

cosmetic dentistry _ beauty & science

1 2009



_case study
Tooth whitening

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Minimal intervention

_lifestyle
Naxos — life, the Greek way



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Dear Reader,



Dr Sushil Koirala
Editor-in-Chief

_Welcome to this year's first edition of **cosmetic dentistry**! 2008 was a very successful year, as we were able to expand our professional network with various aesthetic institutions and individuals. I would hereby like to express my sincere gratitude to all editorial board members, advisors, authors, and institutions for their professional support and guidance. We are also much obliged to all our valued readers for accepting this new publication.

During my recent visits to Japan, India, and Thailand, workshops and lectures were organised in collaboration with many aesthetic dentists, both new and well established. I was pleased to note that most professionals are quite serious about the various ethical concerns of cosmetic dentistry. Irrespective of geographic and cultural differences, all of us face the same practical difficulties in differentiating between need- and desire-based treatments. Cosmetic dental treatment is generally related to the personal desires of a patient and may not necessarily improve health or function of the oral tissues. Therefore, dentists have an ethical responsibility to educate their patients about realistic goals and appropriate treatment options.

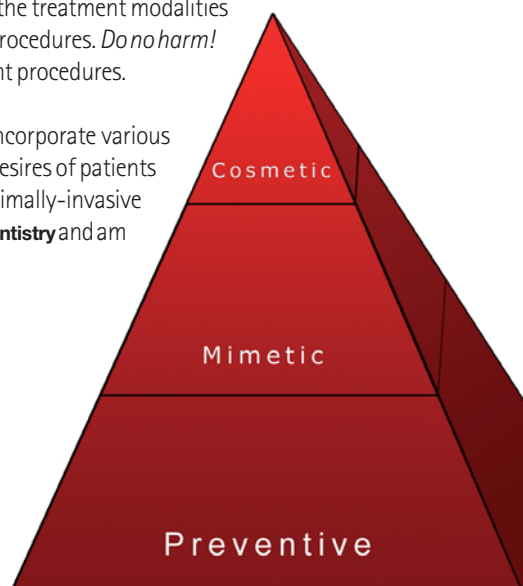
Patient psychology, health, function, and aesthetics are the four fundamental components of comprehensive aesthetic dentistry that need to be adequately addressed during smile-design procedures. I differentiate three different grades of aesthetic dentistry, which can be summarised as follows: **Grade I** (preventive) helps to prevent or intercept diseases, habits, and other factors that may adversely affect the existing or future smile aesthetics; **Grade II** (mimetic) helps to restore or mimic the natural aesthetic, with emphasis on health and function; and **Grade III** (cosmetic) helps to enhance or supplement the aesthetic component, which may not be in harmony with the patients sex, race, or age and not necessarily be beneficial for the health or function of the oral tissues.

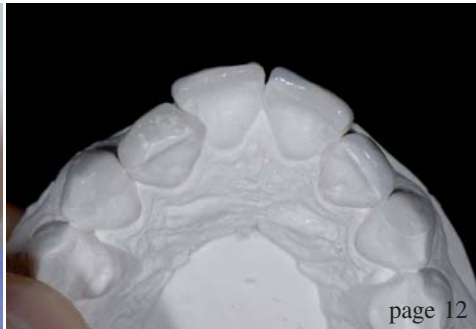
Personally, I feel that a patient's cosmetic desires alone should not be the rationale for cosmetic treatment. The most critical aspect of cosmetic treatment is indeed the treatment's benefit for the health or function of the oral tissues. During any aesthetic treatment where healthy oral tissue is being treated with no direct benefit to health or function, the treatment modalities must be restricted to non-invasive or minimally-invasive procedures. *Do no harm!* should always be the credo pertinent to all dental treatment procedures.

In this issue of **cosmetic dentistry**, we have tried to incorporate various clinical cases that are mostly related to natural, cosmetic desires of patients who are treated exclusively with non-invasive to minimally-invasive procedures. I hope you will enjoy this issue of **cosmetic dentistry** and am eagerly awaiting your comments and contributions!

Sincerely,

Dr Sushil Koirala





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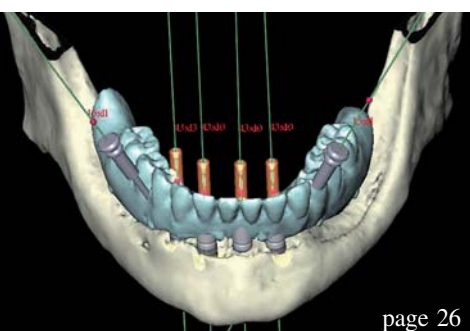
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Welcome to our Asian colleagues



Wynn Okuda

The American Academy of Cosmetic Dentistry (AACD) is dedicated to advancing excellence in the art and science of cosmetic dentistry and encouraging high standards of ethical conduct and responsible patient care. The AACD fulfils its mission by offering superior educational opportunities, promoting and supporting a respected accreditation credential, serving as a user-friendly and inviting forum for the creative exchange of knowledge and ideas, and providing accurate and useful information to the public and dental professionals.

It is my honour to invite you to the 25th Anniversary AACD Scientific Session, *Excellence in Cosmetic Dentistry 2009*, in Honolulu from 27 April to 1 May 2009. As aesthetic dentistry continues to evolve at a rapid pace, it is becoming increasingly important for dentists and laboratory technicians to seek out progressive dental education at an international level. The annual AACD Scientific Session does just that, with world-renowned international educators, such as Dr Galip Gürel, Dr John Kois, Dr Akira Senda, and Dr Toru Masuo.

It is the AACD's goal to bring East and West together to share ideas and innovations and promote global aesthetic synergy. Honolulu is the perfect backdrop for this session, as AACD members from around the world join us in celebrating our 25th anniversary.

The AACD has formed the Global Forum that seeks to promote global participation at the 25th Anniversary AACD Scientific Session. The Global Forum will take place on 29 to 30 April 2009 and will present some of the best clinical courses in the field of aesthetic and restorative dentistry. If you plan to attend throughout the entire week, you will receive a 10 per cent discount on member and non-member tuition rates.

We are also excited to announce the return of the Matrix Band! This rock band, whose band members are AACD members, and the 90s popstar Glenn Medeiros, are performing on 29 April at 7 pm at the Pipeline Café in Honolulu. The *Rockin' in Paradise* concert celebrates the band's 10th anniversary, and proceeds will be donated to the *Give Back a Smile* charitable programme.

The AACD and I look forward to hosting you at our scientific session and fostering great relationships as dental colleagues and friends. To sign up for the AACD Hawaii 2009 meeting go to www.aacd.com. To sign up for the *Rockin' in Paradise* concert go to www.aacd.com/matrixband. I hope to see you there!

Mahalo,

Wynn Okuda, DMD FICD FICOI

Past President and Board-accredited member of the AACD

International Ambassador and Liaison of the AACD International Advisory Council



Tooth whitening: A conservative approach

Author_ So-Ran Kwon, Korea

Fig. 1 _Smile analysis before whitening.

_A beautiful smile tends to be associated with health, self-confidence, and happiness, and because of this, it influences a person's self-esteem and even

social perception by others. Among many other treatment options for obtaining a beautiful smile, tooth whitening is a relatively cost-effective, minimally-invasive, and highly effective treatment method. The success rate depends mainly on the type of discolouration and ranges from 90 to 97 per cent. Satisfactory retention of the colour can be expected for one to three years and may last up to ten years post-treatment.

Sensitivity of the tooth and irritation of the gingiva are common during tooth whitening; however, all side effects cease upon completion of treatment. Nevertheless, a comprehensive examination followed by proper consultation is required to meet the patient's aesthetic expectations with an emphasis on maximum conservation of healthy dental tissue.

_Case report

In many cases, patients are well aware of their dental problems and request specific dental treatment. In this case, a 33-year-old female patient wished for tooth whitening and re-contouring of her prominent upper canines.

A comprehensive examination and smile analysis using a spectrophotometer (Spectroshade, MHT) revealed healthy dentition with a shade range between D4 and A4 (Fig. 1).

The upper right first premolar presented a cervical abfraction area with moderate sensitivity to cold. The left first premolar had a Class V composite resin filling with slightly worn margins. Localised white decalcification areas were visible on the upper lateral incisors (Fig. 2).

Tooth whitening, aesthetic re-contouring of the upper cuspids, and a Class V composite resin filling on the right first premolar were proposed to the patient. The

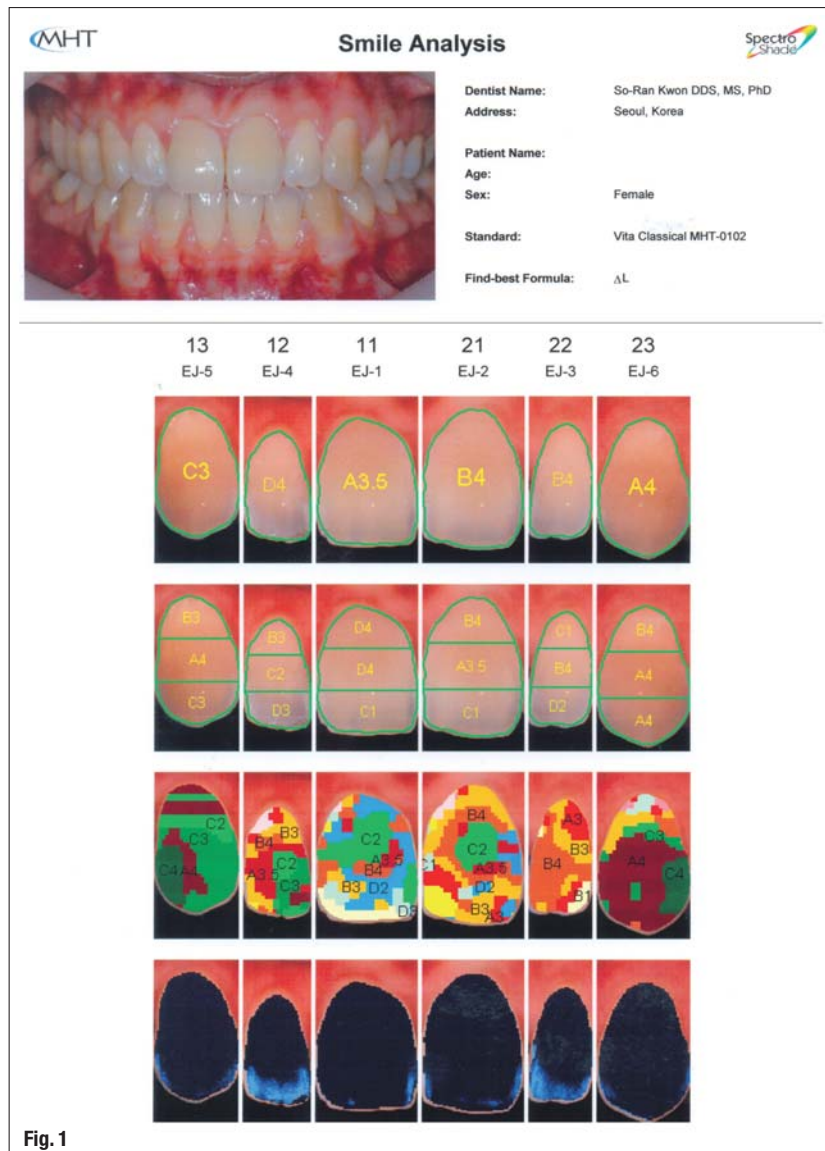


Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5

possibility of additional treatment of the upper lateral incisors was given in case the white decalcification areas would not blend in naturally with the whitened teeth.

Tooth whitening can be performed either at home with the use of a relatively low concentration of

whitening agent delivered in a custom-fabricated tray or in the office with higher concentrations of hydrogen peroxide and a resin barrier to prevent the gel from irritating the soft tissue. Generally, the use of light activation to accelerate the procedure is optional.

Fig. 2 Intra-oral view before whitening.

Fig. 3 Power whitening with a light-activating device.

Fig. 4 Distinct colour difference between the upper and lower teeth.

Tooth number	#13	#12	#11	#21	#22	#23
Shade guide units	10	5	10	11	8	10
DE	16.32	9.05	13.68	14.64	10.19	16.01

Summary of the shade changes of the six anterior teeth in terms of shade guide units and DE values.

In order to obtain a favourable result in a relatively short time, the patient preferred a combination of home and power whitening. An alginate impression was taken prior to the first in-office whitening session (Fig. 3). While the patient received whitening of the upper arch for 40 minutes, a model was poured and a customised tray was fabricated. Thus, it was possible to deliver the upper tray and the home whitening kit on the day of treatment.

office whitening session with an interval of three to four days. During that time, home whitening was performed for maximum efficacy of the treatment. After the third in-office whitening session, a remarkable difference was observed between the upper and lower teeth (Fig. 4). Although the decalcification area on the left lateral incisor was slightly more noticeable at this stage, the patient was very happy about the distinct colour difference between the upper and lower teeth. Treatment on the lower teeth was conducted in the same manner as the upper teeth. She received three in-office whitening sessions on the lower arch with an interval of three to four days combined with home whitening.

Fig. 5_Intra-oral view after whitening.

Fig. 6_Smile analysis after whitening.

Routine explanations on the possibility of sensitivity to cold, irritation to the gingiva, and limitation of whitening in the cervical area were given to the patient. The patient was scheduled for her second in-

Aesthetic re-contouring was cautiously performed with 12-fluted carbide burs to reduce the tips of the cuspids. The Class V composite resin filling was placed two weeks after whitening to allow for colour stability and recovery of bond strength of the enamel. At this stage, the decalcification area finally blended in naturally with the whitened teeth (Fig. 5).

A smile analysis after treatment revealed the efficacy of tooth whitening and confirmed that the treatment had been completed successfully (Fig. 6).

Shade changes can be measured as shade guide units on a value-oriented, classic vita shade guide or as DE values defined by the *Commission Internationale de l'Éclairage* (CIE) $L^*a^*b^*$ colour system. DE is the shortest distance in the CIE $L^*a^*b^*$ colour space between the colours being compared and is determined using the equation $DE = \sqrt{(DL^*2 + Da^*2 + Db^*2)^{1/2}}$ where L^* represents lightness, a^* corresponds to the red-green axis (positive value indicates red, negative indicates green), and b^* corresponds to the yellow-blue axis (positive value indicates yellow, negative value indicates blue). The shade change as indicated by DE was obtained by overlapping the image of the same tooth before and after tooth whitening (Fig. 7), using the Spectroshade analysis software (Version 2.41).

An increase in DE after tooth whitening is usually attributed to an increase in L^* values and a decrease in b^* values. It is interesting to note that DE values varied according to the teeth although all teeth were treated with the same concentration and same exposure time. This suggests that each tooth has its own degree of whitening, which is a very

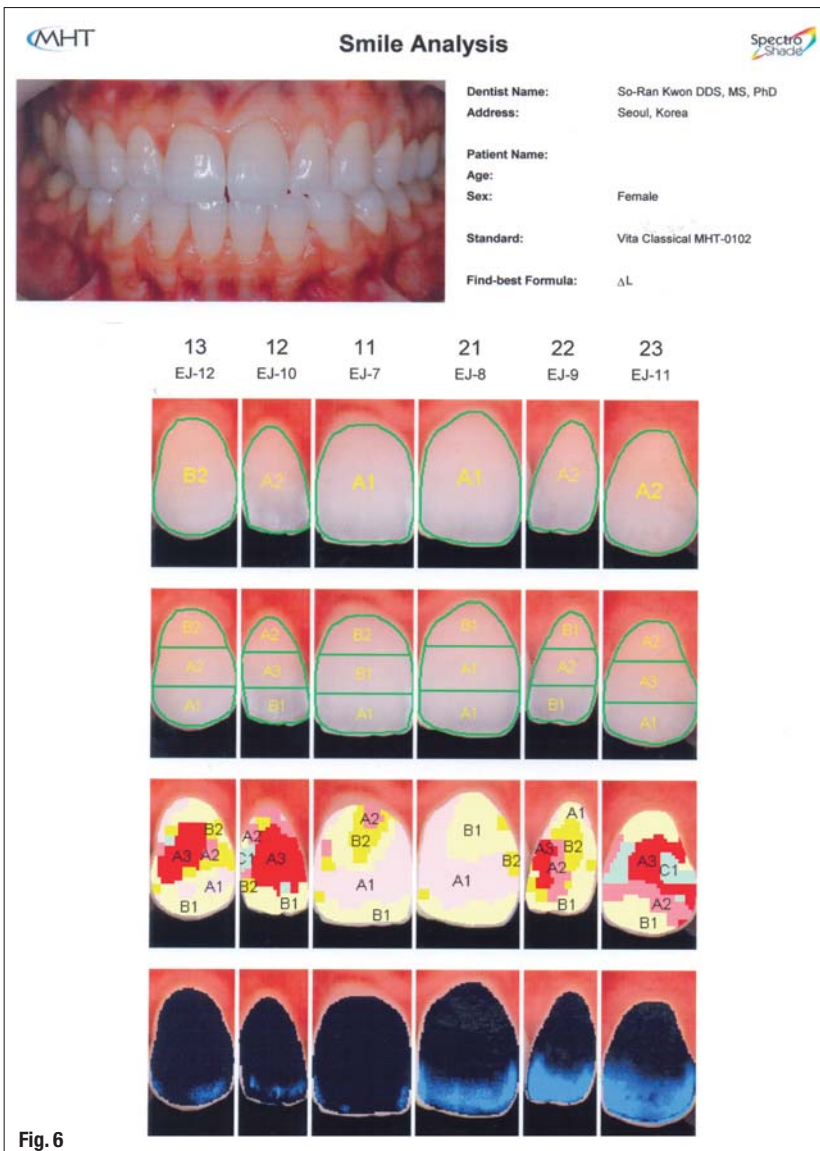


Fig. 6

important factor that influences the efficacy of tooth whitening.

A combination of home and power whitening gives the advantage of faster whitening with the benefit of monitoring and motivating the patient throughout the treatment.

_Conclusion

Tooth whitening is a non-invasive, economical, and highly effective aesthetic treatment for creating a bright smile. It should always be considered in aesthetic treatment planning to provide patients with a beautiful smile, giving them self-assurance and bringing them happiness.

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Fig. 7 Synchronisation of the same tooth before and after whitening to measure the shade change.


_author info

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Dr So-Ran Kwon, Founder and President of the Korean Bleaching Society, lectures internationally on tooth whitening. She has written many articles and books on tooth whitening, including *Tooth Whitening in Esthetic Dentistry* published by Quintessence. She is currently a visiting professor at Yonsei University and maintains a private practice in Seoul, Korea. Dr Kwon can be contacted at smileksr@hotmail.com.

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Non-invasive **mini** **porcelain veneers:** An alternative to direct resin restorations

Author_ Dinos Kountouras, Greece



Fig. 1



Fig. 2

Fig. 1 Pre-op view of the smile.
Fig. 2 Pre-op view. Note the incisal edges.

Aesthetic dentistry is featured widely in the media as the field of dentistry that can change or enhance the appearance of the face, leading to an improved quality of life and increased self-confidence for the patients. Of course, the patients as clients can decide for themselves whether they want to have brighter teeth, but in granting this request, sound tooth structure is often removed.

I will apply dietetic measures for the benefit of the sick according to my ability and judgement; I will keep them from harm and injustice is at the core of the Hippocratic Oath. Dentists not adhering to the Oath risk losing their physician status, especially when they provide aesthetic treatments based solely on their patients' demands. Without critically analysing these demands, they can satisfy the patients' cosmetic needs but may cause harm when otherwise healthy teeth are prepared.

When a tooth is prepared and dentine is exposed, the physiology of the tooth is affected. Oral bacteria can migrate through the exposed dentinal tubules,² especially

when these are not immediately sealed after preparation, and deteriorate the condition of the pulp leading to future endodontic problems. So, apart from the obvious ethical questions, a financial gain for the dentist can unfortunately be short-lived when legal action procedures are taken by patients, who blame the dentist for harming them, not acting professionally, and not judging correctly based on scientific evidence.

Unfortunately, our society considers the 'denture look' the only aesthetically acceptable smile design look. Therefore, the question is: how can natural-looking smiles that are in harmony with the patient's appearance be delivered, while conserving tooth structure and generating income for our practices? The answer lies in appropriate material selection; allowing for the adoption of minimally- or non-invasive methodology; possibly, the involvement of other specialties, like orthodontics, to facilitate tooth movement, in order to allow for less tooth preparation; and of course, on patient education and appropriate fee selection. Patients should be informed about the possible long-term



Fig. 3

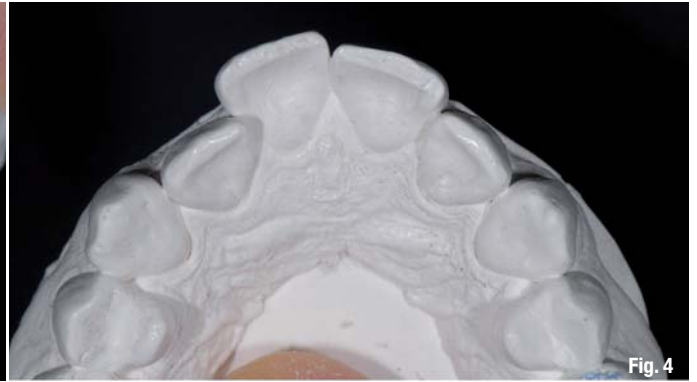


Fig. 4



Fig. 5



Fig. 6



Fig. 7

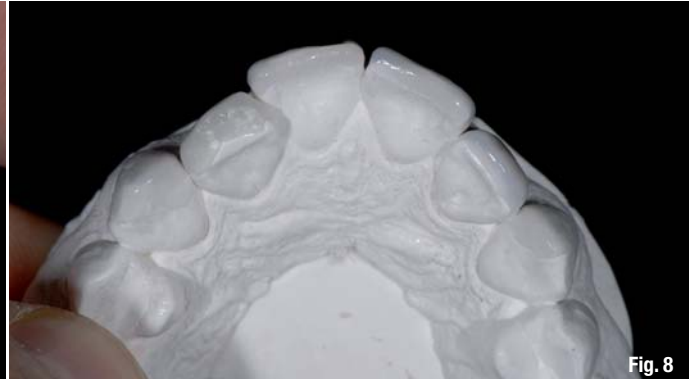


Fig. 8

results of aggressive tooth preparation. They should take responsibility in their care and actively participate in their diagnosis and treatment. Through communication methods, like mock-up or imaging, patients should be given the opportunity to visualise and value the results that minimally- or non-invasive procedures can have for their smile. Often, a combination of bleaching, aesthetic re-contouring, bonding, or minimal veneering can enhance the appearance of the smile and simultaneously maintain the individuality and look of the patient.

Adhesive dentistry allows more conservative approaches to restorative solutions, allowing practitioners to choose 'addition' over 'resection' of the remaining sound tooth structure whenever indicated.

Composite materials are the most commonly used for correcting small to medium aesthetic discrepancies. Owing to their reduced expense, improved physical and optical characteristics, and direct application in a single appointment, they have become increasingly important

in contemporary aesthetic dentistry. Their minimal invasion requirements satisfy both the patient and the dentist.

Alternatively, porcelain provides superior colour stability and physical durability with greater longevity and superior optical and aesthetic properties. Traditionally though it has been associated with more invasive techniques. Nevertheless, when it comes to enhancing the smile with porcelain in order to improve the aesthetics, porcelain veneering is one of the most conservative and aesthetic techniques that we can apply. The prognosis of the veneers is very good especially if the right indications are chosen and the correct techniques are applied.

The feldspathic type of porcelains can be baked at thicknesses of 0.2 mm when considering minimally- or non-invasive indirect veneering options. This allows for a minimal amount or no removal of tooth structure, while maintaining the ability to improve the appearance of the tooth.

- Fig. 3**_Frontal view of the cast.
- Fig. 4**_Occlusal view of the cast.
- Fig. 5**_Frontal view of the diagnostic wax-up.
- Fig. 6**_Occlusal view of the wax-up.
- Fig. 7**_Frontal view of the veneers in the cast.
- Fig. 8**_Occlusal view of the veneers on the cast.



Fig. 9_Try-in of the facings to evaluate their fit.

Fig. 10_Frontal view of the cemented veneers.

Fig. 11_Occlusal view of the cemented veneers.

The preparations remain almost entirely in enamel, which is important from a longevity standpoint. The longevity of a bonded veneer is in correlation with the amount of enamel substrate supporting it. The dentine–enamel junction is very important for the structural strength of the tooth because it is regarded as a fibre-reinforced bond. When our preparations lay on enamel, the tooth will not flex. However, if we finish our preparation on large amounts of dentine, we will not only create bonding issues and possibly cause endodontic problems, but we will also increase the flexing of the tooth structure. When a rigid material like a porcelain veneer is bonded on top, the difference in the rigidity may cause the luting resin at the margin to start peeling off slowly in function. In these situations, we will most likely end up with some micro-leakage or delamination. In order to avoid these problems, we have to be very precise and careful in case selection and tooth preparation. Minimally-invasive, controlled reduction techniques have been developed to safeguard tooth structure¹⁰ and increase the veneer treatment prognosis, while still delivering the designed final aesthetic result.

This article presents a case report featuring an indirect treatment approach using non-invasive mini porcelain veneers to enhance the aesthetics of the smile as an alternative to direct composites.

Case report

A 36-year-old female patient presented for a consultation concerning her anterior aesthetics. She was

not pleased with the palatal position of her right lateral incisor (Fig. 1). Owing to her profession—she works as a violinist with regular TV appearances—she often performs in studios, where the lights accentuate the dark space in the area of the lateral incisor. She also wanted to correct the pointed incisal edges of her upper canines (Fig. 2). Apart from reporting these specific problems, the patient requested an overall enhancement of her smile. A main concern of the patient was that all treatment should be done without preparing any of her teeth.

On examination, there was an anterior open-bite. When the patient was in centric occlusion, she did not contact the lateral incisors and canines. Even though, orthodontic treatment was the ideal choice for restoring this case, the patient felt she did not want to undergo this type of treatment at this time.

The aesthetic problem could be corrected using either composite resin or porcelain. Porcelain was chosen for this case, as the patient is a frequent coffee drinker and was concerned about possible future discoloration. Feldspathic porcelain offers superior colour stability and physical durability compared with composite resins. It can also be manufactured in very thin layers, allowing for a very conservative reversible treatment.

Full-arch impressions were taken using a vinyl polysiloxane material, and casts were poured (Figs. 3 & 4). No gingival retraction was needed because all margins were supra-gingival. No provisional veneers were fabricated.

A diagnostic wax-up was made (Figs. 5 & 6) for evaluative purposes. We decided to elongate teeth 11 and 21 by adding and simultaneously shaping up the incisal edges, and increasing the bulk of the contour facially, to complement the appearance. We also added bulk to tooth 12, to make it part of the arch, and shaped the facial contour of tooth 22 similarly. In addition, we added a little bit of bulk mesially to the incisal edges of the canines, in order to minimise the pointed incisal edges. All changes in the contour were

additive and no teeth needed to be prepared. The veneers were manufactured in the laboratory using IPS d.SIGN porcelain (Ivoclar Vivadent), keeping the same shape as the wax-up model. A full facial coverage porcelain veneer was manufactured in teeth 12 and 22. Very thin porcelain edges were fabricated in teeth 13, 11, 21, and 23 (Figs. 7 & 8).

The porcelain veneers were first tried to evaluate their fit (Fig. 9). Using glycerine try-in gels (Variolink Veneer, Ivoclar Vivadent) the aesthetic appearance was also evaluated. The transparent Variolink glycerine gel (MV 0) was chosen in this case as the most appropriate for aesthetics, and therefore, the equivalent transparent luting resin (MV 0, Variolink Veneer, Ivoclar Vivadent) was picked as the cementation medium of choice. A retraction cord (Ultrapak E #00, Ultradent) was placed to prevent gingival fluids from contaminating the teeth during the bonding process.

The surface of the teeth was cleaned with pumice and then the teeth were acid-etched for 30 seconds with 37 per cent phosphoric acid gel. A bonding agent was then applied (Heliobond, Ivoclar Vivadent) according to the manufacturer's instructions. The internal aspect of the veneers was treated with 5 per cent hydro-fluoric acid for 30 seconds, then silane treated (Monobond-S, Ivoclar Vivadent) for an additional 30 seconds, and finally air-dried with warm air to increase the bond between the ceramic and bonding resin. A bonding agent (Heliobond, Ivoclar Vivadent) was applied over the dried, silanated fitting surface. After gently air thinning the bonding agent, the transparent luting resin (MV 0, Variolink Veneer System, Ivoclar Vivadent) was placed inside the veneers, and the veneers were placed on the teeth. Excess luting composite was removed with a brush and then each veneer was cured for 3 seconds before additional excess resin was removed while still in gel form. Dental floss was used to remove excess resin from the interproximal areas.

Final curing was accomplished by using the curing light on the facial and lingual surfaces of each tooth. Carbide-finishing burs (Safe End Tapered Round, SS White) were used to remove excess luting resin at the margins and then aluminium oxide polishing strips were used to smooth these areas. Occlusal adjustment was accomplished with carbide-finishing burs (SS White Flame). Diamond and silicone carbide-impregnated rubber polishing cups and points were used to polish all surfaces (Jazz P3S, SS White).

The final images can be seen in Figures 10 and 11. The veneers were manufactured in harmony with the patient's face and overall appearance (Fig. 12). The aesthetic demands of the patient were met, no teeth were prepared, and an overall enhancement of the smile was achieved.



Fig. 12_Patient showing her new smile.

_Conclusion

The adoption of non-invasive methodology during aesthetic treatment is in agreement with not only ethical considerations but also physiological ones. By using non-invasive mini porcelain veneers, we are able to enhance the smile of patients, with a completely reversible approach, without removing any of their natural tooth structure and therefore with no interference with the physiology of their teeth. Owing to the presence of enamel under the whole fitting surface, bonding procedures are very strong and the flexural properties of the underlying natural teeth are also unchanged; thus, they are expected to last for many years.

Naturally, non-invasive methodology cannot always be adopted because of various clinical situations and treatment demands. Nevertheless, whenever possible, additive procedures should be preferred to resectional ones.

Our smile design deviates from the 'one-smile-fits-all', 'denture look' approach. We aim to create smiles that safeguard the individuality and variability that natural aesthetics exhibit and that are always in harmony with the unique appearance and style of our patients.

_Acknowledgements

I would like to thank August Bruguera, MDT, for undertaking all the technical work in this case.

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

_author info

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Dr Dinos Kountouras is the founder and president of the Hellenic Academy of Aesthetic Dentistry (EAAO). He can be contacted at dinos@kountouras.com.

Maximum aesthetics with minimal intervention

Author _ Sushil Koirala, Nepal

_Many of us find it difficult and confusing to distinguish between the aesthetic and cosmetic desires of our patients. Proper understanding and analysis of the psychology, health, function, and aesthetic components of smile design are essential to satisfying such desires.

young patient whose anterior teeth are darker (A3 or A3.5) and attrited want to restore natural shade and shape, this should be regarded as an aesthetic desire.

In my opinion, patients' desires for dental treatment that are not harmonious with SRA factors and do not directly benefit the health or function of oral tissues should be categorised as cosmetic desires. And when such cosmetic desires are to be fulfilled, non-invasive to minimally-invasive restorative techniques should be preferred.

In the following cases, the patients' desires were within the natural parameters in terms of their SRA factors. For both of the cases, I tried to mimic the natural aesthetics using minimally-invasive techniques.

In my 17-year-old aesthetic dentistry practice, I have found that the cosmetic desires of most of the patients cannot be fulfilled by only applying the rules of natural smile aesthetics because such desires are mostly at odds with their sex, race, and age (SRA) factors and are guided by trends and culture. For example, an older patient seeking white (A1, B1, or bleached white) teeth and a youthful-looking smile has a cosmetic desire that is contrary to the natural aesthetics of dentition according to his age. However, should a

Fig. 1a_Pre-op smile showing discoloured teeth 11 & 12 with uneven incisal edges.

Fig. 1b_Pre-op full frontal view of the anterior teeth with lips retracted.

Fig. 1c_Close-up view of the upper anterior teeth.

Fig. 1d_Planning for selective home bleaching. Note the spacer on the cast.

Fig. 1e_Bleaching tray placed in the upper arch.



Fig. 1a

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_Case I

A 19-year-old female patient presented with discoloured upper anterior teeth 11 and 12. The teeth were non-vital and treated endodontically. The patient was examined as per the Smile Design Wheel protocol, taking the psychology, health, function, and aesthetic components into consideration. The patient's major concerns were the discolouration of teeth 11 and 12 and the uneven incisal edges of the upper anteriors.

The intra-oral examination and dental history of the patient revealed bruxism. After proper counselling about her existing para-functional habit and aesthetic problems, various treatment options were discussed. Initially, the case was treated with the selective walking and home bleaching of teeth 11 and 12, followed by the re-contouring of the upper anteriors. A night guard was fabricated to prevent the loss of tooth structure. The patient was extremely satisfied with the treatment outcome.



Fig. 1b



Fig. 1c



Fig. 1d



Fig. 1e



Fig. 1f

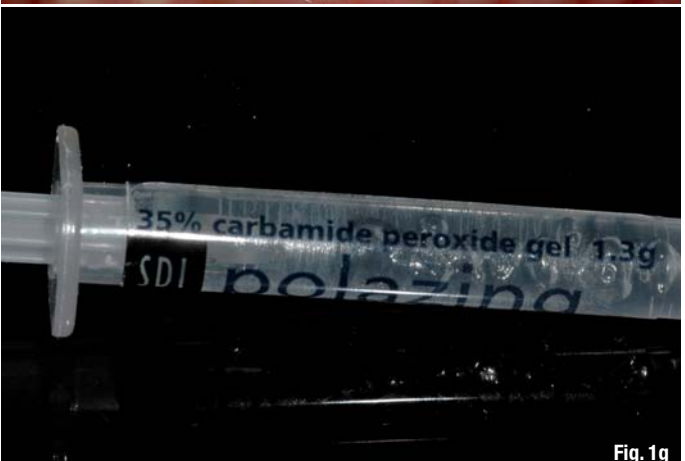


Fig. 1g



Fig. 1h



Fig. 1i



Fig. 1j



Fig. 1k



Fig. 1l



Fig. 1m

Fig. 1f Nupro White Gold (15% carbamide peroxide gel) used for home bleach.

Fig. 1g Pola Zing (35% carbamide peroxide gel) used as walking bleach.

Fig. 1h Teeth 11 & 12 seven days after bleaching.

Fig. 1i Close-up view of teeth 11 & 12 after bleaching. Note uneven incisal edges.

Fig. 1j Planning for cosmetic contouring. Note area to be contoured marked in black.

Fig. 1k Contouring of the incisal surface with Super-Snap black disk.

Fig. 1l Anterior view after cosmetic contouring.

Fig. 1m Close-up view with black background.

Fig. 1n Night guard fabricated for preventing tooth structure destruction due to bruxism.

Fig. 1o Smile after completion of the treatment.



Fig. 1n



Fig. 1o



Fig. 2a

_Case II

A 26-year-old female patient unsatisfied with her existing smile presented. Her aesthetic desire was less gum visibility with prominent upper centrals in her full smile. After thorough clinical examination and smile analysis, the patient was informed about her existing smile aesthetic defects and possible treatment options were discussed. We decided to treat the case with minimally-invasive techniques. The patient was treated with minor gum re-contouring and direct bonding restorations. The outcome of the treatment was much praised by the patient and her family.



Fig. 2b



Fig. 2c



Fig. 2d



Fig. 2e



Fig. 2f



Fig. 2a_Pre-op smile. Note excessive maxillary gingiva, poorly restored midline diastema, and less prominent upper centrals.
Fig. 2b_Pre-op full frontal view of the anterior teeth with lips retracted.
Fig. 2c_Maxillary gingival contouring.
Fig. 2d_Close-up of the upper central incisors after gingival re-contouring and removal of the poor composite restorations.
Fig. 2e_Application of acid etchant on tooth 11.

Fig. 2f_Application of bonding on tooth 11.
Fig. 2g_Flowable frame technique using Beautifil Flow, SHOFU Inc.
Fig. 2h_Lingual frame ready on tooth 11.
Fig. 2i_Final application of enamel layer (Beautifil II, INC Shade, SHOFU Inc.).
Fig. 2j_Post-op full frontal view of the anterior teeth with lips retracted.
Fig. 2k_Close-up view of the restorations.
Fig. 2l_Aesthetic smile after completion of the treatment. Note harmonious gingival level and the central dominance.

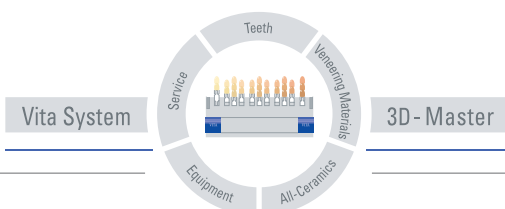


Fig. 2l

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Aesthetic inlays and onlays: The coming of age

Author_ Ronald D. Jackson, USA



Fig. 1



Fig. 2

Fig. 1_Fractured cusp, no caries present.

Fig. 2_Indirect resin composite onlay at 15 years.

There are many prominent teaching clinicians who feel that inlays and onlays (of whatever colour) are a grossly underutilised restoration, and that crowns are an overutilised restoration.¹⁻³ I think it is worthwhile to examine some of the possible reasons for this unfortunate situation (for our patients' sake) and see if the reasons for dentists' reluctance to incorporate these restorations into their routine services are really valid today.

Reason No. 1: Large amalgam fillings are easier and more affordable than inlays and onlays.

Both terms—easier, affordable—are relative. Whether something is easy or not in dentistry depends on your training and how often you've done it. Our first amalgam filling or crown in dental school wasn't easy either. As for affordable, isn't that for the patient to decide? People generally buy what they want or what they perceive is in their best interest.

Reason No. 2: It's just easier to do a crown than an onlay.

Same response as above. However, I will agree that when doing a crown, the clinician isn't faced with the decision of which cusps to keep and which to remove—you just unthinkingly remove them all. But as practitioners, we have to ask, are we deserving of patients' trust and their money by only recommending that which we perceive (possibly because of lack of training or practice) as expedient?

Reason No. 3: Inlays and onlays are expensive.

Not any more than crowns or root canals! We have no trouble recommending these services when they are indicated. Maybe it would be easier for dentists to accept and recommend these restorations if an onlay (gold or tooth coloured) was referred to, and thought of, as a partial crown and carried the same fee as a crown.

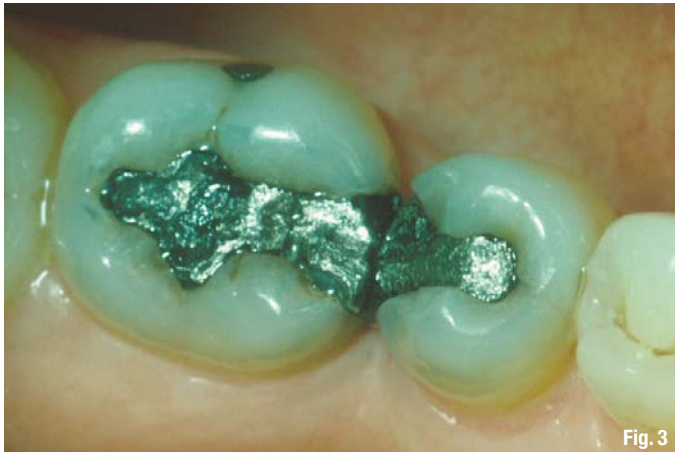


Fig. 3



Fig. 4



Fig. 5



Fig. 6

Reason No. 4: Crowns last longer and are more predictable.

Although longevity is important and ingrained in the dental psyche, it is not the only criteria of value. In the age of adhesive dentistry, respecting remaining tooth structure and aesthetics have become components of value as well. Keeping in mind that patients are living longer and want and expect to keep their teeth for a lifetime (something we tell them can be done) means, in most instances, it is best to recommend a crown only when it's truly indicated.

The name of the game in dentistry today is 'bank the tooth structure' for future use. Regarding durability, aesthetic inlays and onlays are not new anymore.

They have a track record, and it is good.⁴⁻⁹ With today's materials, longevity is mainly a matter of diagnosis, correct treatment planning and proper execution of technique (Figs. 1-4).

Although not aesthetic, well-done gold inlays and onlays are considered to have a proven durability and longevity similar to crowns. If aesthetics is not an issue, gold is still the standard and what I always recommend for second molars when a conser-

vative indirect restoration is indicated. However, it's interesting to note the number of people and the types of people who still desire tooth-coloured or non-metal restorations even in these teeth.

Reason No. 5: Posterior direct resin restorations are less costly to the patient and can be completed in one appointment.

It is a fact that more and more patients today are selecting tooth-coloured restorations for their posterior teeth,¹⁰ and there is no question that well-placed Class I and Class II direct resin restorations are proving to be viable alternatives to amalgam.^{11,12} However, the indications for these restorations do have limits.

Generally, when the cavity is large or the tooth is under excessive functional demand (heavy bruxer or clencher), indirect restorations (resin or ceramic) are indicated. Certainly, when a cusp is missing, many clinicians feel the standard of care is best satisfied by an indirect restoration (Figs. 5-10). After all, there is no question that a laboratory technician working with mounted models at the bench is going to provide a more accurate occlusal morphology, contact and overall contour as well as properly located functional stops of the right intensity than we can by grinding all the blue spots in the mouth. It's also very

Fig. 3 Failing amalgam and poor contact due to tipped teeth.

Fig. 4 Indirect resin composite inlays at 21 years.

Fig. 5 Recurrent caries evident in both molars.

Fig. 6 The second molar was treated with a direct composite resin restoration. It was thought that a better contact, cuspal contour, occlusal morphology, and correctly placed functional stops could be achieved in the first molar with an indirect approach.

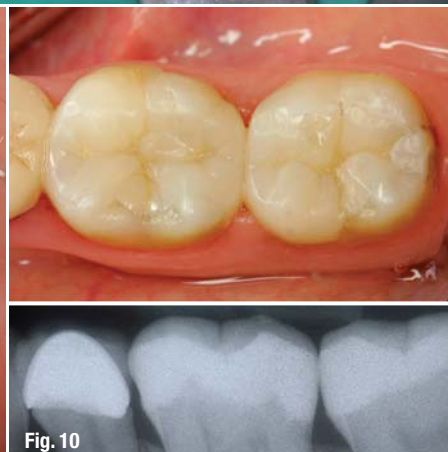


Fig. 7 Molars with failing restorations and recurrent decay.

Fig. 8 Both distal cusps of the first molar were onlayed due to a horizontal crack in the middle of the pulpal floor that stopped halfway across. The distal buccal cusp of the second molar was onlayed due to a crack on the pulpal floor at the base of the cusp.

Fig. 9 This 44-year-old patient was pleased that crowns could be avoided and no sound healthy tooth structure was unnecessarily removed.

Fig. 10 Indirect resin composite onlays at four years. Note contacts and marginal integrity at gingival margins as seen on the radiograph.

difficult to achieve quality contacts in large restorations with poor tooth alignment or spacing.

No matter how good the direct resin materials get, the above situations will usually be better served by indirect restorations in the same way that gold inlays/onlays are considered superior to large amalgams, especially those that replace cusps.

Reason No. 6: Many third-party payment plans don't pay benefits for aesthetic inlays and onlays, but most pay a benefit toward porcelain-fused-to-metal crowns.

In a health care profession, it shouldn't be necessary to even respond to such a statement, but I will. If a properly informed patient would rather sacrifice healthy tooth structure to save a few dollars or for a

perceived greater longevity, well, that's his or her choice. It may be what that patient feels is best for himself or herself at that time. The operative words, however, are 'properly informed' (pros vs. cons) and 'his or her choice.' We shouldn't make the choice for a patient based on an assumption that all patients want the cheapest option or what their insurance will partially pay for.

In conclusion, for many dental practices, offering only low-cost (at least initially), large fillings or expedient crowns where they may not be the best our profession has to offer, is questionable and short-sighted. The bottom line in dentistry today, as it always has been, is to recommend treatment, which according to the clinician's professional judgment, is in the patients' best interest. This is usually what the clinician would select if he or she were the patient. The patients may not always want that particular service and decline to have it done, but they always deserve the choice.

The trend in dentistry is clearly toward more aesthetic and less invasive. Indirect resin and ceramic inlays and onlays are not only compatible with this trend, but fulfil very nicely the restorative void between fillings and crowns.

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

_author info

Dr Ron Jackson has published many articles on aesthetic and adhesive dentistry and has lectured extensively across the United States and abroad. He has presented at all the major US scientific conferences. Dr Jackson is a fellow in the American Academy of Cosmetic Dentistry, a fellow in the Academy of General Dentistry and is director of the Advanced Adhesive Aesthetic Dentistry and Anterior Direct Resin programmes at the Las Vegas Institute for Advanced Dental Studies. He maintains a private practice in Middleburg, VA, USA, emphasising on comprehensive restorative and cosmetic dentistry.



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CAD/CAM

was just the beginning

Author_ Manfred Kern, Germany

Today, practising dentistry without digital technology and CAD/CAM procedures is unimaginable. Intra- and extra-oral imaging, scanning of antagonists and impressions, on-screen 3-D designing, the use of innumerable tooth shapes from the tooth database, the design of anatomic occlusal surfaces, functional articulation on virtual models, subtractive processing of high-performance ceramics—none of this would be possible without the use of computers.

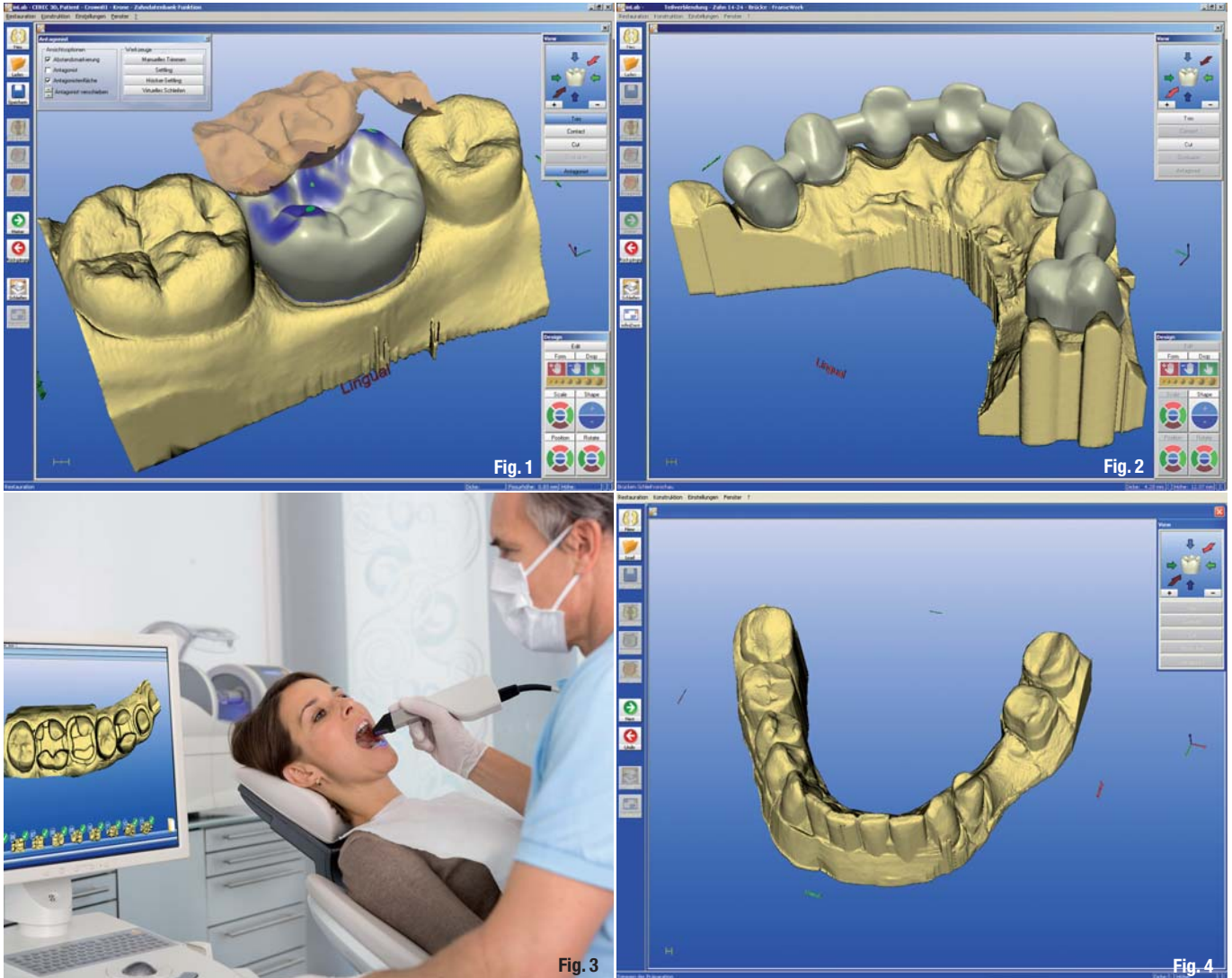
The groundwork for this quantum leap in dental technology was laid in 1985. Using a Fairchild video sensor (which at the time was only used for military purposes and for which special permission was required for use in dentistry), for the first time it was possible for a preparation—made visible intra-orally with a triangulation camera—to be measured multidimensionally and transferred onto a screen. Then, with the help of a PC, imaging software, and a connected CNC grinding unit, the first inlay of silicate ceramic was produced at the University of Zurich.

In those days, only a few could imagine the new technologies and revolutionary treatment possibilities awaiting dentistry thanks to this development. Since then, more than 28 million all-ceramic restorations have been produced worldwide using CAD/CAM technology, both chairside and in the dental laboratory. Computerised milling machines have made subtractive processing of glass- and oxide ceramics possible from which to fabricate aesthetic, high-quality restorations with a reproducible, consistent material quality at a reduced cost.

Relatively recently, discussion was centred on accuracy of fit, cost-effectiveness, and user-friendliness. The quality of CAD/CAM restorations was viewed critically, and only a few leaders in the field investigated this technology with scientific rigour. Currently, the initially hesitant, and even sceptical, attitude towards computer-manufactured dental prostheses has been replaced by one of approval, and this technology has become a standard procedure.

From a technical point of view, the development of 3-D image capture was propelled not only by more powerful microprocessors, but also by CCD image sensors with high-resolution photodiodes, as well as optical and tactile scanners that help read and upload preparations and models to the software. Laser scanners provide an impulse capacity for reproducing tooth surfaces at a rate of thousands of measured points per second. Upgraded CAD software with 3-D graphics applications receives the digital signals and recreates the clinical surface needing restoration.

Using 'occlusal settling' with preformed occlusal surfaces from the tooth databank, the software then virtually rebuilds the tooth surface. The cusps of the occlusal surface are 'settled' into their occlusal position. An articulation programme takes the occlusal characteristics of antagonists and the adjacent teeth's occlusal surfaces and creates a contact-point pattern that fulfils the criteria of the individual function. An acquired, regional functional generated path registry detects sites that interfere with the gliding space and reduces them automatically (Fig. 1).



The impetus for this development in dental technology stems from two sources. The first was protagonists of computerised chairside restoration desiring to process an industrially fabricated ceramic with defined physical properties directly at the treatment unit (chairside) and provide the patient with the definitive restoration (omitting temporaries) in one appointment. The second was the idea of employing oxide ceramics, like ZrO_2 , for crown- and bridge frameworks, by using CAD/CAM technology or digitally controlled milling techniques.

Other ceramics, such as lithium disilicate, also exhibit better properties after mechanical processing, as the blanks used are industrially manufactured under optimal conditions. In addition, the technology of CAD/CAM systems has been substantially improved. In the 1990s, computers became more powerful and measurement methods more effective, making it possible to adapt 3-D data acquisition systems to the needs of dentistry and simplify equipment handling. The evolution of CAD software enabled the development of a variety of

construction possibilities and improved the quality of grinding/milling units (Fig. 2). Cost-effectiveness and high-quality restorations are the defining characteristics of CAD/CAM technology. Dentist and dental technician alike profit from this through standardised and controlled treatment and manufacturing processes—and so does the patient. Today, approximately 82 per cent of all-ceramic restorations in Germany are made using computer technology, which indicates that CAD/CAM technology is establishing itself in dental offices and laboratories. The next step in its evolution is now anticipated.

Where do we stand today?

New methods constantly change customary processes, and advancements simplify the workflow. This is reflected in the increased mention of construction models, articulation on a Windows interface, biogenic occlusal surface design using intelligent software, rapid prototyping, and 3-D printing in the context of CAD/CAM in scientific

Fig. 1 Virtual automatic reconstruction: the scan data of the antagonist, the functional movement, the adjacent teeth, and the preparation can be taken into consideration in their entirety to design an occlusal surface that fits according to all requirements.

(Image: Mehl)

Fig. 2 CAD construction of a wide-spanning ZrO_2 bridge framework. The system examines the connectors for minimum thickness and load-bearing capacity.

(Image: Mehl)

Fig. 3 Individual intra-oral images are anatomically correct, as they are compiled in a virtual quadrant model.

(Photo: Sirona)

Fig. 4 The intra-oral camera scanner enables an optical impression of the entire maxilla or mandible, leading the way for the impression-free practice.

(Image: Wiedhahn)



Fig. 5

Fig. 5 Milling centres have an ingenious quality-control system for processing ZrO₂ ceramic for crown- and bridge frameworks.

(Photo: Etkon-Straumann)

Fig. 6 Milling centres operate cost-effective and according to standardised manufacturing procedures.

(Photo: Heraeus Kulzer)

Fig. 7 Automatic reconstruction of inlay cavities. Top: undamaged original tooth; centre: cavity; bottom: occlusal surface automatically reconstructed given only the remaining tooth substance (centre).

(Image: Mehl)

publications. The impression-free practice is the latest step in this development. At IDS 2009, the use of intra-oral 3-D measurement to, in part, make the impression-free practice possible will be demonstrated (Figs. 3 & 4). With data from an intra-oral image sequence, e.g. of a quadrant, working models can be produced using a wax-processing 3-D printer in a rapid prototyping system, on which prostheses can be manufactured conventionally or with CAD/CAM.

Via internet portals, the dentist can send optical impressions from intra-oral scans to the dental technician, which are then fed into the stationary CAD system. The impression-free practice is much more comfortable for patients because impression-taking and its incident gag reflex are eliminated. Addition-

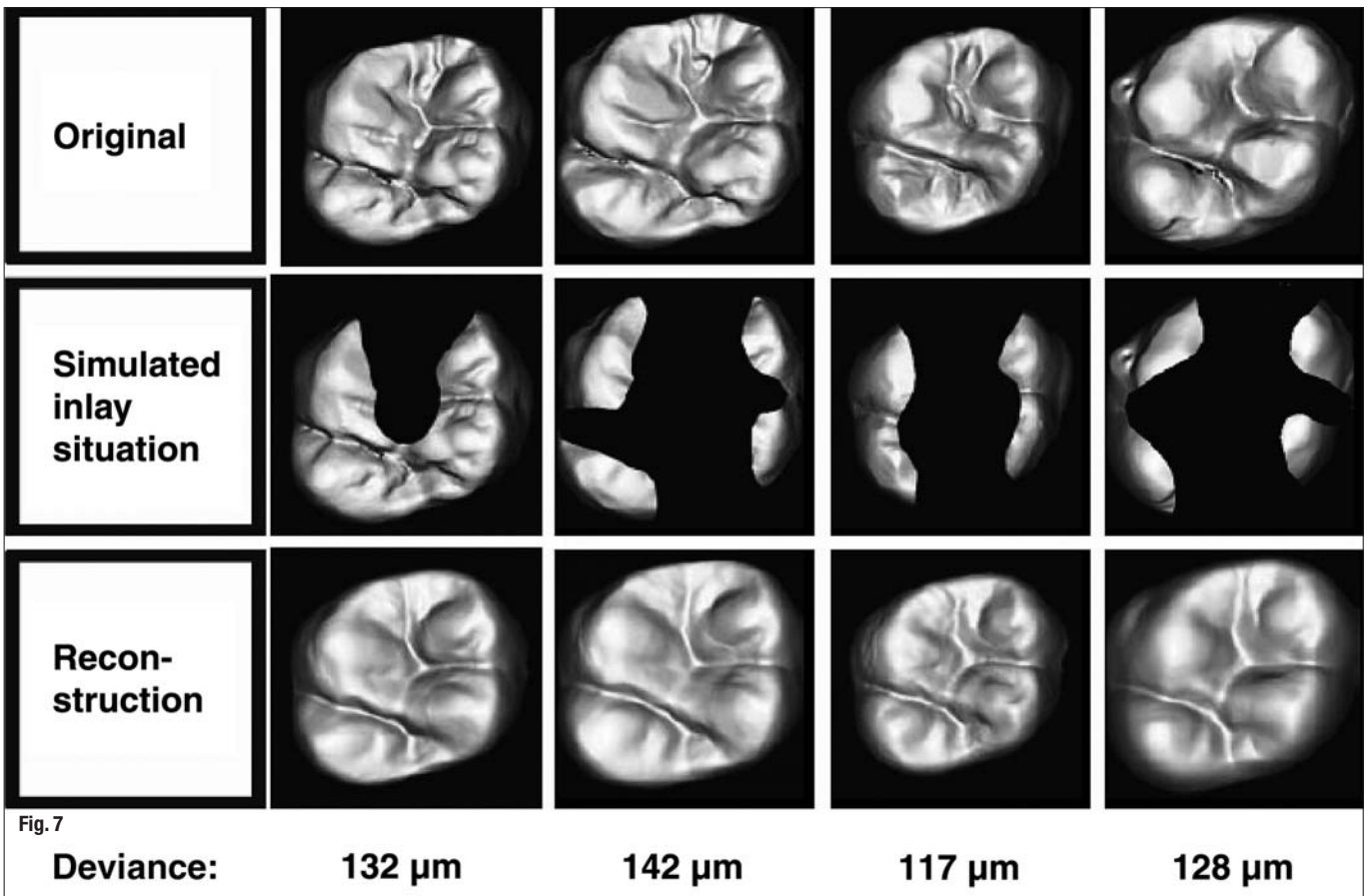


Fig. 6

ally, production time can be cut and the dental technician's productivity increased considerably.

What is the future of CAD/CAM?

Those long familiar with the field were able to predict early on that manufacturing centres would play a crucial role: high efficiency, specialised personnel, centralised material purchasing, and high quality standards for the 'standard restoration' enable an efficient output that in turn makes it possible to pay off investments in high-tech manufacturing machines, while increasing cost-effectiveness (Figs. 5 & 6). Mid-sized and smaller dental laboratories will make best use of their core competency in the computer-supported manufacture of high-quality



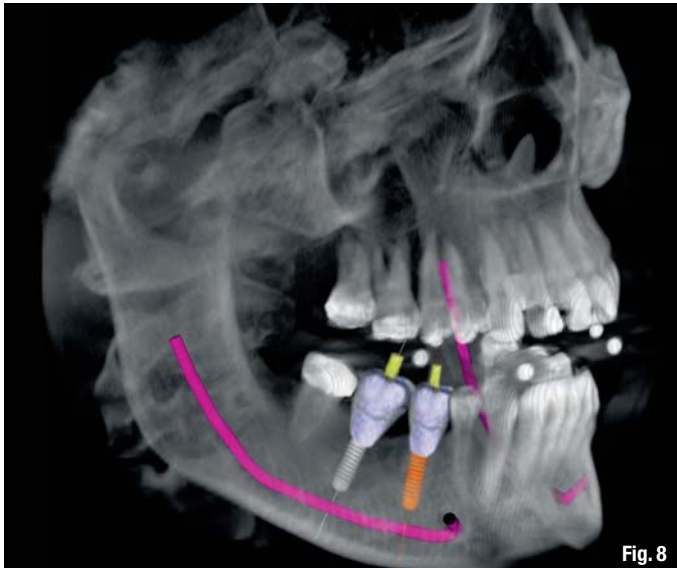


Fig. 8

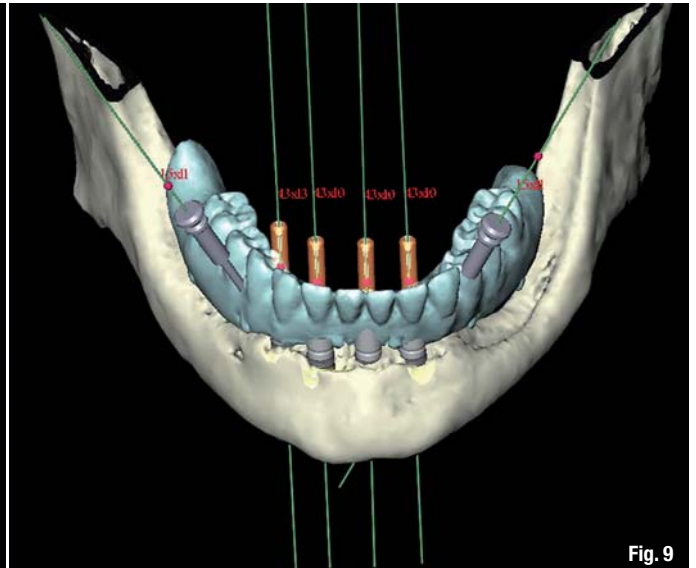


Fig. 9

aesthetic restorations and in the specialised production of partial and implant-supported prostheses.

Another trend is the computerised fabrication of inlays, onlays, and partial and single crowns, either chairside or in the office's own CAD/CAM-equipped laboratory. Biogeneric occlusal surface design enables the reconstruction of the missing occlusal surface with inlays, onlays, and partial crowns as naturally as possible (Fig. 7). The one-appointment treatment saves the patient time and removes the need for provisional restoration, which minimises the risk of cusp fracture, enamel-margin chipping, and weakening of the dentine bond.

CAD/CAM and all-ceramics are frequently mentioned together, which falsely implies that CAD/CAM is limited to all-ceramics. The enormous potential inherent in the milling and, most recently, the laser sintering of metals is often completely overlooked. The fabrication of metal restorations (e.g. non-precious metals and titanium) will eventually become a domain of CAD/CAM technology.

In the field of implantology, it is already possible to create long-term provisional restorations, abutments, and crowns using computer-assisted methods, which also shorten treatment steps. Digital volume tomography (DVT) yields a 3-D image of the bone structure, thus enabling much higher quality diagnosis, including the exact localisation of the alveolar nerve. Particularly in dental arches bearing partial prostheses, the DVT image quality is better than that of CT images, and the X-ray dosage required is much lower. The DVT thus provides the basis for the surgical planning of the implant.

In the future, the implant site and adjacent teeth will be scanned with an intra-oral digital camera, and

a virtual model will be calculated. The 3-D volume tomogram will be superimposed on this model and the crown will then be exactly positioned in the X-ray image (Fig. 8). The position of the endosseous abutment will be suggested in the centre of the crown's basal surface and in its insertion pathway, and based on this the situation will be examined for its surgical feasibility. When selecting the implant system for a given case, the case will be able to be completely simulated in a three-dimensional radiograph. Using special software, it will soon be possible to construct a stereolithographically manufactured drilling template, which will guarantee that the holes drilled in the bone and the implants are exactly positioned (Fig. 9).

The demands of CAD/CAM technology have inspired topics in basic research and hence propelled progress in other areas of dentistry too. Universities and industry can collaborate and thereby promote and shape these exciting developments. Thus far, CAD/CAM or computerised dentistry has not been a central area of interest at universities. But as CAD/CAM technology is relatively new and its performance potential is significant, this is likely to change in the next few years. In turn, this development will influence dental education curricula and thereby influence treatment options in private practices to the benefit of our patients.

Fig. 8 DVT image with superimposed suprastructure to determine implant position.

(Image: Bindl/Sicat)

Fig. 9 Special software will help construct a stereolithographically manufactured drilling template for exact positioning of drilling holes and implants.

(Image: Nobel Biocare/Geiselhöringer)

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A smile says more than a thousand words: Reconstruction & modification of anterior teeth

Author_ Ronaldo Hirata, Brazil



Fig. 1

Fig. 1 _Initial situation: worn incisal edges, enlarged interdental spaces, and aesthetic shortcomings.

_Ceramic veneers and direct composite build-ups present the two most popular treatment options in modern dentistry for modifying anterior teeth; both attain a harmonious aesthetic appearance and re-establish an anatomically correct form and proportion of incisor teeth. Ceramic veneers necessitate tooth preparation, which in most cases involves the reduction of tooth structure. Hence, ceramic veneers are categorised as irreversible dental treatments. The progress achieved in the field of dental adhesives and the continued improvement of the mechanical and optical properties of dental composites have opened up new possibilities in restorative dentistry. It is now possible to fully restore the aesthetic appearance and function of anterior teeth that have lost their original length due to parafunctional habits or physiological abrasion, using resin-bonded composite restorations. Careful treatment planning is, however, essential for keeping the reduction of healthy tooth structure to a minimum.

Direct composite build-ups provide a treatment method for rebuilding worn anterior teeth, if the treatment is accurately planned and performed. This is particularly important if anterior guidance has to be

established or if a guard splint has to be produced upon completion of the restorative treatment. This article describes the reconstruction of anterior teeth with a nano-optimised hybrid composite material.

_Case report

A male patient presented with abraded anterior teeth. The abrasion was caused by para-functional habits, resulting in a loss of canine and anterior guidance. In addition, the aesthetic appearance was compromised (Fig. 1). As a large portion of healthy tooth structure was still present, we opted for a minimally-invasive treatment method using composite material. In addition, this method would allow us to restore the teeth with ceramic veneers at a later stage, should this become relevant.

Initial treatment planning is best carried out on the basis of digital images of the patient's situation, providing the dentist and the dental technician in charge of producing the wax-up with all the necessary information. A silicone key was prepared from the wax-up and used to fabricate a mock-up. In addition, the silicone key provided a spatial reference for the composite build-up. The dentition was bleached before commencing the restorative treatment. As a result, a consistent tooth shade was established before the aesthetic intervention was started.

The appointment for restoring the teeth was scheduled for two weeks later—this is the minimum interval that should be observed between the bleaching process and restorative treatment, to ensure a firm bond to the tooth structure and a stable tooth shade, which is essential to accurate shade selection. As the existing restorations exhibited hardly any defects, only those portions that were close to the surface were removed.



Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6

If existing restorations demonstrate an acceptable shade and tight restoration margins, repairing them is often the best solution.

Relative isolation may be sufficient in conjunction with cosmetic treatment in the anterior region. In the present case, untreated retraction cords were used.

Two points have to be considered when restoring anterior teeth with composite materials: first, the restorative treatment should start with the central incisors, and second, the central incisor that shows the least damage, i.e. is closest to the ideal final result, should be restored first. Restoring several teeth simultaneously may lead to problems in the proximal region, such as inappropriate proximal contact areas.

The prepared surfaces were etched for 30 seconds using the total etch technique. Next, Tetric N-Bond was applied and light-cured for 20 seconds (Fig. 2). If a silicone key is sited, composite stratification is started in the palatal area, for which a translucent shade is utilised. In the present case, Bleach I (Tetric N-Ceram) was applied. The composite was placed in a very thin layer in order not to impair the subsequent reconstruction of the incisal edge (Fig. 3). After the material was light-cured for 20 seconds, the dentin core was rebuilt using a shade that offered an appropriate level of opacity and saturation. In the present case, Tetric N-Ceram A3.5 Dentin was applied and light-cured for 20 seconds. An opaque halo effect resulted. This thin visible line is produced regardless of the patient's age or degree of tooth abrasion. The halo effect is caused by the variation in the arrangement of vestibular and lingual enamel prisms. For this purpose, Tetric N-Ceram in shade A3.5 Dentin was utilised. The same shade was also used to rebuild the dentin body. Since this material was applied in only a thin layer, light-curing for 20 seconds was sufficient to achieve an optimum depth of cure.

Next, the incisal effects were recreated using Bleach I (Fig. 4). The same shade was used for the reconstruction of the palatal surfaces. This material provides a slightly bluish translucent effect and thereby enhances the degree of translucency and accentuation in this area. After the incisal and palatal surfaces were rebuilt, Tetric N-Ceram A2 was applied to the entire surface in the vestibular region. The material was applied in slightly thinner layers in the marginal and incisal areas, to save space for the application of an incisal material with a higher degree of translucency. This method enhances the passage of light and slightly reduces the colour saturation of the basic material. Here, Tetric N-Ceram T was utilised for this purpose.

Before final light-curing, the composite surfaces should be covered with a thin layer of glycerine to prevent the formation of an oxygen-inhibited layer and to

Fig. 2 Tetric N-Bond adhesive is applied to the central incisor after etching with phosphoric acid.

Fig. 3 The incisal edge is built up with translucent composite material (Tetric N-Ceram Bleach Incisal) with the help of a silicone key, which has been fabricated based on the wax-up. After this layer has been light-cured, dentin material (Tetric N-Ceram A3.5 Dentin) is applied.

Fig. 4 After special effects have been applied, the incisal edge is rebuilt using a specially designed spatula (OpraSculpt).

Fig. 5 After the first incisor has been built up, the proximal contact areas are roughly contoured to facilitate the subsequent re-establishment of adequate contact areas.

Fig. 6 The same procedure is used to build up the other teeth. After restoring the central incisors, the lateral incisors and canines are reconstructed.



Fig. 7_ The restorations are polished with Astropol.

Fig. 8_ The surface texture is rendered visible with ceramic powder. Shortcomings and inadequacies are now easily identifiable and can be corrected if needed.

Fig. 9_ Completed restoration of the aesthetic anterior region.

ensure complete curing of all layers including the top layer. The goal of the layering technique is to pre-empt work-intensive adjustments and to keep the shape of the restoration close to the original. Polishing discs were employed for contouring of the occlusal outline and vertical dimension of the mesial contact areas (Fig. 5).

Tooth 21 was the second incisor to be restored (Fig. 6). The same technique used for the restoration of the first central incisor was employed. Here, particular care was given to the reconstruction of the contact areas between the two incisors. For this purpose, the restoration was first built up with shades A2 and T until contact with the first restoration was established. At this point, the build-up was light-cured, the proximal surfaces were separated, and composite material was applied from the palatal to the vestibular surface by means of a transparent matrix. After the central incisors were restored, the lateral incisors and canines were reconstructed according to the same principles. After all composite build-ups had been completed, the restorations were finished and polished. Further details may be applied at a later appointment, if desired. First, the occlusal outline and marginal ridges were finished using polishing discs. Here, it is important to pay attention to providing mirror-image symmetry. In other words, the distance between the marginal ridges of a central incisor should not only be physically symmetrical, but the distance should also be optically the same in relation to the other incisor in what is known as symmetrical virtual width. Vestibular lines and depressions can be created with spiral-

shaped diamonds (Jota) and a T2 Revo R170 angled hand-piece (Sirona).

The 3-step polishing system, Astropol, allows the restorations to be polished to an optimum surface finish. Finishing is carried out with silicone finishers (Astropol, grey finishing cup) (Fig. 7). The Astropol set is used directly on the composite surfaces in conjunction with indirect water cooling (from a rotating instrument or multifunctional syringe with water spray); a polishing gel or paste is not necessary. Polishing should be performed with intermittent movements, which can be easily accomplished with silicone rubber polishers. The grey finishers facilitate the finishing process considerably. The green Astropol polishing cups are used to polish the surfaces, providing a very smooth surface finish.

In some cases, it is necessary to apply additional surface characteristics to the labial surface. A variety of options is available for this purpose. In the present case, a spiral-shaped diamond was utilised to apply irregular, frequently interrupted lines of varying depths mainly on the central third of the incisor (the lines can be marked in pencil before they are cut). The lines are clearly visible. After having been cut, they were levelled off with grey finishing tips (Astropol) without, however, eliminating them. The pink polishers (Astropol HP) were subsequently utilised for high gloss polishing. The resulting surface texture, marginal ridges, and mirror surfaces can be viewed more clearly by dusting dry ceramic powder onto the restorations. After the surfaces had been examined, the powder was removed with oil and water spray (Fig. 8). Final polishing was carried out with aluminium oxide polishing pastes.

Conclusion

Direct build-ups of composite restorations are suited, in selected cases, to re-establish the aesthetic properties and function of worn, aesthetically displeasing anterior teeth. It is however important to select a composite that offers appropriate optical and mechanical properties. In the above clinical case, a group of anterior teeth were aesthetically restored with the Tetric N-Ceram nano-hybrid composite system (Fig. 9).

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Nobel Biocare adds to its NobelActive implant system



_LOCATOR attachments and GoldAdapt abutments are Nobel Biocare's two new additions to its NobelActive implant system. They were both developed by the company in response to customer demand, further expanding clinicians' treatment options.

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The Asian Academy of Aesthetic Dentistry: A brief history

Author | Seok-Hoon Ko, Korea

This year, the Asian Academy of Aesthetic Dentistry (AAAD) is celebrating its 20th anniversary. In honour of this, I would like to present an overview over the Academy's history. We are pleased to have this article appear in cosmetic dentistry beauty & science Asia Pacific Edition, which was recently named an official publication of the AAAD.

The beginnings

Twenty years ago, leading dental professionals from Korea, Japan, and Singapore met to lay down the foundation of the AAAD. The purpose of the Academy was to popularise and advance the practice of aesthetic dentistry and to encourage research in the field.

The first business meeting took place on 25 April 1989 in Seoul in Korea, which the following representatives from Japan, Korea, and Singapore attended: Dr Seok-Hoon Ko, Dr In-Chool Park, Dr Seok-Kyun Kim, Dr Toru Matsuo, Dr Peter Tay, and Dr Chee Peng Sum.

At this meeting, the parties agreed that Academy membership was to be based on personal invitation to prospective members via the Academy's representatives in various countries. A copy of the proposed constitution was circulated and following modifications, it was unanimously accepted. Furthermore, the venue for the first scientific meeting was decided upon and was to be held in Singapore, while Korea was to host the second one.

The second business meeting took place in Hong Kong on 15 January 1990. At this meeting, it was evident that the AAAD had the key to promoting aesthetic dentistry in the Asia Pacific region and was increasingly attracting membership from other countries.



**THE ASIAN ACADEMY OF
AESTHETIC DENTISTRY
EST. 1990**

With Prof Stephen Wei (Hong Kong) as the chairperson, the following representatives were present: Dr Gerald Chow (Hong Kong), Prof Sison Renato (Philippines), Prof Joo-Loon Lui (Malaysia), Dr Ko (Korea), Dr Park (Korea), Dr Kim Choy Low (Republic of China), Prof Takao Maruyama (Japan), Dr Sum (Singapore), and Dr Tay (Singapore). Unfortunately, Dr Choung Min Lin (Republic of China), Dr Lucas Kustarjo (Indonesia), and Dr Matsuo (Japan) were not able to participate.

The growth and development of the AAAD since its inception called for a comprehensive constitution, which was the major item on the agenda for the second business meeting. At this meeting, concerns regarding the inadequacy of entire sections in the constitution were raised.

Dr Ko proposed that a constitutional and by-law review subcommittee be set up to address the matter. The Constitutional Review Committee consisted of Prof Wei, Dr Ko, Prof Renato, and Dr Sum.

_The first scientific meeting

On 8 September 1990, the AAAD held its first scientific meeting in Singapore, at which the latest developments and practice in aesthetic dentistry were promoted and shared with the help of well-known speakers from various backgrounds. The meeting now takes place biennially and is a forum for dental professionals working in aesthetic dentistry.

Guest speakers at this meeting were Dr Patrick Henry (Australia), Dr Dominic Leung (Singapore), and Dr Jan Pameijer (Holland). In addition, Dr Hisashi Hisamitsu, Prof Maruyama, Dr Kunihide Terakawa, and Dr Masahiro Naito from Japan; Dr Kim, Dr Park, Dr Ko, and Dr Kwang-Woo Baek from Korea; Dr Kim Choy Low and Dr Choung-Min Lin from the Republic of China; Prof Lui and Dr Booi Cie Ling from Malaysia, as well as Dr Sum and Dr Jennifer Neo from Singapore were invited to speak at the meeting.

The following board members were elected to ensure progressive and dynamic management of the AAAD:

President:

Prof Jae-Hyun Lee (Korea)

President-elect:

Prof Takao Maruyama (Japan)

Vice-president International:

Dr Seok-Hoon Ko (Korea)

Vice-president Membership:

Dr Choung Min Lin (Republic of China)

Secretary/Treasurer:

Dr Peter Tay (Singapore)

Deputy Secretary/Treasurer:

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Dr Lucas Kutarjo (Indonesia),

Dr Hisashi Hisamitsu (Japan),

Dr In-Chool Park (Korea),

Prof Booi-Cie Ling (Malaysia),

Dr Kim Choy Low (Republic of China),

Prof Sison Renato (Philippines),

Dr Peter Tay (Singapore).

dentistry than simply creating a smile. Various factors and contributions from different areas of aesthetic dentistry play a role and must be combined to achieve a truly beautiful smile. That is where the AAAD found its niche, serving as a worldwide hub for leaders in aesthetic dentistry to stimulate the exchange of ideas and raising of relevant issues to make a major contribution to aesthetic dentistry.

_Dr Michio Haga

(Japan) 1989–1990

_Prof Jae-Hyun Lee

(Korea) 1990–1992

_Prof Takao Maruyama

(Japan) 1992–1994

_Dr Choung Min Lin

(Republic of China) 1994–1996

_Dr Peter Tay

(Singapore) 1996–1998

_Dr Sandesh Mayekar

(India) 1998–2000

_Dr Seok-Hoon Ko

(Korea) 2000–2002

_Dr Toru Matsuo

(Japan) 2002–2004

_Dr T.C. Phua

(Singapore) 2004–2006

_Dr Robert Dharma

(Indonesia) 2006–2008

_Dr Sim Tang Eng

(Malaysia) 2008–2010

_Dr Hisashi Hisamitsu

(Japan) 2010–2012

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Dr Seok-Hoon Ko, DDS (Seoul), MS (Michigan), MS (Michigan), was a founding member and Past President (1997–2002) of the Korean Academy of Esthetic Dentistry. He was also a founding member and Past President (2000–2002) of the AAAD, for which he dedicated himself to further the development of aesthetic dentistry in Asia. He also held the position of President (2006–2007) of the International Federation of Esthetic Dentistry. He served as Editor-in-Chief of the Asian Journal of Aesthetic Dentistry (2002–

2007) and is the scientific advisor for **cosmetic dentistry** Asia Pacific Edition. From the start, Dr Ko has devoted himself to creating the most favourable academic environment for aesthetic dentists, an environment which fosters young dentists to become leaders in the field of aesthetic dentistry.

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_AAAD presidents

Since its foundation, the AAAD has prided itself on its past and upcoming presidents, who have devoted themselves to the Academy and its goals and showed exceptional leadership in contributing to the development of the Academy. There is more to aesthetic

Products designed **for** dentists **by** dentists

An interview with Cosmedent Inc. co-founders Michael O'Malley & Dr K. William 'Bud' Mopper



The company's co-founders: Michael O'Malley (Cosmedent President, left) and Dr K. William 'Bud' Mopper (Cosmedent Chairman and CEO, and Director of The Center for Esthetic Excellence).

_cosmetic dentistry: *Back in 1982, some 25 years ago, Cosmedent opened an office in Chicago. Here you began to offer the first hands-on training and lectures devoted to composite resins. What were you both involved in at the time and what was the impetus behind this decision?*

Mr O'Malley: I was working for a dental consulting company when I met Buddy in 1980 to consult with him on one of his dental practices. Buddy and his friend, Dr Norman Feigenbaum, were lecturing on the use of the new composite materials for aesthetic dentistry. Over dinner, the three of us agreed to start an educational company dedicated to sharing our enthusiasm and

knowledge of composite dentistry and showing dentists the remarkable things these materials could do for dentistry—for both the patient and the dentist. In the earliest days we published *The Forum of Esthetic Dentistry*, a newsletter that promoted a dialogue among the first users of composite resins. We also continued to lecture across the United States and Canada, showing clinicians the vast possibilities of direct resin bonding as both a restorative material and a cosmetic procedure.

Dr Mopper: In 1982, there was a total lack of reliable information about how to use composite materials. I was lecturing around the country showing dentists how to get the best results with these versatile materials. As a practicing dentist working with these materials everyday, I realised that direct resin bonding offered the dentist an opportunity for a rewarding personal experience making patients feel better about themselves as well as a way to significantly increase their office revenues. This was the main reason that I became such an enthusiastic advocate of using composites in dentistry.

There is a saying that goes, "Necessity is the mother of invention." In the case of Cosmedent, this applies to dentists as your products are created to meet their needs. You also clearly state that your products are "designed for dentists by dentists." Can you elaborate on how this process works in the company?

Mr O'Malley: Cosmedent has working relationships with many dentists who come to us with innovative ideas they would like to bring to the marketplace. These ideas are evaluated by our product development team of dentists and chemists. A royalty is paid once the product has been successfully developed.

Dr Mopper: The process works in this company by taking ideas and using them in practical application. Products are evaluated on a clinical basis considering ease of application, durability and final results. Cosmedent products stand the test of time because of their chemistry and quality control.

Would you explain how the Center for Esthetic Excellence (CEE) functions and what it offers?

Mr O'Malley: The CEE focuses on teaching what we know best—how to work with modern resin materials to accomplish beautiful aesthetic results. Classes are small, limited to 15 dentists, so there is always a lot of individual attention to problem solving and teaching current dental techniques. A hands-on experience is included with each class.

Dr Mopper: The CEE is dedicated to teaching the bonding experience better than any other facility in the country. For those who want to learn the artistry of direct resin bonding, the CEE is the place to come. We consider ourselves a very motivational institution; we motivate clinicians to increase respect for themselves when they acquire the skill to be dental artists. Because cosmetic dentistry is not a part of the curriculum in dental schools, the CEE fills this void in the educational system and gives dental professionals a place to focus on current aesthetic techniques.

Cosmedent's Renamel Microfill has been the No. 1 rated composite for a remarkable 17 years and it also has received REALITY's Product of the Year award three times. Now you have expanded this line to include Renamel NANO. Would you tell me about this new product?

Dr Mopper: Cosmedent had a nano composite from the beginning of the company. Renamel Microfill was the first true nanofill resin and continues to be recognized as the No. 1 composite in dentistry. Renamel NANO was recently developed with the handling properties and aesthetics of a microfill and the strength of a hybrid, combining many of the best qualities of these products in a single use composite. Renamel NANO will provide excellent restorative results in all types of aesthetic restorations, both anterior and posterior. Our Renamel NANO is also completely integrated to the Renamel Restorative System for dentists who prefer to use a layering technique.

Mr O'Malley: Over the years we noticed a need in the marketplace for a universal composite that not only handled well, but also performed aesthetically. Renamel NANO was really born out of

this need. Renamel NANO was designed for the dentist who wants to use just one composite, but does not want to sacrifice on the end aesthetic result.

Would either of you be willing to share with me some pearls of wisdom you have learned after 25 years?

Dr Mopper: "Don't believe everything you read." If I had believed all of the early negativism surrounding composite dentistry, I would never have experimented with these materials and realised how they would change dentistry and my life forever. "You never get more satisfaction out of dentistry than what you do yourself." When you work directly with composite resin you feel a higher sense of gratification. This is your chance to really shine as a dentist as well as an artist. You can be as creative as you choose to be while remaining fresh and innovative. It will not take long for you to realise the effects composite has on your confidence, your patients smile and your office revenues. "A dentist who improves a smile gives a gift both to the patient and himself/herself."

Mr O'Malley: I really share the same pearls of wisdom as Buddy. "Don't believe everything you read." Despite the popularity of cosmetic dentistry, there are still a lot of misrepresentations and faulty product claims circulating in the industry. Consumers are overloaded with information, making it very difficult to recognise what is real and what is not. It is therefore always important to ask questions, stay open-minded, and always think for yourself. "You never get more satisfaction out of business than what you do yourself." Although starting a business involves a lot of hard work and an extreme time commitment, there is nothing more satisfying. The excitement Buddy and I share towards our products and contribution to dental aesthetics extends far beyond anything I could have imagined. "Nothing spreads joy better than a smile." I have seen countless lives improve after a smile makeover. A beautiful, real smile radiates from the inside out. I am very proud of the role that Cosmedent played in fostering the success, innovation and growth of the cosmetic dental field.

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Naxos — life, the Greek way

Authors & Photographers_ Annemarie Fischer & Daniel Zimmermann, Germany

_The old landlady is waving to visitors from afar. In Lionas Bay, however, no further invitation is needed to indulge in dolmades and tsatsiki, followed by a serving of grilled fish. During the off season, the remote beach strip in the northern part of Naxos is only inhabited by a dozen people, all making their living at the local taverns. The few visitors, who stray from the main roads and wander down the narrow, dusty path, are treated to a delicious meal and homemade wine bottled in plastic water bottles—one of the many provisional arrangements you are certain to fall in love with.

Upon exploring the Hellenic civilisation, the famous German writer Johann Wolfgang von Goethe remarked: "Of all peoples, the Greeks have dreamt the

dream of life best"; on Naxos, this dream is still much alive. According to the myth, Dionysus and Ariadne were married here. Like the gods, the island combines opposites that make it attractive: white sandy beaches cover the southern coast, while sparse mountain ranges and solitary villages dominate the northern regions. Roman Catholic and Greek Orthodox churches along massive Venetian castles and Hellenic cult sites tell of the island's multicultural history. Greeks, Persians, Italians, and Turks long fought for dominance in the Aegean, and only since 1832 has the island been part of Greece.

Naxos lures locals, as well as tourists, with a more peaceful ambience nowadays. Visitors are greeted by the iconic Portara, the entrance to an unfinished



temple from the 5th century BC. Although Chóra—as the capital is called by locals—has an airport, most visitors take the ferries that leave from Piraeus in Athens three times a day. On the airy decks, weekenders unite with backpackers and Greek grandmothers, who occasionally feed tourists with cookies and fruit. Security instructions should always be followed, since the ferries here tend to be overcrowded. Only recently have ferry workers protested against their poor working conditions.

With an area of 500 square kilometres, Naxos is the largest island of the Cyclades; yet, it managed to resist the mass tourism that swept through Greece in the 1980s and 1990s. As a result, you will not be able to find resorts or big holiday complexes that are common on other islands, like Crete and Rhodes. Instead, the island offers a vast number of decently priced apartments that will make you forget the buffet when you can enjoy breakfast on your sea-view balcony.

The tourism business has brought moderate wealth to Naxos, which was formerly known only for its marble mining industry and its excellent citrus liqueur.

There is plenty to explore on the island: the still intact, picturesque Castro in Naxos-City with the Venetian Museum; the Temple of Demeter in the Naxos-City centre; the unfinished Kouros statue of Apollonas; the Dimitra temple near Sangri; and the Dionysus temple at Glinado, to the centre and north of the island. Agia Anna and Plaka, just outside Naxos-City, are the most well known beaches. But only a few kilometres south, each remote and beautiful beach is followed by another, connected only by twisting dirt tracks that challenge even the most experienced drivers.

A dusty road meanders invitingly down to Lionas Bay, and the journey is absolutely worth it as the landlady is sure to be expecting you already.



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The International Congress on Dental Aesthetics in Sofia

Author_ Nadejda Kuyumdjieva, Bulgaria

On 1 November 2008 the long-awaited International Congress on Dental Aesthetics, organised by *Dental Tribune Bulgaria Ltd.* and the Bulgarian Academy of Cosmetic Dentistry, was held at the Sheraton Sofia Hotel Balkan. With combined vision and ambition, the organising partners were able to arrange one of the most spectacular events in the Bulgarian dental field last year.

As a special guest, the mayor of Sofia, Boiko Borisov, officially welcomed the 400 attendees, consisting of leading Bulgarian and foreign dentists, dental technicians, dental companies, honoured guests, and media representatives. It was the first time that a Bulgarian dental event was arranged for a broad international audience.

Highly acclaimed lecturers in the field of dental aesthetics, namely Dr Galip Gurel (Turkey), Dr Roberto Spreafico (Italy), Dr Gernot Morig (Germany), and



Fig. 1

MDT Michael Brusch (Germany), had travelled to the Bulgarian capital to share their knowledge with congress attendees.

In his lecture, Dr Gurel focused on the minimally-invasive preparation of anterior teeth for all-ceramic restorations—veneers and crowns. With his charisma and appealing visual presentation, he easily held the audience's attention.

The second lecturer on the podium was Dr Spreafico, a well-known professional, international speaker, and co-author of the bestseller *Adhesive metal-free ceramic restorations*. Dr Spreafico's presentation, which focused on direct and indirect

Fig. 1_ The guest lecturers, Dr Galip Gurel, Dr Gernot Morig, and Dr Roberto Spreafico (left to right).

Fig. 2_ Uliana Vincheva, President of *Dental Tribune Bulgaria Ltd.*, and Dr Selar Frances, President of the Bulgarian Academy of Cosmetic Dentistry.



Fig. 2



composites and emphasised patient concerns, addressed the audience at a high academic level.

In the afternoon session, two long-time friends of Bulgaria and exceptional professionals, Dr Morig and MDT Michael Brusch, together presented the first 3-D lecture on the use of ceramics and composites in Bulgaria. The images were projected on a special screen, which attendees viewed with 3-D glasses.

Overall, the attendees enjoyed a well-organised event, including simultaneous interpretation, with a very high academic level. The day was concluded with a party at the piano bar, The Voice, where everyone was able to meet in an informal setting.

3M ESPE (General Sponsor), First Investment Bank (Golden Sponsor), Colgate (Silver Sponsor), and Axis Bulgaria supported the event financially. During the congress, a trade exhibition took place at which 14 companies showcased their products and services.

The event was arranged and announced by the organisers throughout the year, accompanied by an international advertising campaign. The *Dental Tribune International Group* supported its licensing partner, *Dental Tribune Bulgaria Ltd.*, and ran a media campaign for the event in over ten countries. Advertisements were published in the *Dental Tribune* editions in Germany, Austria, the UAE, Italy, Greece, Turkey, Croatia, Poland, and Romania.

The International Congress on Dental Aesthetics in Sofia provided attendees with the opportunity to meet other practitioners and specialists who are conducting valuable work in the field. The organisers of the event would like to thank the general sponsor, 3M ESPE, for their efforts to publicise the event in the country. _



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Web site: www.aacd.com

EAED Spring Meeting

Where: Gleneagles, Scotland
Date: 28–30 May 2009
Tel.: +39 02 295 236 27
E-mail: info@eaed.org
Web site: www.eaed.org

2nd International Meeting by Dental Tribune Italian Edition

Where: Salerno, Italy
Date: 5–7 June 2009
Tel.: +39 39 39 34 00 44
E-mail: cosmeticmeeting@tueor.com

IACA Annual Meeting

Where: San Francisco, CA, USA
Date: 30 July–1 August 2009
Tel.: +1 866 669 4222
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AAED 34th Annual Meeting & IFED 6th World Congress

Where: Las Vegas, NV, USA
Date: 2–5 August 2009
Tel.: +1 312 981 6770
E-mail: meetings@estheticacademy.org
Web site: www.estheticacademy.org

FDI Annual World Dental Congress

Where: Singapore, Singapore
Date: 2–5 September 2009
Tel.: +33 450 4050 50
E-mail: congress@fdiworldental.org
Web site: www.fdiworldental.org

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Where: Scottsdale, AZ, USA
Date: 11–14 November 2009
Tel.: +1 800 701 62 23
E-mail: contact@ACEsthetics.com
Web site: www.acesthetics.com

SAAAD Aesthetic Dental Conference

Where: Kathmandu, Nepal
Date: 21–22 November 2009
Tel.: +977 142 425 64
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2010

EAED Spring Meeting

Where: London, UK
Date: 27–29 May 2010
Tel.: +39 02 295 236 27
E-mail: info@eaed.org
Web site: www.eaed.org

AAED 35th Annual Meeting

Where: Kapalua, HI, USA
Date: 3–6 August 2010
E-mail: meetings@estheticacademy.org
Web site: www.estheticacademy.org



submissions:

formatting requirements

Please note that all the textual elements of your submission:

- _ the complete article,
- _ all the figure captions,
- _ the complete literature list, and
- _ the contact info (bio, mailing address, E-mail address, etc.)

must be combined into one Word document. Please do not submit multiple files for each of these items.

In addition, images (tables, charts, photographs, etc.) must not be embedded into the Word document. All images must be submitted separately, and details about how to do this appear below.

Text length

Article lengths can vary greatly—from a mere 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 extra long article in multiple parts, but this is usually discussing a subject matter where each part can stand alone because it contains so much information. In addition, we do run multi-part series on various topics.

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

Please use single spacing and un-indented paragraphs for your text. Just place an extra blank line between paragraphs.

We also ask that you forego any special formatting beyond the use of italics and boldface, and make sure that all text is left justified.

If you would like to emphasize 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 'center' text on the page, add special tab stops, or use underlining as all of this must be removed before layout. If you require a special layout, please let the word processing programme you are using help you to do this formatting rather than doing it by hand on your own.

If 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 help you to do this. The fact is that no matter how careful one might be, errors have a way of creeping in when you try to hand number footnotes and literature lists.

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 the images in a group (ie, 2a, 2b, 2c).

Please put figure references in your article wherever they are appropriate, whether that is in the middle or end of a sentence. If you are not directly mentioning the figure in the body of your article, when it appears at the end of the sentence the figure reference should be enclosed within parenthesis and be inside the sentence, meaning 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.
- _ Images cannot be any smaller than 80 KB in size (or they will print the size of a postage stamp!).

Larger images are always better, and something on the order of 1 MB is best. Thus, if you have an image in a large size, do not bother sizing it down to meet our requirements but send us the largest file sizes available. (The larger the starting image is in terms of bytes, the more leeway the designer has in terms of resizing the image to fill up more space should there be room available).

Also, please remember that you should not embed the images into the body of the text document you submit. Images must be submitted separately from the textual submission.

You may submit images through a zipped file via E-mail, unzipped individual files via E-mail, or post a CD containing your images directly to us (please contact us for the mailing address as this will depend upon where in the world you will be mailing them from).

Please do not forget to send us a head shot photo of yourself that also fits the parameters above so that it can be printed along with your article.

Abstracts

An abstract of your article is not required. However, if you choose to provide us with one, we will print it in a separate box.

Contact info

At the end of every article is a Contact Info box with contact information along with a head shot of the author. Please note at the end of your article the exact information you would like to appear in this box and format it according to the previously mentioned standards. A short bio may precede the contact info if you provide us with the necessary information (60 words or less).

Questions?

Please contact us for our Author Kit, or if you have other questions:

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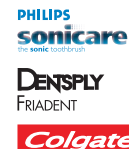
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