complete (with joint pulp) fusion.

Since the young patient had two separate pulp chambers, the vital tooth #21 could be retained. Should pulp opening occur during hemisection with complete fusion, an immediate application of a hydrogen peroxide pellet would be recommend. After a short integration period, calcium-hydroxide paste (e.g. Kerr Life, Kerr) should be applied to the pulp wound. This initial therapy—direct capping—is very likely to help keep the part of the tooth to be retained vital.

A temporary crown, as shown in this case, completed the treatment. After a rest period of at least three months and monthly vitality tests, long-term tooth retention can be expected.

Orthodontics following the hemisection should not be performed until a six weeks healing period has elapsed._

_contact

cosmetic dentistry

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Fig. 1


Fig. 2


Fig. 3

Figs. 1 & 2_Fusion of teeth #21 and 21a (accessory tooth germ).—**Fig. 3**_Orthopantomograph with illustration of the fused teeth #21 and 21a. Seemingly, the accessory tooth #21a does not have a proper pulp chamber.


Fig. 4


Fig. 5


Fig. 6

Fig. 4_Minimally invasive, marginal incision with discreet vertical relief distally to tooth #21a.—**Fig. 5**_Vestibular formation of a muco-periosteal flap to evaluate the fusion between teeth #21 and 21a.—**Fig. 6**_The fused teeth were cut off from the crown right down to the root using a diamond-coated micro-cutter with a cutting disc.

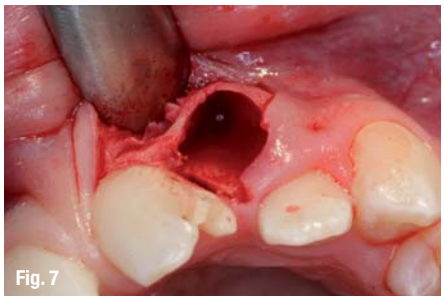
Fig. 7

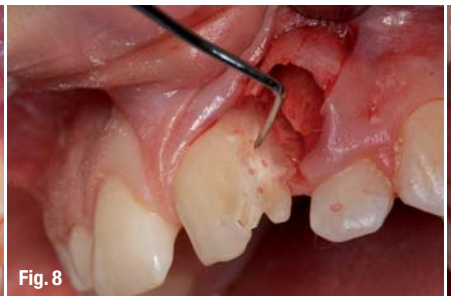
Fig. 8


Fig. 9

Fig. 7_The fused part of tooth #21a was removed by periotomy and the actual tooth #21 was retained.—**Fig. 8**_Openings in the pulp chamber were investigated using explorer sensors and magnifying spectacles. The pulp chamber of tooth #21 appeared to be completely closed.—**Fig. 9**_Tooth #21 was carefully prepared for the incorporation of a provisional crown.


Fig. 10

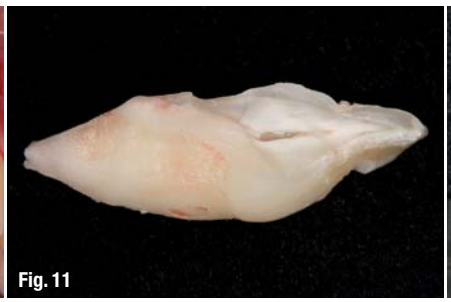
Fig. 11


Fig. 12

Fig. 10_The empty alveolus of tooth #21a was filled with a collagen sponge to avoid quick resorption.—**Figs. 11 & 12**_Tooth #21a after exact hemisection of the fused teeth.


Fig. 13


Fig. 14


Fig. 15

Fig. 13_Plastic covering of the alveolus of tooth #21a. Wound closure was carried out with absorbable suture materials and through surface adhesion with cyanoacrylate.—**Fig. 14**_Post-op view.—**Fig. 15**_Post-op view after one week.

Root recession coverage made predictable using resorbable barriers

Authors_ Dr David L. Hoexter, Dr Nikisha Jodhan & Dr Jon B. Suzuki, USA

_**Gingival recession is defined** as the location or displacement of the marginal gingiva apical to the cemento-enamel junction (CEJ).[1] Recession is the exposure of root surface, resulting in a tooth that appears to be of longer length. From a patient's perspective, recession means an unaesthetic appearance and is associated with ageing.

The gingiva consists of free and attached gingival tissue, as seen macroscopically. The free marginal gingiva, located coronal to the attached gingiva (AG), surrounds the tooth and is not attached to the tooth surface. The AG is the keratinised portion of gingival tissue (KG) that is dense, stippled and firmly bound to the underlying periodontium, tooth and bone. In ideal health, the most coronal portion of the AG is located at the CEJ, where the most apical portion is adjacent to the muco-gingival junction (MGJ). The MGJ represents the junction between the AG (keratinised) and alveolar mucosa (non-keratinised).[2]

There are numerous aetiological factors that may result in recession. Generally, the aetiology can be categorised as either mechanical or as a function of periodontal disease progression. Recession usually occurs due to tooth malposition,[3-5] alveolar bone recession,[6,7] high muscle attachments and frenal pull,[8] and iatrogenic factors related to restorative and periodontal treatment procedures.[3,9]

The detrimental effects of recession include compromised aesthetics, an increase in root sensitivity to temperature and tactile stimuli, and an increase in root caries susceptibility due to cementum exposure. Thus, the main therapeutic goal of recession elimination is gingival root coverage in order to fulfil aesthetic demands and prevent root sensitivity.

Miller classifies recession defects into four categories:

_class I: marginal tissue recession does not extend to the MGJ;
_class II: marginal tissue recession extends to the MGJ, with no loss of interdental bone;
_class III: marginal tissue recession extends to or beyond the MGJ; loss of interdental bone is apical to the CEJ but coronal to the apical extent of the marginal tissue recession;
_class IV: marginal tissue recession extends beyond the MGJ; interdental bone extends apical to the marginal tissue recession.[10]

A possible treatment modality for recession includes restorative/mechanical coverage, such as cervical composite restorations. This kind of treatment may effectively manage root sensitivity and root caries. However, such treatment entails a long-term compromise from an aesthetic perspective. Composite restorations stain over time, and any marginal leakage may lead to secondary caries, recurrence of sensitivity and/or local inflammatory changes. Additionally, colour matching can be difficult and such restorations may involve the undesirable removal of vital tooth structure in order to create adequate retention form. Thus, clinicians must determine whether the restorative benefits outweigh the aesthetic shortcomings and whether is it possible to employ a treatment modality with few, if any, functional and aesthetic disadvantages.

Another treatment modality for recession is muco-gingival surgery. Muco-gingival surgery refers to periodontal surgical procedures designed to correct defects in the morphology, position and/or amount and type of gingiva surrounding the teeth.[11]

In the early development of muco-gingival surgery, clinicians believed that there was a specific

Fig. 1


Fig. 2

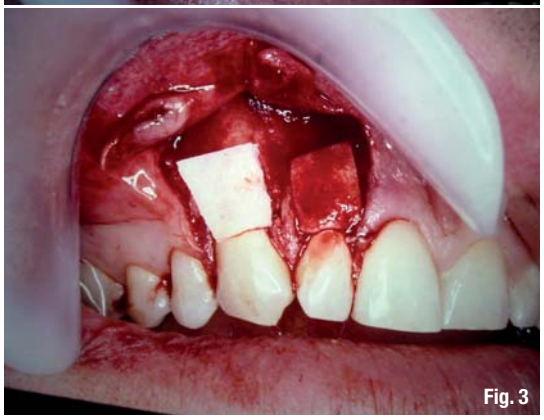
Fig. 3

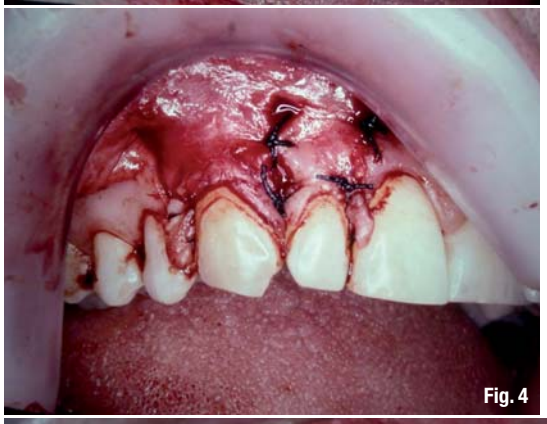
Fig. 4

Fig. 1_Pre-op labial view of anterior teeth: recession on tooth #6; tooth #7 surrounded by a small adequate zone of keratinised apical tissue.
Fig. 2_Flaps reflected preserve the interproximal tissue, which preserves the blood supply and prevents black triangles (unaesthetic interproximal spaces).
Fig. 3_The GTR membrane was shaped and placed over the root surfaces of teeth #6 and 7.
Fig. 4_Gingival tissue was coronally repositioned, covering the membranes and the roots of teeth #6 and 7, and sutured in place.
Fig. 5_Post-op view: the previously recessed roots of teeth #6 and 7 are covered with attached pink, keratinised gingival tissue, with no pocket depth upon probing.

Fig. 5

minimum apical-coronal dimension of AG that was necessary to maintain periodontal health. However, subsequent clinical[12–15] and experimental studies[16,17] have demonstrated that there is no minimum numerical value necessary. However, for aesthetics, a uniform colour and value of AG is desirable amongst adjacent teeth.[18]

Some of the earliest techniques for correcting recession involved extension of the vestibule.[19] The subsequent healing usually resulted in an increase of AG. However, within six months, as much as a 50 % relapse of the soft-tissue position was reported.[20,21] Thus, these techniques did not adequately address recession.

In order to improve aesthetics and increase KG for root coverage procedures, current periodontal surgery largely involves the use of gingival grafts. There are a multitude of surgical techniques, which can be distinguished based on the relationship between the donor and recipient sites. Gingival graft procedures involve either (a) pedicle soft-tissue grafts, which maintains the pedicle blood supply, or (b) free autogenous soft-tissue grafts. Techniques involving the latter type require the clinician to prepare two surgical sites: one to harvest the tissue (1) and another one to prepare the recipient site (2). In this case, the autogenous soft-tissue graft has a separate blood supply to the recipient site. Combinations of (a) and (b) have also been reported.[22–24]

The pedicle soft-tissue graft was first described by Grupe and Warren in 1956.[25] This involved raising a full thickness flap and laterally positioning and then suturing donor tissue into place from an adjacent area, while maintaining a pedicle blood supply. This technique and others that followed were designed to increase the zone of AG. Later modifications of the technique included the double papilla flap[26]—introduced by Cohen and Ross in 1968—the oblique rotational flap[27] and the rotational flap.[28] Another type of gingival movement flap was described later as the coronally repositioned flap.[29] This technique involves mobilising a full thickness flap and repositioning the tissue to the CEJ, thereby covering the exposed recession.

The use of free gingival grafts was described in the 1960s by Sullivan and Atkins.[30] The free auto-

genous graft can be made up of either epithelialised gingiva or connective tissue. Initially, the therapeutic goal was to increase the zone of KG. The clinical objective has now evolved to covering the recessed root with a zone of attached KG. This can be achieved in one or two stages. Initially, Sullivan and Atkins described a one-stage procedure in 1968. Its purpose was to increase the zone of KG without concentrating on coverage of a recessed root. In the 1980s, a two-stage modification was suggested for an increase in root coverage, which proved to be more successful with increased predictability. This involves first placing the free gingival graft or the free connective tissue graft apical to the area of recession, and using the coronally repositioned technique after healing.

Free autogenous grafts are predominantly harvested from the palate. Recently, materials other than gingival grafts have been explored. Using a guided tissue regeneration (GTR) technique, an acellular dermal matrix has been reported to yield favourable outcomes in root coverage.[31,32] This material may provide the patient with a less invasive alternative than a palatal donor site, in order to achieve root coverage.

Procedures combining both free grafts and pedicle techniques have also been detailed. For instance, when a connective tissue graft is employed, the graft is placed sub-epithelially with a coronal advancement of the overlying keratinised tissue. GTR techniques have also been developed more recently. In 1992, Pino Prato et al. described a combination technique of sub-epithelial placement of a membrane with coronal advancement of the flap, such as e-PTFE.[33] The function of the membrane is to maintain space during the healing period for tissue regeneration to occur. From a patient's perspective, biodegradable membranes with GTR might be preferable in order to avoid a second-stage surgery for membrane removal.

The goal is to restore gingival health, colour and aesthetics by covering the exposed root predictably with healthy gingival tissue and in doing so decrease sensitivity. Using GTR and coronal repositioning techniques, we achieve predictably covered roots.

Variations in muco-gingival procedures have been developed to include root surface bio-modifications by treating the root surfaces with a variety of materials. These measures enhance the regeneration process of a new connective tissue attachment. In order to increase root coverage, a new clinical attachment is necessary. Root surface bio-modification involves treating the root surfaces with citric acid, tetracycline or EDTA in order to remove the smear layer and expose dentinal tubules and thus facilitate a new fibrous attachment. An enamel matrix derivative claimed to support the action of enamel matrix proteins by inducing acellular cementum, periodontal ligament and alveolar bone formation is also available in the range of root surface bio-modification materials.

The following case report considers predictable aesthetic root coverage by comparing a GTR technique to a non-GTR technique in a split-mouth procedure involving the same patient.

_Case report

A young, adult male patient presented with recession bilaterally in his maxilla. The upper right maxilla had extensive recession on teeth #6 and 7 (Fig. 1). The upper left maxilla had similar recession on teeth #11 and 12. Additionally, tooth #11 had a cervical groove, which was stained and hard but not decalcified.

After local anaesthesia using lidocaine, the desired flap design was completed. There was an adequate zone of KG present before treatment, which was preserved and repositioned coronally. Upon reflection of the tissue, the full extent of the underlying recession was evident (Fig. 2). The area and recession were uncovered following removal of debridement and granulomatous tissue. The resorbable membrane material was shaped and placed on the exposed roots. The membrane was first placed on tooth #6 and thus the tooth appeared darker as it absorbed blood. The membrane was placed on tooth #5 second and thus the tooth had not absorbed the blood at the time of the photograph, which accounts for the colour difference at this time.

The coronally repositioned flap was sutured in place with the flap covering the now submerged membranes and previous recession (Figs. 3 & 4). Periodontal dressing (Coe-Pak, GC) was utilised as a bandage and placed over the surgical area. It was removed a week later at the same time as the sutures. The patient then lavaged and returned to the usual oral hygiene routine, initially lightly and gradually more vigorously. Once healed and oral health was maintained, the recession was covered and health regenerated. Upon periodontal probing, no pockets were present (Fig. 5). The final view presents a visual symmetry of health and colour that is maintainable.

Recession was also present at the maxillary left side (teeth #11 and 12; Fig. 6). After local anaes-

Fig. 6


Fig. 7

Fig. 6_Pre-op labial view of anterior teeth.
Fig. 7_Cervical groove on tooth #11 is solid, hard and non-carious.

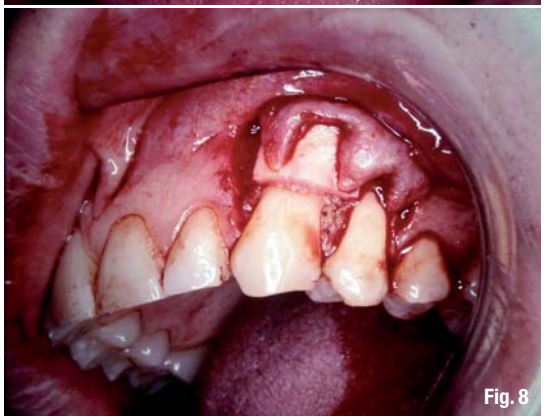
Fig. 8


Fig. 9

Fig. 8_GTR membrane placed over the root surface of tooth #11 only; no membrane was placed on the surface of the recession of tooth #12.
Fig. 9_Gingival tissue coronally repositioned to cover the GTR membrane on tooth #11 and tooth #12.

Fig. 10_Post-op view.

Fig. 10

thesia of the areas involved, a full thickness muco-periosteal flap was completed. This exposed the extent of the recession defects (Fig. 7). Tooth #11 was treated, as was the other side of the mouth, by utilising the GTR technique using an acellular connective tissue membrane to preserve the space for regeneration. Tooth #12 was treated the same way, except that no membrane barrier, resorbable or non-resorbable, was used (Figs. 8 & 9). Thus, there was no use of a GTR technique on tooth #12. Both teeth had the flap manipulated with the coronally repositioned graft, covering the recessed root and suturing to the CEJ level. Both sides were covered with periodontal dressing. Antibiotics (tetracycline) and an analgesic (Tylenol-Codeine) were prescribed for the first week after the operation.

One week after the surgical phase, the dressing and sutures were removed and the mouth lavaged. Oral hygiene was restored to good, maintainable habits following the healing phase of over two months. Upon observation, tooth #11, for which the GTR membrane had been employed, had re-attached healthy gingiva that was not probable. The recessed root and the stained cervical groove were covered. In contrast, tooth #12, for which no GTR membrane had been utilised, displayed recession as prior to the surgery (Fig. 10).

In summary, this split-mouth technique demonstrated that using an acellular resorbable barrier membrane is more predictable for achieving root recession coverage than coverage of a recessed root without such a membrane._

Editorial note: A complete list of references is available from the publisher.

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The benefits of expanding and refurbishing your practice

Author_ Anne Levitch, Australia

_There are many benefits to refurbishing or relocating your dental practice, and although the decision to make such major physical changes to your surgery is usually secondary to other financial concerns, most practitioners find that they receive more than the obvious benefits with a new surgery. The opportunity to streamline the operation of your practice and attract new patients can be immensely profitable to your business. By increasing the functionality of your surgery, the productivity of your staff will improve. Patients will also feel more comfortable in a fresh, well-organised, private practice.

After about ten years, the furnishings and fittings in most dental practices become worn. Fashions also change—to such an extent that even the most stylish design in 1997 can simply highlight the age of your practice today. Patients expect a clean, modern surgery design and associate it with the highest standards in health care. Most commercial leases are for five years, so the end of your second lease is often a convenient time to consider relocating your practice. Generally, the life of your equipment is also about ten years, considering changes in technology and the availability of spare parts.

The main factors involved in the decision regarding a new surgery are room for expansion, practice image, privacy for patients and staff, movement and functionality, standards of hygiene, and the age

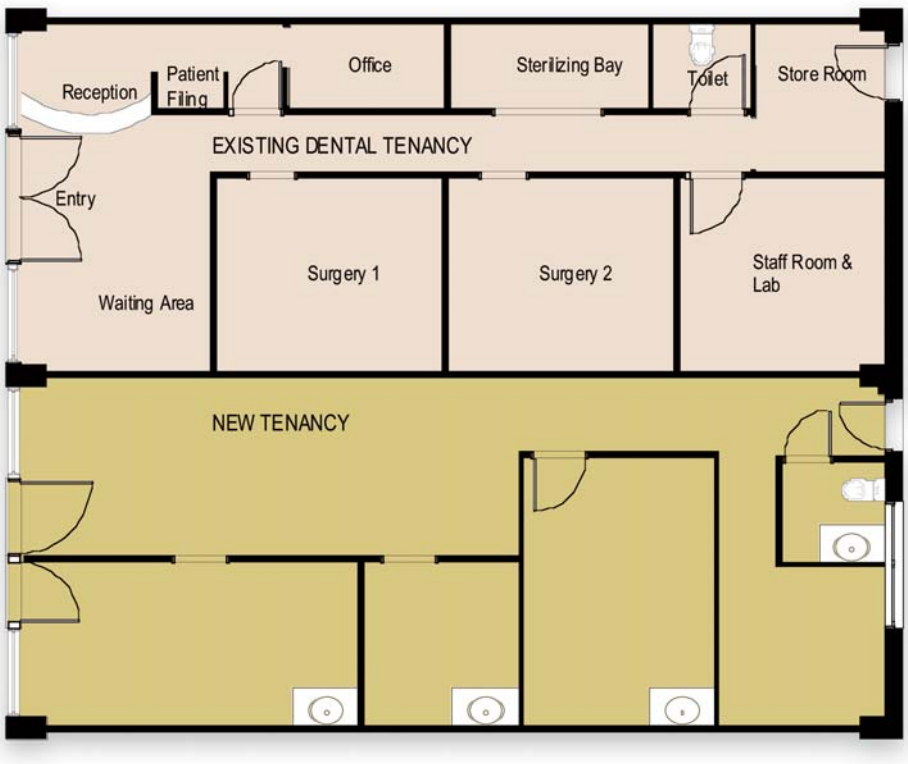

Fig. 1_Before.

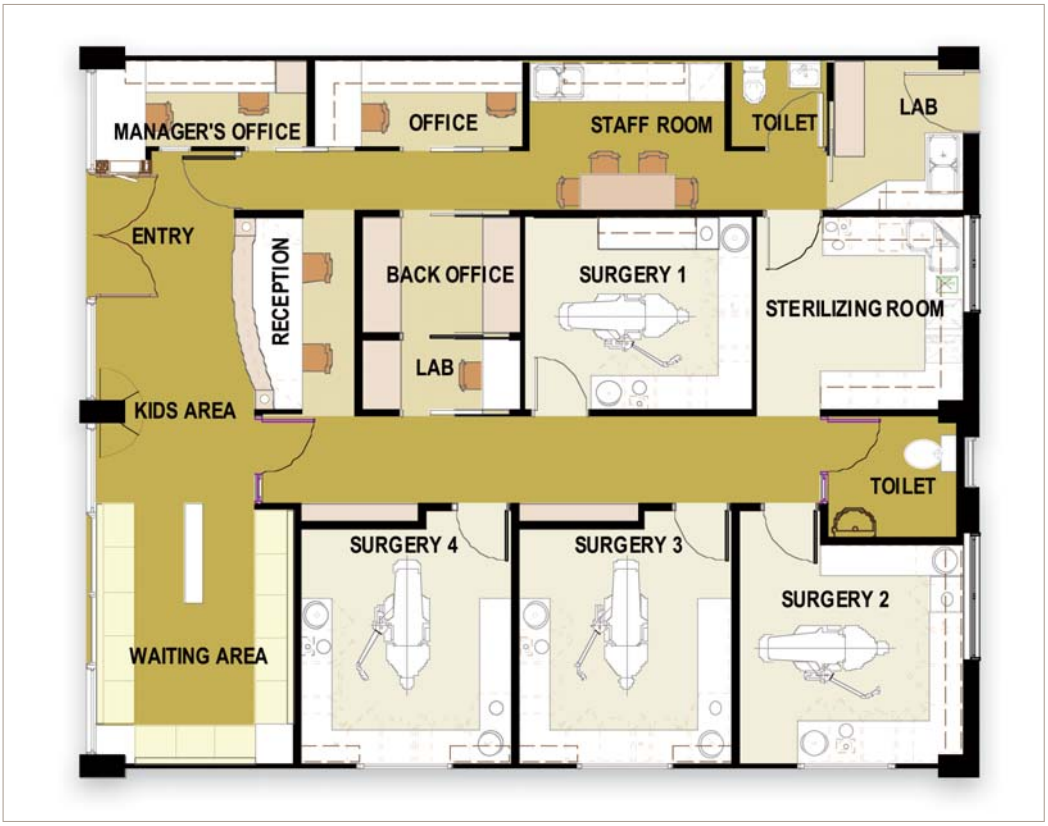

Fig. 2_After extension into adjoining tenancy.

of equipment. Relocating to larger premises allows for the expansion of your surgery and the facilities to take on more staff, and therefore, more patients. Space adjoining your existing premises may be available, and awareness of such opportunities is worthwhile.

Should you update the overall image of your practice during refurbishment, you could address aspects such as the finishes, graphics, visibility, staff image and the facilities in your practice. Major refurbishment or relocation gives you an opportunity to overhaul the image of your practice, which can help you attract potential patients and retain existing ones.

The traffic flow in your practice should allow for easy movement by staff and patients, whilst maintaining the privacy of both. Refurbishing gives you the opportunity to redesign the layout of your practice, and make better use of the space available. Moving into a new space means your surgery can be designed based on the knowledge of your previous layout—its benefits and disadvantages.

Your practice will ensure a higher standard of infection control with new fit-out and streamlined surfaces to clean. An advantage of relocation or a major refurbishment is the opportunity to upgrade equipment and reassess storage needs. The size and accessibility requirements of new equipment and storage can be integrated into the design of a new practice.

Relocation carries a greater financial risk than refurbishment, owing to the time it may take to secure new premises and an increase in short-term expenses, but this is usually outweighed by an increase in business. Fitting out a new space also eliminates the inconvenience of an interruption to the operation of your surgery, as you can continue practising in your old premises until the new space has been finished.

Should you consider relocating your surgery, start looking around generally for commercial premises in your area 18 months in advance, in order to better determine the range of spaces available and learn of future opportunities? Looking ahead of time will help you to secure a space that is appropriate and affordable for your new surgery. Should you inform agents and owners that you are looking for premises, these opportunities may come to you._

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Word-of-mouth 2.0

How leveraging one's online reputation can help attract new patients

Author_ Dr Lorne Lavine, USA

_It is an undisputed fact that in the world of dentistry, no amount of expensive advertising or fancy marketing can beat the power of word-of-mouth referrals from your satisfied patients. What your patients say about you is the ultimate driver of your business success. Today, consumers increasingly turn to the Internet to locate and select a dental practice. Understanding this and using the right tools will help you create and maintain the most relevant, valuable practice builder you'll ever have: the experience and feedback of your own patients shared with millions of prospective patients actively seeking a new dental practice. It's up to you to choose: will your online reputation consist of a single thread of random gossip, or will it become your most valued asset, carefully managed and nurtured to give you the best return on your investment?

Everyone knows consumers will share a good experience with a few people, but they'll make a point of telling the world about a negative one. As a service provider, you and your staff are your brand. You don't sell widgets; you sell your skills, experience, specialties, personalities, hours and location—and your very existence and livelihood depend on your reputation.

We all work hard to ensure our patients have a good experience and ask that refer us to friends and family based on this. Now, take that most valuable scenario, expand it to hundreds and even thousands of prospective patients, and you've just moved from the world of offline word-of-mouth referrals to the sophisticated new world of online reputation-based marketing—or word-of-mouth 2.0.

We know that in the growing world of online reviews, consumers want and expect to find the local user information they seek, whether it's a great Italian restaurant or a top-notch cosmetic dental practice. As the Internet has come of age, our universe of availability for goods and services has exploded. The advent of local reviews provides a return to neighbourhood intimacy—and neighbourhood reputation.

It is highly likely you already have an online reputation, and may not even know it. Through online web sites, consumers can review and rate your business. There is no way to know whether their comments are legitimate. In fact, these people may have never seen your dental chair. Like it or not, these consumers are establishing your online reputation—without your knowledge, without your control—and there has been nothing you could do to manage this exposure, until now.

_Driving patient volumes

As you probably know, the largest and most powerful search engine is Google. Today, 67 per cent of all online searches are conducted using Google. Google sees 3.2 billion visits per month. You can optimise your web site to come up in the free, natural search results when prospective patients google for a dental practice. If you choose to pay for exposure, you can subscribe to Google Adwords *(https://adwords.google.com/select/Login)*, paying for each 'click' generated from Google to your web site. The higher you bid for a click, the higher your placement in the sponsored section of Google.

There are many dental practices that bid more than US$6 for every click, resulting in thousands of pounds spent on Adwords each month. One particular practice I am aware of spends more than US$3,000 a month on Adwords and claims the cost is "worth every penny". As with all advertising, there are limitations, even beyond expense. Ads are companies promoting themselves, and today's savvy consumer recognises this and filters information accordingly. However, even the world's leading search engine recognises the extreme power and relevance of word-of-mouth feedback. Google recently expanded its offerings to enable consumers to search for and compare local businesses online. Try searching for a dentist in your area by typing in your postcode followed by the word dentist in the Google search box. A map with a listing of ten dental practices will be displayed above the natural search results.

To the far right of each listing is a link to reviews. This is where a consumer can view what your patients say about your practice. With this Google has hit the referral jackpot: this functionality leverages consumer relationships and capitalises on the inherent credibility of the first-person testimonial. This is a priceless intangible—something advertising dollars just can't buy.

_Build your reputation

So how do you, as a dentist, take advantage of this new tool to guide and shape your online reputation? It is important to remember that this is not a practice snapshot in time, but rather a reputation built and sustained over time. Your best chance of securing and maintaining a 'top-ten' placement is to be amongst the first to populate your Google profile—and to keep a steady stream of relevant reviews and quality practice information flowing in to Google. You can do this one of two ways: passively or actively.

The passive approach: you can hope the patients who visit your practice have the wherewithal to create a Google account, find your Google profile, and submit a review. This requires time and effort on your patients' part, and staff time to inform patients and promote the process. Even if your staff are dedicated to making your patients aware of the online review process, you can only hope patients remember to follow through once they get back to their busy schedules at home and work. If history is any guide, a passive approach will result in one or two reviews posted over the course of several months.

The proactive approach: today, the only integrated approach to proactively managing your online reputation on Google is through companies such as Demandforce *(http://demandforce.com/)*, an online patient-communication company. They recently announced a data integration agreement with Google that enables dental practices to populate their Google profiles easily, including posting reviews directly from data originating from their communication systems.

With Demandforce, each patient is automatically sent a thank-you e-mail message after each appointment. As part of the thank-you, they can choose to submit a confidential survey of their visit, as well as a public review. You can read the reviews of your practice and post a response or ask for a review to be removed if it does not meet standard posting requirements. After seven days, the data is automatically sent to Google to populate your profile.

This proactive approach results in dozens of reviews being posted to your profile every month. In addition to Google review management, Demandforce will optimise your profile by submitting additional information such as specialties, languages spoken, insurance accepted, hours of operation and affiliations. You can also choose to integrate online scheduling directly into your profile. The new Google review functionality is included at no additional cost with a standard monthly subscription.

Whether you opt to take a passive approach or a proactive approach to building your online reputation, I highly recommend you take charge to ensure it accurately reflects and therefore benefits your practice. Your online reputation is your business and those practices that realise this early on will have a significant head start over their peers.

Solicited or not, online reviews are here to stay. Our patients' satisfaction and their resulting word-of-mouth referrals will always be our bread and butter; only the serving plate has changed. What are you doing to shape your online reputation? Have you googled your practice or your competitors lately?_

_about the author

cosmetic dentistry

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"Once you've tried it, you can't drink anything else"

Author_ Dr Jay B. Reznick, USA


Fig. 1


Fig. 2

Fig. 1_Pre-op view of failing tooth #10 in a 70-year-old female patient.
Fig. 2_Pre-op radiograph showing a horizontal fracture, root canal treatment and a cast post.

_Way back in 2005, I was listening to a speaker discuss a new way of placing dental implants that would revolutionise the process. He showed a video of an elderly Swedish man strolling into a dental clinic with a bag full of ill-fitting dentures, and walking out later that same day with fully implant-supported final prostheses. The process used 3-D computed tomography (CT) imaging to plan the implant placement, and then a custom surgical guide was made that facilitated the flapless placement of a dozen or so implants so precisely that only minimal adjustments would be necessary to the prefabricated fixed bridges. The cost of this treatment was about US$100,000, rendering it beyond reach for the majority of patients.

Fig. 3_CEREC 3D virtual model with proposal of provisional restoration.

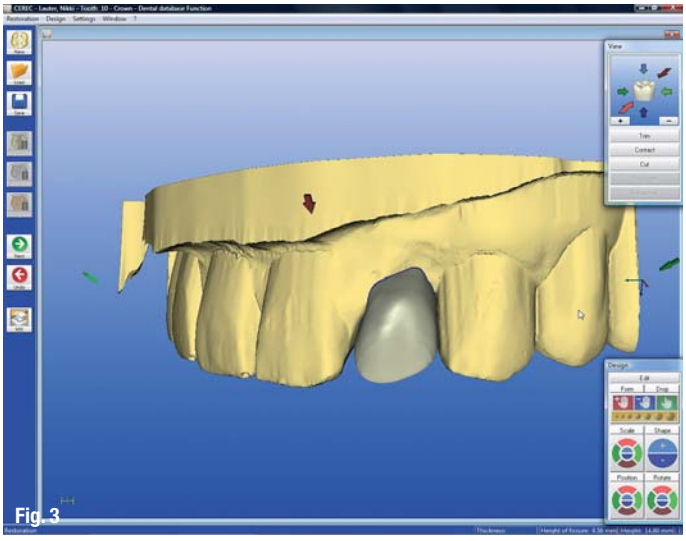
Fig. 3

This was an enlightening moment for me, as I saw the potential in this technique. As soon as it was available in the US and the cost became more reasonable, I vowed to bring this technology into my practice so that my patients could benefit from this amazing innovation.

Early in 2006, I flew to Chicago and took the Nobel-Guide training course, and within a short time I had half a dozen cases under my belt. I was amazed by how quickly and accurately I could place multiple implants, and that most patients needed only a few post-operative ibuprofens and were back at work the next day. Soon thereafter, I acquired SimPlant software and began using both methods for treatment planning and placing implants.

These two pioneering systems opened the door for the current tidal wave of CT-guided implant surgeries. For those of you not familiar with the concept, CT-guided implant surgery uses 3-D CT imaging to evaluate the bony anatomy of the edentulous jaw, uses this for implant planning, and then accurately transfers the treatment plan to the patient at surgery using a custom surgical guide that controls the position, angle, and depth of each drill and implant fixture. It is so accurate that a custom provisional or even final prosthesis can be made that is delivered with minimal, if any, adjustment needed. It is a panacea for the restorative dentist because implant placement is completely prosthetically driven, not dictated by the surgeon's whim if there are anatomical surprises when the tissue is flapped open. The anatomy is known with 3-D accuracy before surgery, and should bone or tissue augmentation be necessary to position the implants properly, this information is known ahead of time and additional procedures are planned. The result is perfectly placed implants in ideal bone that are straightforward to restore and function properly nearly all of the time.

Even though I did not use CT-guided surgery for every implant case, I probably completed a hundred cases or more in those first two years. It was a very time-consuming process. I had to have the laboratory make a radiographic template, arrange for the patient to have a CT scan, have the scan redone should the technician not have followed the protocol exactly,

import the DICOM files into the software program, clean up the scatter, treatment plan the implants, and then see the patient for a second consultation to review the treatment plan. Because of the significant time and effort required to complete a computerised treatment plan, I generally reserved this process for the more complicated cases or those for which accurate implant placement was critical. Most cases were done the 'old-fashioned way' during this period.

My next revelation came in 2007, when I first saw the GALILEOS cone-beam computed tomography (CBCT) scanner and started thinking about incorporating this into my practice. The beauty of it was not the scanner itself, as most CBCT scanners on the market render a good image; it was the software. GALAXIS and GALILEOS Implant were developed with the dentist in mind, as opposed to most other CT viewing and implant-planning programmes, which were modified from existing medical CT software. With very little instruction, I was able to navigate through the images and start planning implant surgery like an expert.

Sirona, the manufacturer of GALILEOS, hit a home run, in my opinion, when they considered the entire work flow in designing the software suite that was included with their machine. With the simple click of a tab, the same software programme used for viewing the scan diagnostically could quickly and easily be used for treatment planning implants, and then ordering a custom surgical guide.

Once I had brought GALILEOS into my office, life became easier. Now, as soon as my patient was scanned, using a radiographic template, the images could be brought up on the monitor, and then implant planning could begin immediately. What previously took at least 30 minutes of my time and two patient visits was now possible in less than 5 minutes in a single appointment. As a result, cases that I previously considered to be too simple to treat using CT-guided surgery techniques were now suitable candidates. Before I knew it, I was utilising this technology for practically every implant case. The only exception was a case in which a patient could not wait the seven working days that it currently takes to have the surgical guide manufactured. CT-guided implant surgery has the benefits of increased accuracy of implant placement through a smaller, minimally invasive incision. Another major benefit to the implant surgeon is decreased surgical time, which allows one to schedule more patients and more procedures in the day. Of course, this is of little benefit if treatment planning becomes very time-intensive. The beauty of the GALILEOS Implant/siCAT system is in the integration of work flow that makes the implant planning phase rapid and effortless. An additional plus is improved inventory control. Instead of requiring a variety of implant sizes for a single case, the exact fixture diameter and length are predetermined, so only a single fixture has to be ordered per site.

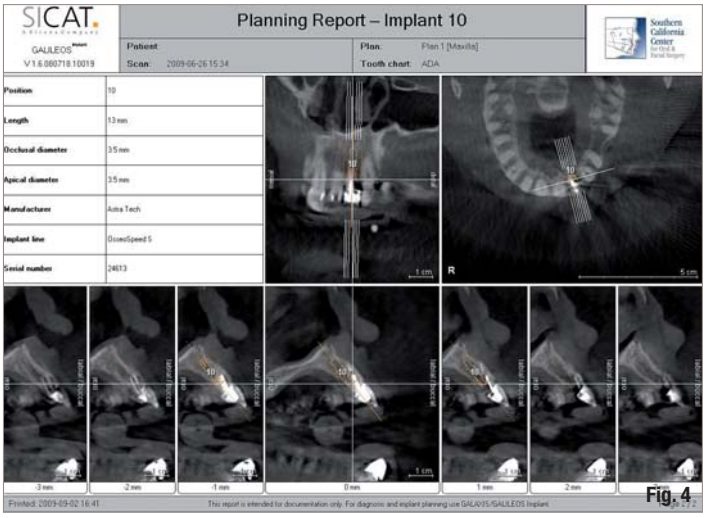

Fig. 4

Fig. 4_GALILEOS treatment planning report demonstrating position of implant in relationship to existing restoration.

We have traditionally relied on panoramic radiographs and study models to plan our implant placement. Surgical stents have always been used in implantology to aid in this process. The traditional surgical

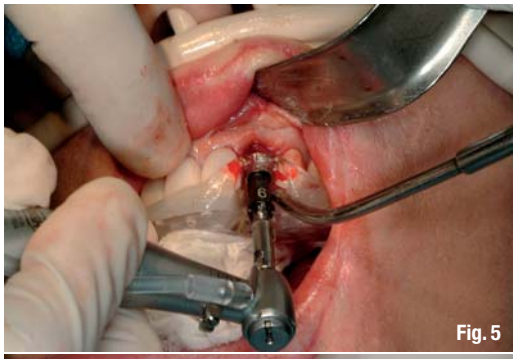
Fig. 5


Fig. 6


Fig. 7

Fig. 5_Placement of implant through siCAT surgical guide using Facilitate Surgical Guide.
Fig. 6_Provisional abutment attached to immediately placed implant.
Fig. 7_Provisional crown on implant immediately after placement.


Fig. 8

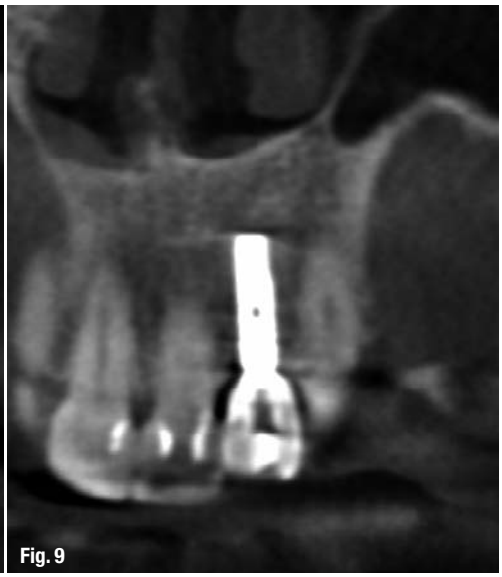
Fig. 9

Fig. 8_Post-implant cross-sectional CBCT image demonstrating good position and angulation in relationship to provisional prosthesis.
Fig. 9_Tangential slice CBCT showing implant and provisional restoration immediately after placement.

guide is made from a wax-up on a stone model that does not allow representation of the true bony anatomy of the underlying edentulous ridge nor the position of adjacent tooth roots. There are various styles of surgical guides that have been in use, ranging from thermoplastic sheets to solid acrylic replicas of the final prosthesis. These guides only estimate the position for the initial drill, leaving this up to the discretion of the surgeon, and do not control the depth of drilling. Sequential osteotomies are then generally drilled free hand. This introduces many opportunities for aberrant implant positioning. Even in the hands of the most experienced implant surgeons, up to 20 % of implant placements vary from their intended position. Dentists need only look in their favourite implant textbook or journal to find examples of textbook cases that are less than perfect. And, I have never met a restorative dentist who has not had his or her share of similar experiences.

Often, these restorative challenges can be managed with custom abutments and other prosthetic tricks, which significantly increase the dentist's laboratory bill and affect the profitability of the case. However, in some cases, the only solution is either to not restore the fixture or to remove it and start over. Anatomical variations also pose challenges, such as a high lingual mylohyoid concavity, a surprise pneumatised sinus, or a divergent root that came a little too close to the implant fixture. We do not like to have to deal with these complications, but even the best of us have faced them more than we like to admit.

Many of my surgical colleagues are of the opinion that CT-guided surgery is unnecessary because they have been placing implants for many years using the technique they learned 15 or more years ago. I completed my surgical training in 1990, and have done more implants than I can count since then. And for the most part, I have a very high success rate, with minimal problem cases of which to speak. But, am I perfect? Of course not. Are my colleagues any better? I don't think so. I strongly believe that CT-guided techniques will become the standard of care for implantology within the next ten years, or sooner. Those clinicians reading this article have already demonstrated an understanding of what new technologies can do for the practice of dentistry. I'm sure that few of you who own dental CAD/CAM systems could imagine practising without them and the benefits that this technology gives to your patients and your practice. The same holds true for CBCT and guided implant surgery.

In September 2009, I was honoured to be the surgeon for the introduction and first live demonstration of the integration of GALILEOS CBCT data with that from a CEREC digital impression and prosthetic proposal. CEREC uses surface-scanning technology to capture a digital impression of the hard and soft tissues around an area where a dental implant is being considered. GALILEOS uses a radiographic source and sensor to image the bony anatomy in the area of interest. The multiple views are then processed by a computer to create a 3-D image of the teeth and bone, which can be viewed in an infinite number of cross-sectional cuts. Both types of images are nothing more than a set of digital data translated into an image that can be viewed on a monitor. Merging these two sets of numbers appears to be a simple process. However, I am not a software engineer; I am just a dentist. Luckily for us,

Fig. 10_Clinical photograph of provisional restoration at three months after surgery.
Fig. 11_Panoramic CBCT reconstruction of a 62-year-old male patient missing multiple teeth in the maxilla. Bilateral sinus-lift procedures had been performed six months prior.


Fig. 10

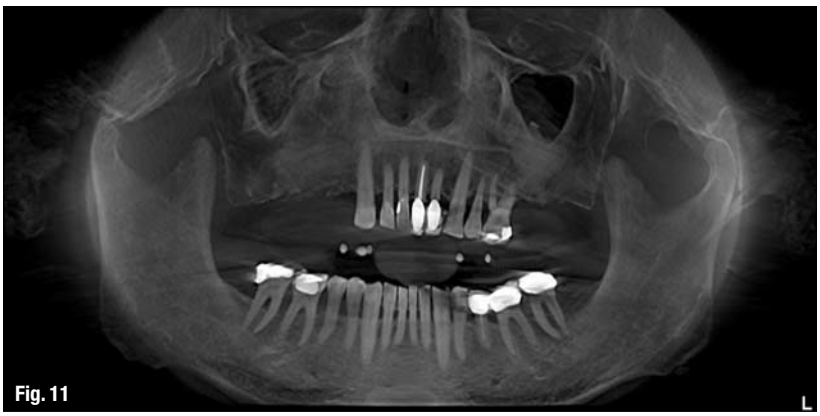
Fig. 11

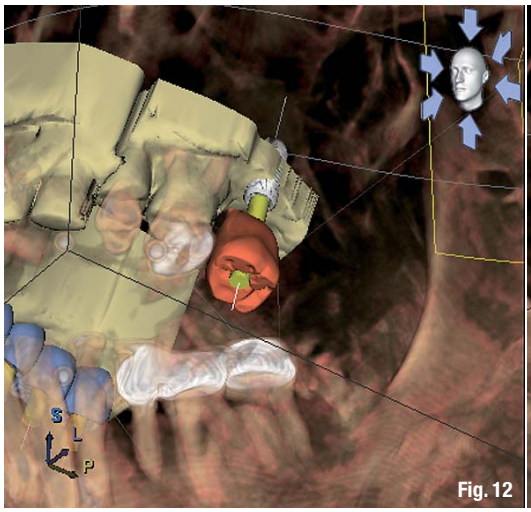

Fig. 12

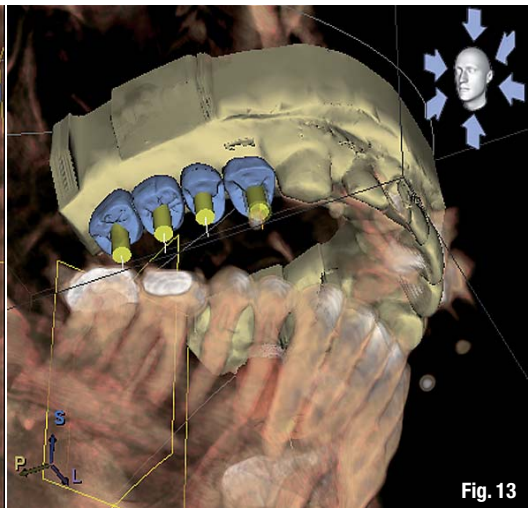

Fig. 13

Fig. 12_3-D image reconstruction from GALILEOS Implant software showing implant planning for tooth #15, based on imported CEREC virtual model and prosthetic proposal.
Fig. 13_3-D image reconstruction from GALILEOS Implant software showing implant planning for teeth #2 to 5, based on imported CEREC virtual model and prosthetic proposal.

there are some smart people at siCAT, Sirona's software subsidiary in Germany, whose mandate was to do just that. Their efforts have changed implant dentistry forever. With the integration of CEREC and GALILEOS, we now have the opportunity to practise real digital implantology. The restoration of a patient's missing dentition can be treatment planned in virtual reality, without the need for physical impressions, pour-up study models or wax-up prostheses. The ability to visualise the patient's bony- and soft-tissue anatomy in relationship to the proposed prosthesis is a tremendous advantage in attempting to follow the principles of prosthetically driven implant dentistry. This facilitates restoration, optimises functional forces on the implant fixture, and improves long-term implant success.

Another benefit of CT-guided implant surgery is the ability to perform the procedure through a minimal incision. This is possible because the underlying 3-D bony anatomy is known preoperatively. Also, since the surgical guide directs the position, angulation and depth of each drill, the surgical time is significantly reduced. This translates to an easier post-operative course for the patient. Because the implant is placed in the ideal position, functional loads on the implant fixture are more ideal. This helps maintain optimal peri-implant bone levels and reduces the failure rate. The resulting time saved can be used by the surgeon to schedule another consultation, surgery, or recreational activity.

The following cases demonstrate the types of implant treatment plans that can be treated using 3-D CT-guided surgical techniques through the integration of GALILEOS and CEREC.

_Case I

This first patient was a 70-year-old woman with a failing maxillary left lateral incisor. The tooth had been treated endodontically many years before and had a post-retained fixed prosthesis that was subject to repeated failures (Fig. 1). The tooth was not restorable and a decision was made to remove the tooth and replace it with an immediately placed dental implant and provisional prosthesis (Fig. 2). The patient understood and agreed that the immediate implant and prosthesis would not be placed in function for three months after placement.

A stone study model was made, and the crown of tooth #10 was removed. This modified model was captured by CEREC in order to create a digital model that represented the site after tooth extraction. The opposing dentition was captured in a Futar D

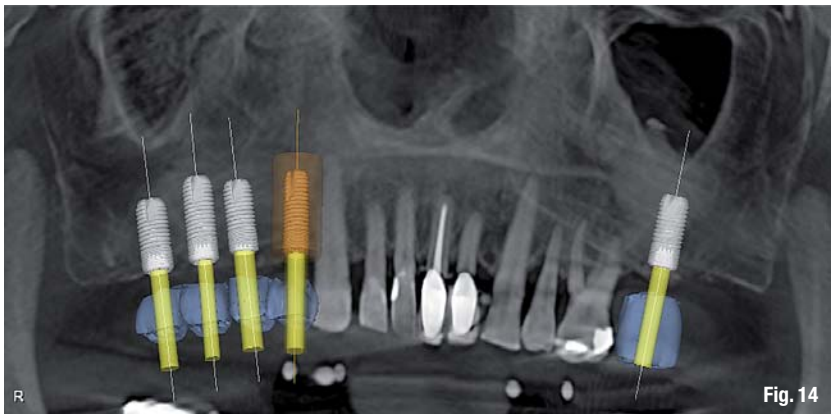

Fig. 14


Fig. 15

Fig. 14_Panoramic reconstruction of CBCT showing proposed implant positions and abutment screw paths.
Fig. 15_Prepared siCAT surgical guide for Facilitate Surgical Guide.


Fig. 16

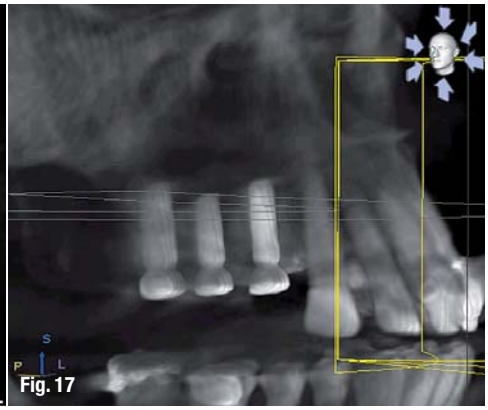
Fig. 17

Fig. 16_Post-op panoramic CBCT reconstruction showing position of placed implants.
Fig. 17_3-D reconstruction of post-op CBCT showing placed implants in the right maxillary posterior region.

(Kettenbach) bite registration and the prosthetic proposal was created in CEREC (Fig. 3). The digital model and prosthetic proposal were then imported into GALILEOS. The ideal implant size and position were determined within the GALILEOS scan, based on the bony anatomy data, as well as the mucosal surface and prosthetic data from CEREC (Fig. 4). The treatment planning data, along with the stone model and a special scanning template were sent to siCAT, and a custom surgical template was returned.

This template was used in surgery once the tooth had been atraumatically extracted in order to direct the placement of the implant fixture into the site of tooth #10. The position, angulation, and depth of implant placement were all controlled by the guide, so that the implant was placed exactly where it had been planned in the 3-D imaging software (Fig. 5). A provisional abutment was placed (Fig. 6), and the patient was sent to her dentist for a digital impression and fabrication of a CEREC-produced provisional crown (Fig. 7). The procedure to remove the tooth and place the implant took under ten minutes. Post-operative GALILEOS scan images indicated accurate implant placement (Figs. 8 & 9). At the three-month follow-up appointment, the provisional restoration was stable. The gingival architecture and tissue health were excellent (Fig. 10).

_Case II

This second case illustrates the tremendous power of the integration of GALILEOS and CEREC for treating the partially edentulous patient. This patient was a 62-year-old man with moderate bone loss due to smoking. He was otherwise healthy. He was missing teeth #2 to 5 and 15, and had undergone bilateral sinus-lift surgery to augment the bony deficiency in the posterior maxilla (Fig. 11). In preparation for implant placement, a GALILEOS CBCT scan was performed with a siCAT scanning template. A full-arch digital impression was acquired with the CEREC AC unit, and then prosthetic proposals were designed for teeth #2 to 5 and 15. This data was then imported into GALILEOS for implant planning (Figs. 12 & 13). The position of the implants was verified (Fig. 14) and the surgical guide was ordered from siCAT (Fig. 15). This was used to place four Astra Tech dental implants accurately using the Facilitate Surgical Guide (Astra Tech). Post-operative radiographs demonstrated that all four implants were accurately placed and in accordance with the treatment plan (Figs. 16 & 17). The patient had an uneventful post-operative course.

One of my favourite cocktails is the Vesper Martini, which was introduced to the world in the novel *Casino Royale* when James Bond asked the bartender to mix him this variation on his standard drink. Bond named the drink after Vesper Lynd, his love interest in the story because, he confessed, as with her, once you've tasted it, that's all you want to drink. CT-guided implant surgery is no different for me. After years of planning and placing dental implants the old-fashioned way I learned in residency, I was given a taste of a new way to do so. It was a radical change at first, but once I knew the recipe, I realised that it was a faster, better and more accurate way to treat my patients. Now, I can't drink anything else. Hopefully, you will give it a taste too and agree._

_about the author

Dr Jay B. Reznick is a Diplomate of the American Board of Oral and Maxillofacial Surgery. He received his dental degree from Tufts University, and his MD degree from the University of Southern California, and trained in Oral and Maxillofacial Surgery at LA County-USC Medical Center. His special clinical interests are in the areas of facial trauma, jaw and oral pathology, dental implantology, sleep disorders medicine, laser surgery and jaw deformities. He also has expertise in the integration of digital photography, 3-D imaging, and CT-guided implant surgery in clinical practice.

He frequently lectures at continuing education meetings, and has published articles in the *Journal of the American Dental Association; Journal of the California Dental Association; Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology and Endodontology; Compendium of Continuing Education in Dentistry; DentalTown Magazine; CE Digest;* and *Gastroenterology*. Dr Reznick is a founder of OnlineOralSurgery.com, which educates practising dentists in basic and advanced oral surgery techniques. He serves on the editorial and advisory boards of a number of journals and organisations. He is the Director of the Southern California Center for Oral and Facial Surgery (www.sccofs.com) in Tarzana in California, and a consultant for various dental and surgical manufacturers. He can be contacted at jreznick@sccofs.com.

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Patients demand instant aesthetic results

An interview with Dr Sim Tang Eng, AAAD president

Dr Sim Tang Eng

_cosmetic **dentistry**: *Dr Sim, would you please tell us a bit about yourself, your background and your initial involvement in dentistry?*

Dr Sim Tang Eng: I graduated from the University of Malaya in 1985 and obtained my MFGDP(UK) in 1997. I undertook clinical attachment in Oral Implantology at Goethe University Frankfurt and was awarded the Certificate in Oral Implantology in 2001. I served as part-time clinical supervisor and lecturer in the Faculty of Dentistry at the University of Malaya and was a lecturer of the Oral Implantology course organised jointly by the University of Malaya and Goethe University Frankfurt. I am now in a private group practice and my work is focused on aesthetic dentistry and implantology.

_How was the Asian Academy of Aesthetic Dentistry (AAAD) established and who qualifies to be a member?

The AAAD was established as an umbrella body for the various aesthetic dentistry academies/associations/societies in the many Asian countries. Following a preliminary meeting in Korea of interested representatives from Korea, Japan and Singapore in 1989, a formal meeting was convened at the Prince Philip Dental Hospital in Hong Kong for the founding of the AAAD on 15 January 1990. At this historic meeting, which was chaired by Prof Stephen Wei, the founding officers were unanimously elected, with Prof Michio Haga from Japan as Founding President of the AAAD. Since then, the Academy has grown annually and the number of member countries has increased from the original three to include China, Hong Kong, India, Indonesia, Malaysia, Nepal, the Philippines, Taiwan and Thailand.

In order to become a member of AAAD, one must hold a university dental degree. One can become a member through the institutional membership of an aesthetic dentistry organisation in one of the member countries, or privately. The AAAD aims to have all member countries register as institutional members in order to simplify the logistics of keeping track of membership records.

_The 11th biennial AAAD meeting is going to be held in May. What objectives would you like to fulfil through this year's meeting?

In accordance with the objectives of AAAD, the main objective will be the promotion of the art and science of the disciplines in aesthetic dentistry. This is the first time that the biennial AAAD meeting will be held in Malaysia and it certainly is an opportunity for many of our dental colleagues to experience the meeting and visit beautiful Malaysia. I hope the meeting will foster greater understanding amongst Malaysian and other Asian dentists, besides providing an opportunity to experience the excellent scientific meetings that AAAD organises biennially in this region.

This year's biennial meeting boasts some of the best speakers and clinicians in aesthetic dentistry in the world. It is very difficult to book them and we thus had to plan their lecture schedules way in advance. This meeting will be a golden learning opportunity for our colleagues in Asia, particularly in Malaysia. Thanks to this meeting, our colleagues will not have to fly half way around the globe and pay hefty registration fees in order to hear these top speakers at meetings in USA and Europe. I am sure it will be an eye-opening and rewarding experience to see and hear the level of aesthetic dentistry presented by the four keynote speakers, Dr Galip Gurel, Dr Mauro Fradeani, Dr Didier Dietschi and Dr Rhys Spoor. In the process, I hope attendees will be inspired and never look at aesthetic dentistry the same way again.

_In your opinion, how important is continuing education in the field of cosmetic dentistry?

Very important! In fact, I strongly believe that all dental professionals who profess to practise aesthetic or cosmetic dentistry must keep up-to-date with the developments in dental materials, technology and clinical techniques, as this clinical discipline changes dynamically and rapidly. They have to possess knowledge of sound scientific theories and clinical practice. They owe it to their patients who entrust them with the responsibility of providing quality aesthetic dentistry. This is only possible if the dentists keep abreast of developments through continuing education.

_What options for continuing education are available for Asian dentists?

There are basically two options available. Firstly, besides the biennial AAAD meetings, dentists can attend the numerous scientific meetings and hands-on workshops organised regularly by the various national aesthetic dentistry organisations in the Asian region. Those who are really eager can attend the meetings organised by the International Federation of Esthetic Dentistry, American Academy of Esthetic Dentistry, European Academy of Esthetic Dentistry and American Academy of Cosmetic Dentistry. These are excellent meetings but dentists will have to travel great distances to the meeting venues. Secondly, dentists can attend the structured programmes organised by universities. Several US universities offer courses, on part-time or full-time basis, tailored for aesthetic dentistry. In addition, it is extremely important for dentists to read journals and textbooks regularly in order to enrich their knowledge. I find that most dentists want to take the easy route by depending only on lectures and fellow colleagues for information.

_Standards and education vary greatly throughout the region. Do you see your organisation as a representative for the profession?

I certainly think this is the way forward. The AAAD can act as an accreditation body by conducting courses and examinations regionally for aspiring dentists who wish to be proficient in aesthetic dentistry. Those qualified can then be awarded a fellowship so that patients can recognise them as having achieved a certain acceptable standard.

_What are the objectives of the AAAD and what role does the Academy play in Asia?

This is best summarised by the objectives of the AAAD as stated in the constitution. The Academy is a non-profit and non-political organisation and shall not discriminate against creed or race. The Academy shall promote the art and science of disciplines in aesthetic dentistry, and popularise and advance the science and practice of aesthetic dentistry by organising regular scientific meetings. Furthermore, the Academy shall encourage research in Aesthetic Dentistry and inform the public of aesthetic dentistry and its practices through periodic news releases.

_Driven by patient demand, the field of aesthetic dentistry has gained much prominence in recent years. What are the current trends in aesthetic dentistry in Asia?

With greater exposure to the media and the Internet, as well as increasing affluence, Asians have followed trends in the West when it comes to demands in aesthetic dentistry. Increasingly more patients now chose veneers or have their teeth bleached in order to obtain their ideal set of sparkling white teeth. The preference for full-ceramic crowns instead of the traditional porcelain-fused-to-metal crowns is definitely on the rise for obvious aesthetic reasons. The trend for quick fix with veneers or crowns in mildly crowded dentition instead of conventional orthodontic treatment is also gaining in popularity, especially amongst working adults. Patients demand instant aesthetic results with the least amount of interference in their lives. Even in orthodontics, I understand that patients request invisible braces. More patients are also aware of the appearance of their gingiva instead of just their teeth and this has invariably resulted in increasing demand for periodontal plastic surgery as well. The list goes on and on.

THE ASIAN ACADEMY OF AESTHETIC DENTISTRY
EST. 1990

_Asians tend to be guided by Western stereotypes in terms of aesthetics. Have you witnessed this pattern in dentistry?

Rightly or wrongly, I think it is generally true. Just ask any dentist who has been practising aesthetic dentistry long enough. It is not uncommon to have patients coming into the office with close-up photographs of Western models or film stars with the request to have their teeth done the same way.

_What is perceived as an attractive smile in Asia?

I think the general rules governing an aesthetic smile apply universally. Tooth proportion of the anterior teeth is generally the exception. Asians tend to have narrower anterior teeth, i.e. lower width-to-length ratio compared to Caucasians.

_As witnessed at all major dental exhibitions last year, digitalisation is the new trend in dentistry. What has the effect of this increasing digitalisation been?

It certainly is a boon to the practice of aesthetic dentistry. It makes communication and presentation so much easier. The archiving of clinical photographs, which is of utmost importance, is now an easy task thanks to digitalisation.

_What are your plans for the future?

My term as the AAAD President ends with my handing over of office to Prof Hisashi Hisamitsu at the biennial meeting this coming May. I will continue to contribute in whatever way I can to the progress of the AAAD, particularly in the areas of sharing my clinical knowledge with the various national aesthetic dentistry organisations. I will remain active in my clinical practice, as I believe one can only teach and share meaningfully if one has the experience and regular practice._

Digital dentistry is finally becoming a reality

An interview with Hans Geiselhöringer, Head of Global Marketing & Products, Nobel Biocare

Fig. 1_Hans Geiselhöringer at a NobelProcera symposium in Singapore.

_**NobelProcera,** which was first introduced to the public in March 2009 at the International Dental Show, is the most comprehensive prosthetic solution in the history of Nobel Biocare. According to the company, it can design and fabricate prosthetics for every clinical indication and treatment option, from single tooth to full mouth. cosmetic **dentistry** spoke with Hans Geiselhöringer, Head of Global Marketing & Products, Nobel Biocare, about the system and how it will affect the dental lab sector in the years to come.

_cosmetic **dentistry**: *The new NobelProcera scanner has been available since June 2009. How is it intended to influence the workflow between dentists, technicians and patients?*

Hans Geiselhöringer: The new NobelProcera system has to be considered as a single unit. By combining high-precision scanning technology, intuitive design software and industrial manufacturing processes, excellent product quality is guaranteed for almost every clinical indication whether it be on natural teeth or dental implants.

Our years of experience with NobelProcera are helping users not only to begin using digital dentistry but also to achieve immediate success in mastering the new technology. Of course, CAD/CAM-supported work processes contribute to the improvement of efficiency and precision, but the quick exchange of data and information among all partners involved in the treatment process is an important criterion for success. In this way, NobelProcera is breaking ground in dentistry.

_*These are challenging economic times. Why should dentists and dental laboratories change to NobelProcera?*

Dentistry will see significant changes through these new technologies in the years to come. We have indeed reached the moment at which 'digital dentistry' is finally becoming a reality and I am convinced that this is the time to change from conventional to CAD/CAM technologies. NobelProcera was designed to grow with the rising demands of the user through regular updates of the system and the software.

With the new generation of CAD software, the construction of frameworks is no longer necessary, which is another important element. Automated processes no longer provide only a recommendation for the later framework production after scanning the master model or the impression. Moreover, ideal dimensioning can be achieved through only an additional scan of the setup with the help of lateral scans. Working processes that once took hours to complete can now be achieved in a few minutes.

I know that it is difficult to introduce new systems into the daily work routine of a laboratory and to keep technicians up-to-date with new developments, but from my point of view, it is better and more efficient to have one system for all indications. In addition, a system like NobelProcera gives users the opportunity to outsource production, which saves time and the need for continued special training of technicians. NobelProcera also helps to reduce costs for each step in production.

Our systems, products and concepts are certainly validated by scientific research, as we want to be a reliable partner for our clients.

_*NobelProcera utilises conoscopic holography technology. What are the advantages of this technique over comparable systems?*

There is no truly comparable system available on the market yet; NobelProcera is the only scanner that exclusively utilises conoscopic holography technology. Most other systems are based on triangulation, which does not offer the same amount of applications offered by NobelProcera. These disadvantages have already been discussed in several publications and, therefore, I won't discuss them here.

The conoscopic holography technology of NobelProcera is based on a particular type of polarised light interference process that has been proven in several long-term trials and in other fields of industry. The main advantage over conventional CAD/CAM systems is that the conoscopic system is based on collinear measurement, which means that the light source and the detector are not arranged at the same angle. The collinearity offers not only higher accuracy of measurement and sensitivity robustness against optical defects, but also the ability to scan a wide range of geometric figures and shapes, including cavities. Besides high accuracy, productivity in dental laboratories can be further increased by batch scanning.

However, it is the precision of NobelProcera that gives the ability to scan several implants or whole implants systems in a patient in order to realise supra-constructions like the NobelProcera Implant Bridge or the new NobelProcera Overdenture solutions. I think the sheer amount of applications cannot be achieved by any other system on the market right now, with the exception of high-precision industrial scanners.

_*Although a wide range of materials is available for almost all indications, the focus is often only on zirconium oxide. What other materials are available, and what are the main differences between them?*

You are talking about something that has been on my mind for quite some time and it is something I see everyday in my own laboratories here in Munich. Zirconium oxide is an excellent material for many clinical indications but not for all. Long-term stability is not the only decisive factor; the

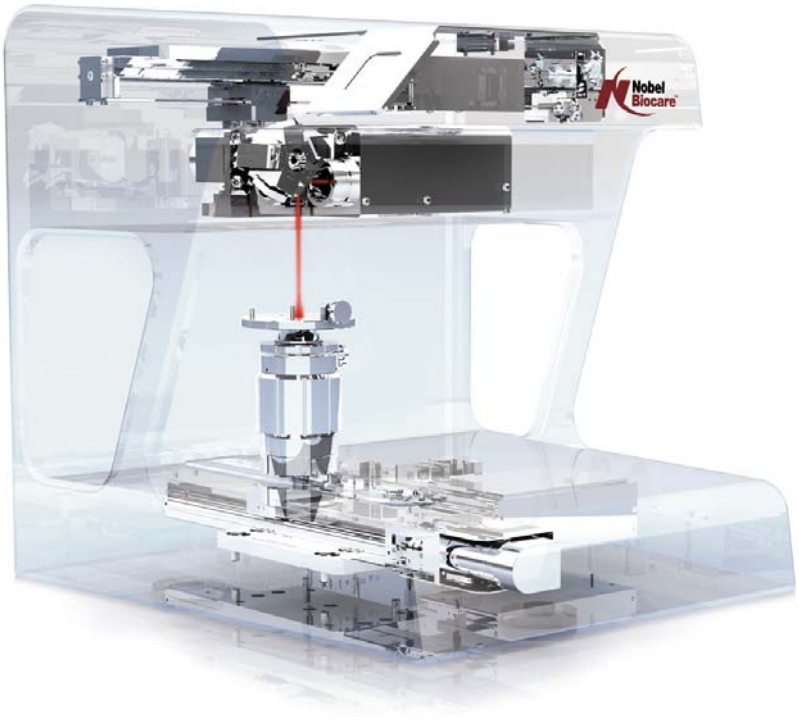


Fig. 2_The NobelProcera Scanner.

requirements and preferred treatment methods of the practitioner involved, and the financial costs to the patient have to be considered as well.

Besides zirconium oxide in four different colours for restorations on natural teeth, implant abutments and screw-retained prosthetic solutions, aluminium oxide is available as the material of choice in aesthetically demanding areas, for example in the anterior dentition. Titanium can be used in all cases in which zirconium oxide is not clinically acceptable.

We are also going to extend the material offering in the upcoming weeks with cobalt-chrome alloys and acrylics. I expect our laboratory clients will appreciate this offering, as they can pass this on to their clinical partners for support of all clinical indications.

_How do these developments benefit the long-term success rates of conventional and implant-supported restorations?

For Nobel Biocare, long-term success is primarily connected to the safety and quality standards we offer our patients and customers. Owing to our many years of experience in the CAD/CAM field and our high requirements of material and product quality, we are able to offer a five-year warranty on all our products, based on the harmonised working processes and the support we give the user regarding optimal construction design. For example, the software takes material-related specifications during the virtual framework design into account and warns users if requirements for dimensional stability are not met.

_Critics say that the automated fabrication of dental restorations may be the death of dental technology as we know it. What is your response?

Definitely not. In a tough market environment like the one we are operating in now, large-capacity laboratories, as well as small- and medium-sized companies gain significant advantages from using CAD/CAM. Improved efficiency and rationalisation do not automatically result in a reduced workforce. In fact, there are new opportunities for specialisation. Human resources, for example, can be used more economically, as uneconomical and time-consuming production steps, such as cast fabrication and moulding, are eliminated.

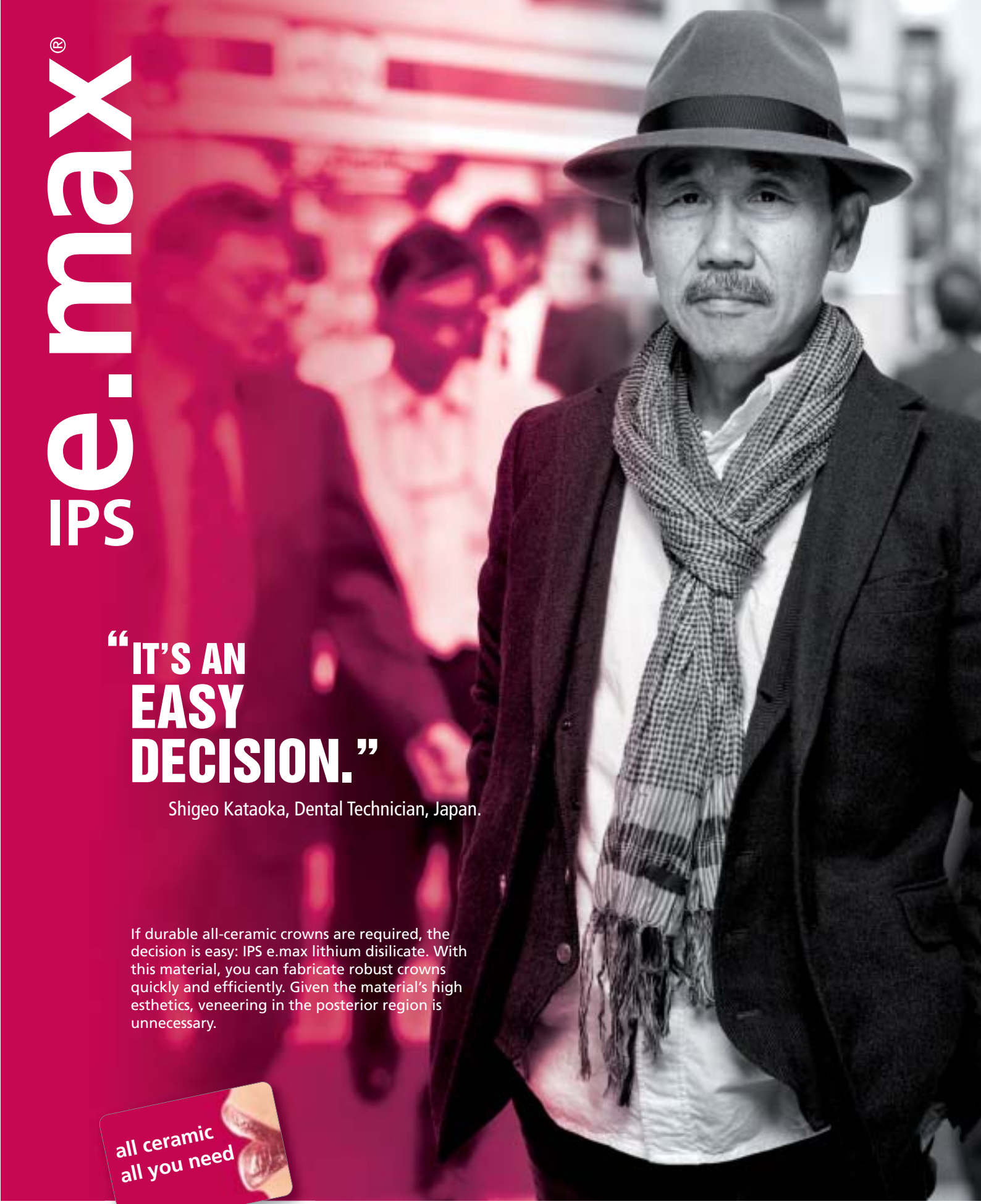
The answer to whether it would be profitable to run an own milling system in the laboratory is also no. Only large-capacity milling centres can do this. Ongoing observation of all production processes, constant surrounding conditions and freedom of choice of materials and their complementary milling systems are only a few reasons that speak for a centralised fabrication of frameworks. In addition, time-consuming maintenance, updating and the need to change milling heads are eliminated, which can only be economical under full capacity.

However, we do not only talk about shortening and simplifying the production processes but also about minimising risks that could result from CAD/CAM-produced restorations. Remaking incorrectly fitting restorations no longer strains the budget of laboratories because if these systems are utilised correctly, free remakes are usually included in the warranty.

_What consequences will arise from these developments for dental technicians?

In the near future, we will see further specialisations and the rise of new professional categories, for example dental designers and dental engineers. These new professionals will play a pivotal role in dentist–patient communication. By eliminating inefficient and error-prone working processes, more resources will be available for such important aspects as treatment planning and communication with practitioners, as well as the functional and aesthetic finish of the restoration.

Needless to say, this new CAD/CAM technology won't be able to replace the individual experience and expertise of dental staff. However, it is a useful addition to ensuring our patients the best quality and safety._



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Opalescent composite resin

Author_ Ulf Krueger-Janson, Germany

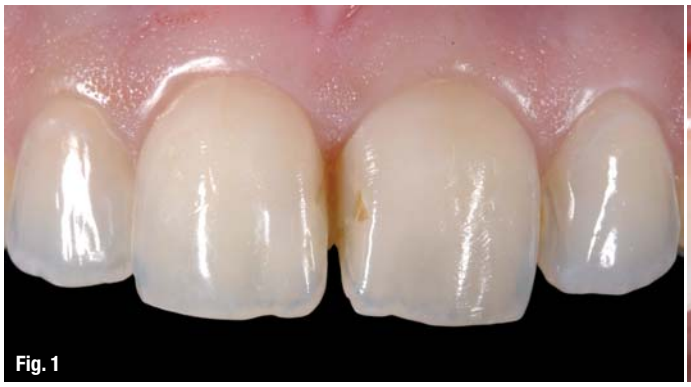
Fig. 1


Fig. 2

Fig. 1_Initial findings: defective restorations in teeth 11 and 21.
Fig. 2_Incisal view.

_**Experience has shown** that aesthetically pleasing composite restorations in the anterior region can only be created, if the clinician succeeds in achieving a near-perfect shade match between the restorative material and remaining dentition. In general, state-of-the-art composite restoratives should be easy to handle, adapt to cavity walls and offer good surface finishing qualities. At the same time, however, it is essential that they allow the restoration to blend harmoniously into the natural oral environment.

Aesthetic integration is accomplished by placing special optical effects. Composite materials with a high opacity (similar to dentine) and relative translucency (similar to enamel) are required for this. Composite restorative systems that additionally include an opalescent material that allows the bluish areas (frequently observed along the marginal ridges) and yellowish-whitish portion of incisal edges to be reliably mimicked, offer just about everything the clinician needs to restore a case aesthetically. The new IPS Empress Direct system (Ivoclar Vivadent) includes such an opalescent material, which enables the reproduction of the above-mentioned optical phenomena owing to its shade effects.

Fig. 3_View after removal of the old fillings.

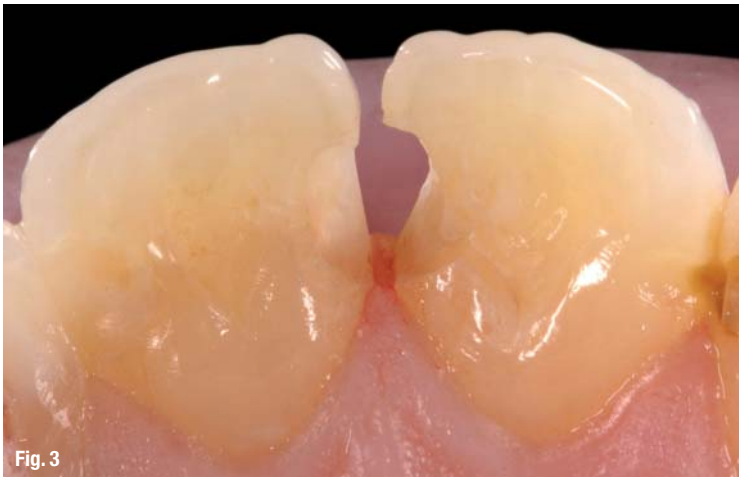
Fig. 3

Opalescence is an optical effect exhibited by some substances. It is caused by the refraction of the various wavelengths of visible light due to the small structures in the substance. As a result, the substance exhibits an intensive bluish tinge in incident light, whereas it has milky yellowish appearance in transmitted light, just as is the case in natural opal stone. In restorations, the light that strikes the composite material and is reflected from it appears bluish. Against the light, however, the composite has a slightly milky appearance with a yellowish tinge. The incisal edge of natural dentition often has this appearance.

The clinical case described here involved the replacement of two defective proximal restorations (Fig. 1). An initial analysis of the various shade layers of which the natural teeth were

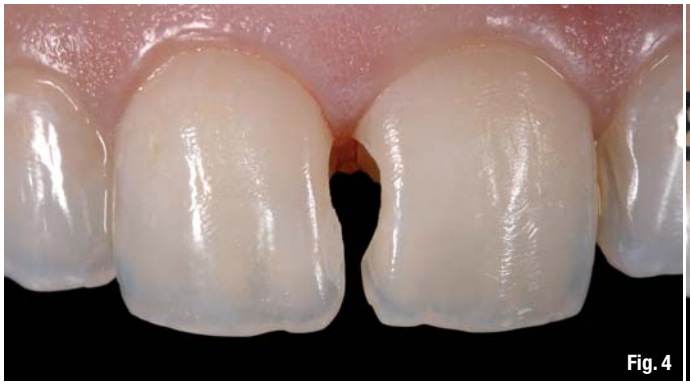
Fig. 4


Fig. 5

composed demonstrated that the optical incisal edge effects described above were particularly eye-catching in this case. Moreover, the bluish-whitish line extended far into the interproximal area. The challenge was to create a highly aesthetic restoration. We strove to achieve this by means of a slight reduction of the diastema and the application of opalescent effects. Following, I describe the way improved restorative results can be achieved if an opalescent material is also available (IPS Empress Direct Trans Opal, Ivoclar Vivadent).

The incisal view of the teeth shows the undulating contour of the incisal edge (Fig. 2). As secondary decay was diagnosed, the old fillings were completely removed (Figs. 3 & 4). A perforated, one-sided diamond abrasive strip was used to bevel the preparation margin (Fig. 5). Thus, minimally invasive roughening and bevelling of the enamel surface were ensured in the equi-gingival cervical region. Following etching with phosphoric acid and conditioning with ExciTE bonding agent (Ivoclar Vivadent), a matrix band was placed (Fig. 6). The band was slid into the sulcus along the proximal tooth surface and secured with a transparent wedge from the palatal side (Fig. 7). The anaemic appearance of the surrounding gingiva indicated that non-traumatic compression of the tissue had been achieved. In the palatal view, the size-1 wedge is clearly visible. Owing to the pressure it exerts, the interdental space was slightly enlarged. The matrix band was secured once in an optimum position. Then the first layer of composite material (IPS Empress Direct Dentin Shade A3) was placed

Fig. 4_Defects viewed from the vestibular aspect.
Fig. 5_Bevelling of the preparation margin using diamond abrasive strips.
Fig. 6_Placement of the matrix band.
Fig. 7_Palatal view.
Fig. 8_Application of the first composite increment.
Fig. 9_Further IPS Empress Direct Dentin Shade A3 increment.
Fig. 10_Completion of the dentine core using IPS Empress Direct Dentin Shade A2.
Fig. 11_Coverage with IPS Empress Direct Enamel Shade A2.
Fig. 12_Contouring of the final tooth shape using IPS Empress Direct Trans Opal.


Fig. 6


Fig. 7


Fig. 8


Fig. 9


Fig. 10


Fig. 11


Fig. 12


Fig. 13


Fig. 14


Fig. 15


Fig. 16

Fig. 13_A matrix band has been inserted in the interdental space between teeth 11 and 21; etching gel has already been applied.
Fig. 14_A layer of IPS Empress Direct Trans Opal was applied to complete the composite build-up.
Fig. 15_Situation immediately after completion of treatment.
Fig. 16_Final photograph taken one week after the treatment, showing complete closure of the interdental gap.

and adapted in such a way that it created a preliminary outline of the proximal contours (Fig. 8).

Subsequently, a further layer of composite was added (Fig. 9). This was followed by a layer of Dentin Shade A2 (Fig. 10), which served to optimise the shade adjustment. Next, a layer of Enamel Shade A2 (Fig. 11) was placed and the build-up was completed with Trans Opal. Figure 12 demonstrates the building up of the composite materials to create the final tooth shape, which also simplified morphological contouring during the finishing procedure. For finishing, an EVA tip handpiece was used. This handpiece performs oscillating movements. Owing to the fine tip, completely non-traumatic finishing was ensured, particularly along the transition between the filling material and sulcus. The fine reduction, which was achieved by means of suitable grit size (the green or blue ring is used for pre-polishing), enables targeted finishing. Therefore, over-contouring of the composite restoration was not necessary. The surface was finished exclusively with an EVA tip and subsequently polished with a pre-polisher and high-gloss polishers (Astropol, Ivoclar Vivadent). Polishing brushes (Astrobrush, Ivoclar Vivadent) were used to finish the surface with a final high-gloss sheen.

In tooth 11, a matrix band was used to shape the proximal surface (Fig. 13). The band also served to protect tooth 21 from the etching gel that was applied immediately afterwards. The wedge was placed with tension in order to establish a perfect separation of the teeth. The intention was to reduce the diastema substantially. The primary composite increments were applied according to the protocol described above. The final layers were also placed based on the previously mentioned criteria. Also, in this case, Trans Opal material was used to complete the build-up (Fig. 14). After polishing the restoration to a high lustre, a slight colour discrepancy due to the dryness of the superficial enamel portion was recognisable. The interdental papilla was still slightly compressed owing to the wedge (Fig. 15). The final photograph (Fig. 16), which was taken one week after placement of the restoration, shows a completely healthy papilla and virtually invisible composite restorations with lifelike opalescence._

_contact

cosmetic dentistry

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‘Myth busting’ laser dentistry

_Lasers are fairly new in mainstream dentistry. Their benefits are still not known to many dentists and patients, and several myths about lasers still exist. Therefore, we would like to do a little bit of ‘myth busting’.

_Lasers cut slower than high-speed burs

This can be true for laser systems that deliver the laser through an optical fibre. In order to protect the expensive fibre, laser energy must be kept low. In order to circumvent this, Fotona’s Fidelis dental laser systems utilise an articulated arm and advanced VSP Technology that allow the laser to deliver much more energy for efficient laser drilling. These lasers cut at comparable and even higher speeds than conventional high-speed burs.[1] A recent study has demonstrated that Fotona’s hard-tissue Er:YAG laser cuts 3 times faster through dentine and 4.2 times faster through enamel than an Er,Cr:YSGG laser delivered through an optical fibre (Waterlase MD, Biolase).[2]

_Lasers are 100 % painless

Ninety per cent of patients feel no discomfort at all during Er:YAG laser treatments.[3] Fotona’s Fidelis lasers are thus predominantly used without anaesthesia. Some procedures and certain patients require local anaesthesia and usually a topical anaesthetic suffices for some soft-tissue procedures, while larger hard-tissue procedures may require a local injection. Nevertheless, patient comfort is dramatically improved—no needles, no noise, no vibration, no numbness. In cases in which no anaesthesia is used, patients can receive treatments in all four quadrants during the same appointment.

_Lasers are a bad investment

Lasers are not inexpensive, but so is every investment in your future. Once you understand the benefits of lasers, the return on investment is obvious. With less need for anaesthesia, more treatments in multiple quadrants during shorter visits can be performed, increasing per-visit productivity. Dual laser systems, such as AT Fidelis, allow you to treat more conditions efficiently and less invasively, even those you were previously not able to treat. Combined with more patient referrals and added exposure by setting your practice apart from others, it is evident that lasers are indispensable to a modern practice._

Editorial note: A complete list of references is available from the publisher.

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Perfect Bleach: Effective and gentle

_With Perfect Bleach, VOCO offers a home whitening system that meets all of the requirements of modern tooth whitening and thus the highest aesthetic demands in an equally simple and cost-effective way. Vital teeth that are discoloured because of ageing or diet-related accretion can be whitened quickly and effectively. Devitalised teeth can also be whitened externally and internally. The treatment of tetracycline discolouration, superficial enamel discolouration from fluorosis, and discolouration caused by trauma due to bleeding is also possible. Perfect Bleach is a carbamide peroxide-based home whitening material. Depending on the type of discolouration, either a 10 % or 17 % concentration can be used.

_Gentle and effective

Distinct whitening success can be achieved with whitening gels containing low concentrations of carbamide peroxide and with a simultaneous gentle treatment of the tooth substance. The carbamide peroxide concentration in Perfect Bleach is sufficiently high to provide effective and gentle treatment of discolouration. The sodium fluoride and potassium in 17 % Perfect Bleach ensure that hypersensitivity is prevented during and after the treatment. Perfect Bleach provides a thorough oxidation of accumulated pigments without damaging the tooth substance or existing restorations.

_Simple and user friendly

The application of Perfect Bleach is uncomplicated and user friendly: the patient simply fills the custom-fabricated and optimal fitting trays with the high viscosity gel and wears them as instructed. Wearing the trays for two hours is sufficient for the gel to achieve full effect. Initial results are already evident after the second application. As the viscosity of the gel ensures it does not run out of the tray, gingival irritation is prevented. The fresh mint flavour is also pleasant for the patient. Furthermore, the concentration of the carbamide peroxide gel remains stable even if the cold chain is interrupted.

_Complete Set and Patient Kit

The Perfect Bleach Complete Set contains all the components needed: six 2.4 ml syringes of whitening gel, two deep-drawing films, one 1.2 ml syringe of Block Out Gel LC for the fabrication of the trays, application pictogram card, shade guide to verify treatment success, storage case for the trays, and a cosmetic bag. The Patient Kit contains four 2.4 ml syringes of whitening gel, application pictogram card, shade guide, storage case for the trays, and a cosmetic bag._

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VITA Easyshade Compact: The new generation in digital shade-taking

_Since its introduction in 2003, VITA Easyshade, the optoelectronic shade-measuring unit, has convinced dentists and dental technicians by its simple handling and high degree of accuracy in the objective shade determination of natural teeth and dental restorations. With the arrival of VITA Easyshade Compact, the second generation of the measuring device, the work of dentists and dental technicians will now be even further facilitated. VITA is proud to present VITA Easyshade Compact at upcoming international trade shows.

VITA Easyshade Compact is the lightweight and ergonomic form of the previous model. The advanced spectrophotometric technology ensures precise and swift results in the determination of natural tooth shades and the shades of dental restorations. Results are displayed in the shade codes of the VITA classical shade guide A1 to D4 or the VITA 3D-Master. Other key improvements include its cordless design, which allows users to move freely, and a durable state-of-the-art LED light. In addition, VITA Easyshade Compact offers storage capacity for 25 measurements that remain stored when the unit is switched off.

VITA Zahnfabrik, headquartered in Bad Säckingen at the foot of the Southern Black Forest region in Germany, is an independent, family-owned enterprise. For over 80 years, the company has been doing justice to the principle upon which it was founded, namely, product development with the goal to provide better prosthetic restorations.

VITA develops materials and technologies for the fabrication of high-quality dental restorations. Numerous pioneering achievements in the fields of ceramics, artificial teeth and the determination and reproduction of human tooth colours have obtained worldwide recognition in the branch._

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CLEARFIL SA CEMENT:

Top Self-adhesive Resin Cement of 2010

_As science and society continue to develop, new questions and challenges arise for dental materials. With the innovative self-adhesive resin cement CLEARFIL SA CEMENT, which was first presented in Europe at IDS 2009, Kuraray Europe introduced a new dual-curing, self-etching resin cement that meets the demands of today's dental practice.

CLEARFIL SA CEMENT was recently voted the *Top Self-adhesive Resin Cement of 2010* by *The Dental Advisor*. Excess paste can now be removed in one piece or in larger bits with little effort. Kuraray's unique adhesive monomer (MDP) ensures a consistent, strong bond strength and low technical sensitivity. The high mechanical stability ensures an excellent marginal seal, while the auto-mix syringe and the optional dispensing gun (CLEARFIL DISPENSER) provide a direct and comfortable way of using the material without the necessity of mixing. A precise application, even directly into the root canal, is possible with the use of the Endo Tip.

According to the company, CLEARFIL SA CEMENT can be used for the adhesive attachment of full-ceramic, composite, metal or zirconia crowns, bridges, inlays and onlays.

Kuraray, established in Kurashiki in Japan in 1926, was originally involved in the industrial production of synthetic fibres from viscose. Through intensive research and development work, the company has created a broad base of experience and technology in the sectors of polymer chemistry, chemical synthesis and chemical engineering.

Thanks to its technological strength and comprehensive experience, Kuraray has developed innovative products for many different branches of business such as the dental industry. In 1978, for example, the company introduced the first bonding system CLEARFIL BOND SYSTEM F that marked the beginning of the age of adhesive dentistry. At the same time, the company developed the total-etch technique for enamel and dentin.

Today, Kuraray continues to produce innovative high-quality products such as PANAVIA F 2.0, CLEARFIL PROTECT BOND or CLEARFIL SE BOND. Between April and July, Kuraray will be exhibiting at international meetings such as the AACD Annual Meeting 2010 (booth 1110), at Amici di Brugg (pavilion C7, booths 66–95, lanes 2 & 3), Dental 2010 (hall 1.0, booth C011, Oraltek) and IADR in July (halls 1–8, booth 506, MAB Dental)._

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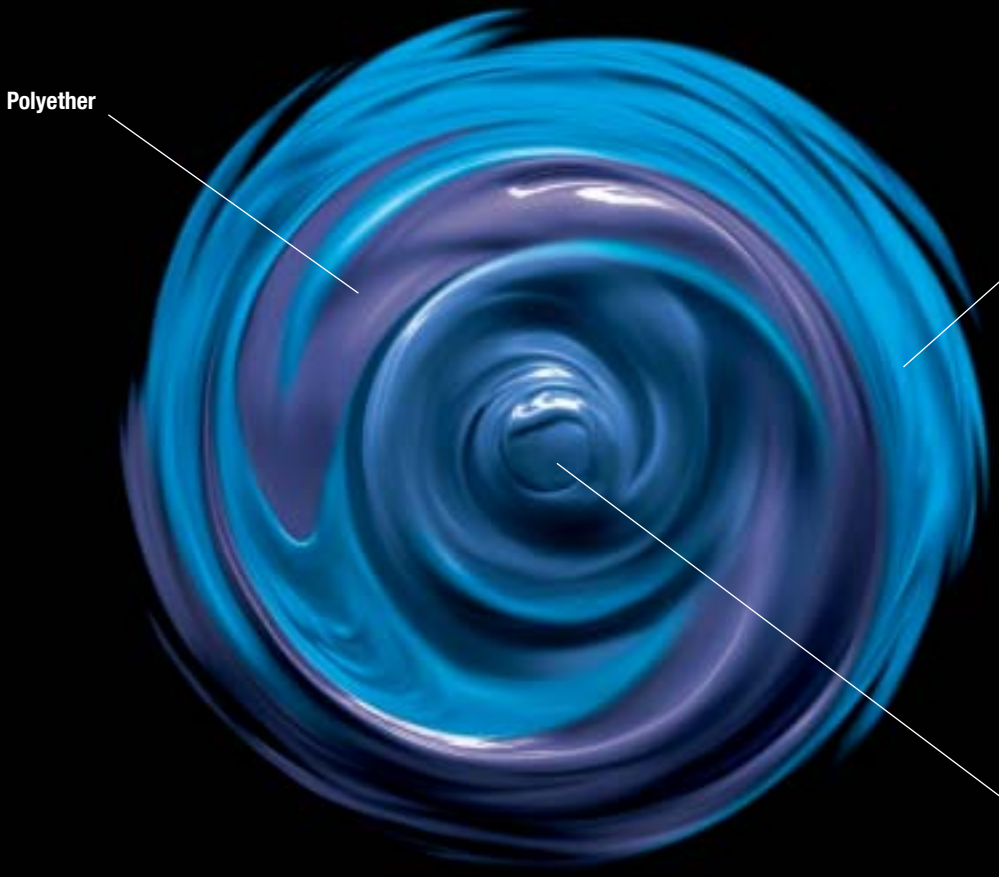

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The first South Asian cosmetic and aesthetic dental congress

Author_ Dr Suhit R. Adhikari, Nepal


Fig. 1

Fig. 2

Fig. 1_Inauguration of the SAAAD meeting with the lighting of the traditional Nepalese lamp.
Fig. 2_Participants.

Fig. 3_From left to right: Dr Sandesh Mayekar (India), Dr Vijayaratnam Vijayakumaran (Sri Lanka), Dr Sim Tang Eng (Malaysia) and Dr Sushil Koirala (Nepal) after receiving their SAAAD inaugural fellowship.
Fig. 4_Japanese delegates singing a Japanese song at the gala dinner.
Fig. 5_AAAD President Dr Sim Tang Eng with traditional Nepali cap.

_The South Asian Academy of Aesthetic Dentistry (SAAAD) held its first biennial scientific meeting *Minimally invasive cosmetic dentistry—A holistic approach* from 28 to 29 November 2009, at Radisson Hotel in Kathmandu in Nepal. The conference, which was organised in collaboration with the Asian Academy of Aesthetic Dentistry (AAAD), Sri Lanka Academy of Aesthetic and Cosmetic Dentistry, Bangladesh Academy of Aesthetic Dentistry and Nepalese Academy of Cosmetic and Aesthetic Dentistry, was attended by 225 South Asian delegates.

The meeting was inaugurated by the presidents of the AAAD, SAAAD and Nepal Dental Association by lighting the traditional Nepalese lamp. The President and Prime Minister of Nepal, Dr Ram Baran Yadav and Madhav Kumar Nepal, offered their best wishes for the conference. As a conference memento, the SAAAD published *Dentistry South Asia*. Speakers from Bangladesh, Greece, India, Japan, Malaysia, Nepal and Singapore presented clinical talks on various aspects of aesthetic and cosmetic dentistry.

The SAAAD was founded in 2005 as the first online, regional professional academy in South Asia. The academy is dedicated to advancing the art and science of aesthetic dentistry and to promoting high standards of ethical conduct and responsible patient care, by institutionalising a standard continuing professional development programme through the provision of a relevant accreditation (fellowship) process.

At the gala dinner, the SAAAD awarded its inaugural fellowship to Dr Sushil Koirala (Nepal), Dr Sandesh Mayekar (India) and Dr Vijayaratnam Vijayakumaran (Sri Lanka) for their outstanding contribution to the promotion of aesthetic dentistry in their respective countries. The next SAAAD biennial meeting will be held in Sri Lanka in May 2011._


Fig. 3


Fig. 4


Fig. 5

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All-ceramics works

Author_ Manfred Kern, Germany

_The Society for Dental Ceramics (SDC) has followed the development of all-ceramic materials and CAD/CAM technology for the last ten years, reviewing and commenting on the clinical results in the professional community, supported by experience from its own field studies in private practices. During this period, the number of inserted all-ceramic inlays, onlays, crowns and bridges has increased steadily to over 5.5 million restorations per year, thus attaining 20 % share of the treatment volume indicated for long-term restorations.

At the 9th Ceramics Symposium *All-Ceramics at a glance*, which was held from 4 to 5 November 2009 in Munich in Germany, the moderator Dr Bernd Reiss (Germany) called attention to the results of the Tele-Dialog Survey, which demonstrated that 87 % of the symposium attendees judged the quality of polycrystalline oxide ceramic frameworks to be better than or at least equal to that of porcelain-fused-to-gold. Prof Sven Reich (RWTH Aachen University, Germany) supported this assessment and presented a thematic tour of millable CAD/CAM ceramics.

Thanks to a combination of different properties, today there is a suitable ceramic for every indication. Silicate ceramic, known for its translucent chameleon effect, has established itself for inlays, partial crowns, veneers, and crowns, chiefly in the anterior-tooth and premolar regions. For extended aesthetic demands, as well as crowns and three-unit fixed dental prosthesis (FDP) up to the second premolar, lithium disilicate (LS_2) ceramic is available in graded opacities for press and CAD/CAM techniques. Framework ceramics of aluminium oxide (Al_2O_3) and zirconium dioxide

Fig. 1a–f_Cusp overlay, indicated for weakened cusps. (Photographs courtesy of Prof Karl-Heinz Kunzelmann, Germany)

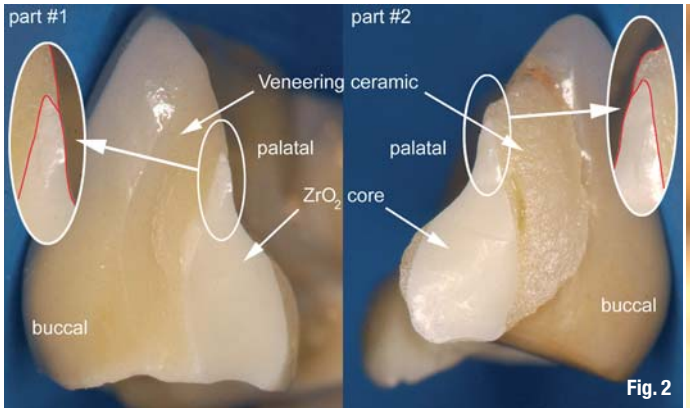

Fig. 2

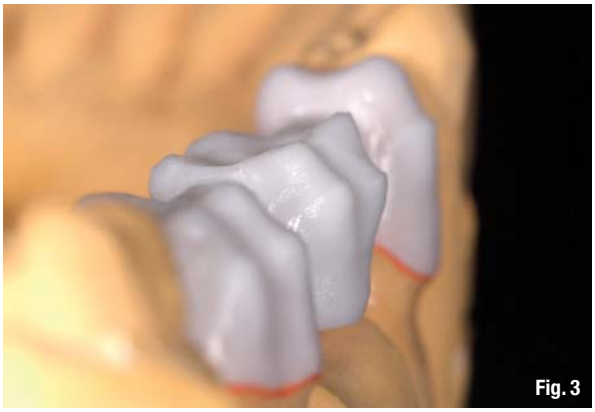
Fig. 3

(ZrO_2) have an opaque structure and require veneering. Owing to its partial translucency, Al_2O_3 is especially suitable for crown and FDP frameworks in the anterior and premolar regions. ZrO_2 is indicated for use not only in the posterior dentition, but also as a framework with wings for adhesive FDPs. Prof Reich discussed the veneering fractures on ZrO_2 frameworks, which have been under discussion in the professional community for some time. The underlying problem is that up until a few years ago, thin-walled crown copings were covered with thick veneer layers, and the bridges lacked anatomically designed frameworks with cusp support.

_Substance conservation as the goal

Prof Karl-Heinz Kunzelmann (Ludwig Maximilian University of Munich, Germany) lectured on *Ceramic inlays and partial crowns: New preparation concepts*, pointing out that current preparation criteria are still heavily influenced by—the limitations of early ceramic materials and CAD/CAM systems. Today, given the good fitting accuracy of ceramic restorations, the enlarged divergence angles of the gold era are no longer necessary (Figs. 1a–f). Thus, classical divergence angles of 6 to 10° are to be avoided, owing to the risk of the cavity margin ending in the area of the cusp tips or contact points. Occlusal surface veneers of pressable ceramic, suitable for the treatment of occlusal defects and vertically increasing occlusion, do not require a chamfer and conserve considerable substance. In partial crowns with cusp reconstruction, a substance-conserving supporting area in the enamel-dentine region is preferable to a supporting shoulder. An overlay is indicated when cusps are very thin (<2 mm cusp thickness). According to Prof Kunzelmann, the reimbursement for overlaying cusps should be adjusted because the statutory health insurance criteria for the partial-crown indication require that all cusps be sacrificed. However, this contradicts the principle of substance conservation.

Dr Andreas Kurbad (Germany) covered the range from *Classical crown to minimally invasive*. In the preparation of a fully anatomical ceramic crown with a circular chamfer, up to 64 % of the hard dental tissue can be conserved.[1] In contrast, metal-supported full crowns consume at least 70 % in preparing the necessary retention surfaces.[2]

A sure positioning of the crown is facilitated by clear margins. It should be tactilely perceptible when the ceramic body has reached its correct position. Further, the advantage of adhesive

Fig. 2_Fracture of a veneered ZrO_2 bridge. The framework was ground in palatinally (pointed droplet shape) and did not support the veneer adequately. The over-dimensioned veneering layer became subject to tensile forces. (Photograph courtesy of Prof Ulrich Lohbauer, Germany)
Fig. 3_Cusp-supporting coping form prevents veneering fractures. (Photograph courtesy of Prof Joachim Tinschert, Germany)

Fig. 4_Embedding the CAD/CAM-milled wax-up in order to obtain a pressed veneer. (Photograph courtesy of Volker Brosch, Germany)
Fig. 5_Pressed veneers (IPS e.max Press) with final firing on ZrO_2 framework. (Photograph courtesy of Volker Brosch, Germany)


Fig. 4


Fig. 5

Table I _Failure rates of all-ceramic bridges. ZrO_2 frameworks remained largely fracture-free; chipping interfered with clinical success. (Table courtesy of Prof Matthias Kern, Germany)

Failure rates of all-ceramic fixed dental prosthesis

FIRST AUTHOR	N	CERAMIC	TIME (IN MONTHS)	FAILURE RATES (IN %) ANT.	PM	M
Pospiech 2004[c]	35	Lava	36	–	–	0°
Suárez 2004[c]	10	In-Ceram Zr	36	0°	5.5	
Raigrodski 2006[c]	20	Lava	31	–	0*	0*
Sailer 2007[a]	33	DCM	53	–	26.1°*	
Molin 2008[a/c]	19	Denzir	60	0	0	0
Tinschert 2008[a/c]	65	DSC	37	0°	0*	
Wolfart 2008[c]	24	Cercon	45	–	4*	
Wolfart 2008[c]	37	Cercon ext-br.	46	–	8.1°*	
Beuer 2009[c]	21	Cercon	40	–	9.5	
Eschbach 2009[c]	60	In-Ceram Zr	60	–	–	3.2*
Wolfart 2009[a/c]	36	e.max Press	86	0°	6.7*	

[a] adhesive luting [c] conventional luting ° up to 25 % additional fractures * 2.2–4.8 % structural fractures

luting is that no retention forms are necessary whatsoever. Depending on the type of material, ceramics have translucent properties; thus, according to Dr Kurbad, dark fillings can be a difficult foundation. Pronounced discolouration of the crown stump requires greater substance removal, in order to allow the ceramic a greater thickness.

_Toughness versus resistance

"The fracture toughness of the ceramic is more important than its resistance," explained Prof Ulrich Lohbauer (University of Erlangen-Nürnberg, Germany) in his talk on *Fracture mechanics of all-ceramic restorations*. Hence, it is an important accomplishment that in the structure of zirconium dioxide ceramic (ZrO_2), volume-expanding compressive forces block the propagation of micro-cracks. The fracture toughness explains the high survival probability of crown and FDP frameworks of ZrO_2 in clinical long-term studies. However, there has been recent discussion about veneering fractures on ZrO_2 frameworks[3] because the veneer ceramic (feldspar) has a much lower crack toughness than ZrO_2. In designing the crown copings, it is therefore important to ensure that cusps support the veneering layer (Figs. 2 & 3). After grinding (fine diamond), Prof Lohbauer recommended polishing the restoration's surface (check with loupes) during insertion or, better yet, sending it back to the dental laboratory for final firing. In selecting the ZrO_2 blank, Prof Lohbauer advised using only original materials from quality-conscious ceramic manufacturers and with proven clinical suitability, and adhering to the procedure for the veneers. This is to ensure that framework and veneering materials match.

_From wax knife to mouse

Master Dental Technician Volker Brosch (Germany) demonstrated the switch from wax knife to electronic framework design, comparing the workflow in conventional dental engineering with the CAD/CAM technique. The digitally constructed datasets can be used to construct both the temporary and definitive restorations. Fully anatomical anterior and posterior crowns can be made from the millable LS_2 blanks, and multi-unit bridges up to the second premolar can also be manufactured from this pressable ceramic of increased strength. Where aesthetic demands are particularly high, the cut-back procedure is used—the fully anatomical crown is anatomically ground down by the thickness of the enamel layer and then fuse-on veneered. Recently, Brosch has made singly designed veneers of fluorapatite pressable ceramic, digitally modelled and then sintered onto the ZrO_2 frameworks (Figs. 4 & 5).

Unique in dentistry is the multi-centre field study by the SDC, in which dentists in private practice can compare their findings/results on all-ceramic restorations anonymously and individually with other participating practices. At the time, over 5,700 restorations from more than 200 practices constituted the basis of the results. After evaluating over 3,000 follow-up examinations, Dr Reiss, who heads this quality-control study, recapitulated that the survival rate of inlays, onlays, partial crowns, and crowns of silicate

ceramic lies at 83 % after 13 years of observation, putting them on par with cast restorations as described in the literature.[4] He explained that participating dentists enter their results online on the platform www.csa-online.net and receive an individual, graphic treatment profile.

_ZrO_2 not always necessary

Speaking on the *Clinical testing of all-ceramic restorations*, Prof Matthias Kern (University of Kiel, Germany) made it clear that ceramics must measure up to the survival rates of metal-supported restorations. The literature demonstrates that ceramic inlays and onlays have a clinical durability similar to that of cast restorations. CAD/CAM restorations demonstrate a longer service life than pressed or laboratory-constructed restorations.[5] Owing to its semi-translucency, Al_2O_3 is particularly well suited for crowns in the aesthetically sensitive anterior dentition. According to Prof Kern, it is thus not necessary to manufacture single crowns from ZrO_2. FDPs with ZrO_2 frameworks have demonstrated encouraging results; in observation periods of up to five years, framework fractures occurred rarely, even in multi-unit FDPs. However, some studies described veneering fractures (chipping; Table I). The reason for this is that originally, trusting in the high fracture-flexural strength of the material, ZrO_2 frameworks were delicate constructions, milled out with thin walls onto which thick veneering layers were applied, which became subject to tensile force. Prof Kern recommended wall thicknesses of no less than 0.8 mm for ZrO_2 frameworks and advised designing them anatomically, so that the veneering is supported by the cusps.

From the papers submitted for this year's Research Award in All-Ceramics, the jury selected three studies of equal merit. The presenter of the award thus decided to recognise all three researchers: Dr Frank Nothdurft (Germany) for his study *Clinical testing of a prefabricated all-ceramic implant build-up of zirconium dioxide in the posterior dentition*, Dr Andreas Rathke (Germany) for his *In vitro examination of the effectiveness of the dentin bond of ceramic inlays using different luting concepts*, and Falk Becker (Germany) for his study *Press-on and layering technique, chipping behaviour of all-ceramic anterior crowns.*

_CAD/CAM workshop reflects practical experience

During the concluding CAD/CAM workshop at the Clinic for Dental Prosthetics in Munich, Prof Daniel Edelhoff, Dr Florian Beuer, dentist Peter Neumeier, dental technician Marlis Eichberger and dental technician Josef Schweiger helped familiarise participants with the functioning of CAD/CAM systems. The clinic is equipped with representative CAD/CAM systems (C.O.S., 3M ESPE; Cercon, DeguDent; DigiDent, Girrbach-Amann; etkon, Straumann; Everest, KaVo; inLab, Sirona Dental Systems; Lava, 3M ESPE; Procera, Nobel Biocare; ZENOTEC, Wieland), which are used in scientific projects and for practical work in patient treatment.

In terms of the achievable quality and precision of fit of the milled all-ceramic frame-works, Prof Edelhoff emphasised that these are of a high level in every respect. Schweiger pointed out that the computerised milling systems for all-ceramic restorations employ various grinding strategies that are especially designed for the original blanks of the manufacturer. ZrO_2 frameworks that were manufactured in manual copy-milling processes (pantograph) had a worse fit and a critical structure, according to Schweiger. Prof Beuer and Schweiger demonstrated a new way to avoid veneering fractures: sinter veneering (Fig. 6). In this, single veneer structures of feldspathic ceramic are computer milled and sintered onto the ZrO_2 framework._

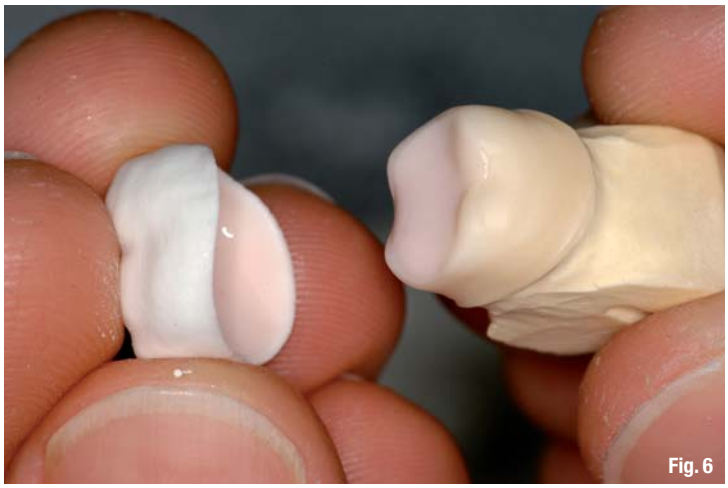
Fig. 6

Fig. 6_The feldspathic veneer, ground with CAD/CAM, was ceramic sintered to the ZrO_2 crown framework. (Photograph courtesy of Josef Schweiger, Germany)

Editorial note: A complete list of references is available from the publisher.

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E-mail: meetings@estheticacademy.org
Website: www.estheticacademy.org

FDI Annual World Dental Congress
Where: Salvador da Bahia, Brazil
Date: 2–5 September 2010
E-mail: congress@fdiworldental.org
Website: www.fdiworldental.org

AACD & ESCD Joint Meeting
Where: London, UK
Date: 23–25 September 2010
E-mail: info@aacd.com
Website: www.aacd.com

Veneersymposium
Where: Leipzig, Germany
Date: 5 & 6 November 2010
E-mail: event@oemus-media.de
Website: www.oemus.com

7th Annual DGÄZ Meeting
Where: Rottach-Egern, Germany
Date: 19 & 20 November 2010
E-mail: info@dgaez.de
Website: www.dgaez.de

Greater New York Dental Meeting
Where: New York, NY, USA
Date: 26 November–1 December 2010
Website: www.gnydm.org

2011

34th International Dental Show
Where: Cologne, Germany
Date: 22–26 March 2011
E-mail: ids@koelnmesse.de
Website: www.ids-cologne.de

7th IFED World Congress
Where: Rio de Janeiro, Brazil
Date: 21–24 September 2011
Website: www.ifed.org

submission guidelines:

Please note that all the textual components of your submission must be combined into one MS Word document. Please do not submit multiple files for each of these items:

_the complete article;
_all the image (tables, charts, photographs, etc.) captions;
_the complete list of sources consulted; and
_the author or contact information (biographical sketch, mailing address, e-mail address, etc.).

In addition, images must not be embedded into the MS Word document. All images must be submitted separately, and details about such submission follow below under image requirements.

Text length
Article lengths can vary greatly—from 1,500 to 5,500 words—depending on the subject matter. Our approach is that if you need more or less words to do the topic justice, then please make the article as long or as short as necessary.

We can run an unusually long article in multiple parts, but this usually entails a topic for which each part can stand alone because it contains so much information.

In short, we do not want to limit you in terms of article length, so please use the word count above as a general guideline and if you have specific questions, please do not hesitate to contact us.

Text formatting
We also ask that you forego any special formatting beyond the use of italics and boldface. If you would like to emphasise certain words within the text, please only use italics (do not use underlining or a larger font size). Boldface is reserved for article headers. Please do not use underlining.

Please use single spacing and make sure that the text is left justified. Please do not centre text on the page. Do not indent paragraphs, rather place a blank line between paragraphs. Please do not add tab stops.

Should you require a special layout, please let the word processing programme you are using help you do this formatting automatically. Similarly, should you need to make a list, or add footnotes or endnotes, please let the word processing programme do it for you automatically. There are menus in every programme that will enable you to do so. The fact is that no matter how carefully done, errors can creep in when you try to number footnotes yourself.

Any formatting contrary to stated above will require us to remove such formatting before layout, which is very time-consuming. Please consider this when formatting your document.

Image requirements
Please number images consecutively throughout the article by using a new number for each image. If it is imperative that certain images are grouped together, then use lowercase letters to designate these in a group (for example, 2a, 2b, 2c).

Please place image references in your article wherever they are appropriate, whether in the middle or at the end of a sentence. If you do not directly refer to the image, place the reference at the end of the sentence to which it relates enclosed within brackets and before the period.

In addition, please note:

_We require images in TIF or JPEG format.
_These images must be no smaller than 6 x 6 cm in size at 300 DPI.
_These image files must be no smaller than 80 KB in size (or they will print the size of a postage stamp!).

Larger image files are always better, and those approximately the size of 1 MB are best. Thus, do not size large image files down to meet our requirements but send us the largest files available. (The larger the starting image is in terms of bytes, the more leeway the designer has for resizing the image in order to fill up more space should there be room available.)

Also, please remember that images must not be embedded into the body of the article submitted. Images must be submitted separately to the textual submission.

You may submit images via e-mail, via our FTP server or post a CD containing your images directly to us (please contact us for the mailing address, as this will depend upon the country from which you will be mailing).

Please also send us a head shot of yourself that is in accordance with the requirements stated above so that it can be printed with your article.

Abstracts
An abstract of your article is not required.

Author or contact information
The author's contact information and a head shot of the author are included at the end of every article. Please note the exact information you would like to appear in this section and format it according to the requirements stated above. A short biographical sketch may precede the contact information if you provide us with the necessary information (60 words or less).

Questions?
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